

Biological Assessment of

Cecil Field WWTP and Watershed, Including Yellow Water, Rowell, and Sal Taylor Creeks

Duval County

NPDES #FL0020966

Sampled October 1995

March 1996

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Cecil Field WWTP
County: Duval
NPDES Number: FL0020966
State Permit Expiration Date: 2 April 1996

Toxics Sampling Inspection (XSI)

Date Sampled: 3 October 1995

Results: No pesticides or other organic compounds were detected in the Cecil Field WWTP effluent grab sample. No effluent metals exceeded Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 3 October 1995

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 3 October 1995

Results: Macroinvertebrate measures, as summarized in the Stream Condition Index (SCI), indicated that all stations in the watershed were healthy, except for the site in Rowell Creek directly downstream of the WWTP, which was classified as "moderately impaired". The moderately degraded classification at this site was corroborated by a violation of the biological integrity criterion (using Hester-Dendys) (Rule 62-302.530(11) FAC). Degradation in this Rowell Creek site may potentially be due to: a sporadically poor effluent quality (remediation water from hazardous waste sites is occasionally discharged into the treatment system), contaminated stormwater inputs or leachate from waste sites upstream of this station, and/or the effects of stream impoundment (Lake Fretwell is directly upstream of this site). Assessment using field identifications ("Biorecon") generally agreed with the SCI results. Periphyton parameters indicated a moderate disturbance in Rowell Creek downstream of the WWTP discharge, attributed to the elevated AGP values.

Water Quality Inspection (WQI)

Date Sampled: 3 October 1995

Results: Nitrate-nitrite concentrations at the Rowell Creek stations downstream of the Cecil Field WWTP were higher than the values found in 70% to 90% of other Florida streams. Another source of nitrate-nitrite in this watershed appeared to be present in Yellow Water Creek, downstream of Moore Branch, where the nitrate-nitrite value (0.34 mg/L) also exceeded the 70th percentile. Algal growth potential (AGP) at two Rowell Creek stations below the WWTP greatly exceeded the 5 mg dry wt/L "problem threshold". All other receiving water stations had AGP's below this threshold. The Cecil Field effluent, with an AGP of 129.3 mg dry wt/L, appeared directly responsible. Total coliform levels in Yellow Water Creek (below Moore Branch) exceeded Class III water quality standards, suggesting inputs from the Moore Branch area. Total and fecal coliforms at all other sites were in compliance with Class III standards.

Introduction

This study was initiated to help satisfy DEP's goals of ecosystem management, as well as to provide data for an ongoing program (Impact Bioassessments of point source discharges). Biological, physical, chemical, and habitat information was collected from three interconnected streams in the vicinity of the Cecil Field Naval Air Station (referred to as the Cecil Field Basin). Eight receiving water sites were selected to assess the effects of human activities in the watershed (one point source, as well as numerous stormwater inputs, and contaminated leachate from hazardous waste sites) (see maps in Appendix A).

This 55 square mile watershed lies in the southwest quadrant of Duval County, Florida, approximately bordered by Interstate 10 to the north, US 301 to the west, the Duval/Clay county line to the south, and the Ortega River watershed to the east (see maps). Land use in the drainage basin consists of silviculture (57%), natural wetlands (20%), maintained grass monocultures (10% for lawns surrounding residences and aviation support facilities), industrial (5% for the Cecil Field jet airport, with 168 acres of runways and additional aviation support facilities), agriculture (4% for cattle grazing), residential (3%), and natural mixed hardwood forest (1%).

This watershed is situated within the Sea Islands Flatwoods subecoregion of the Southern Coastal Plain. It lies within the Duval Uplands physiographic province, which is composed of various Pleistocene marine terraces. Elevations range from 70 to 100 feet above sea level in the northern portion of the watershed, and from 42 to 70 feet above sea level in the southern part. Land surfaces are nearly level with gentle slopes towards creeks and wetlands. Soils are mostly Spodosols, consisting of somewhat poorly to poorly drained sandy soils with dark sandy subsoil layers. Pine flatwoods are the dominant natural ecosystem in the area, followed by mixed hardwood swamp, and a very small coverage of upland hardwood forest.

Environmental concerns in this watershed are primarily associated with the operation of the Cecil Field NAS. Substantial quantities of hazardous wastes (*e.g.*, oils, fuels, paints, paint stripper, solvents) have been disposed of at 19 known waste disposal sites (see map and site description table in Appendix A). Contaminated groundwater has migrated to Rowell Creek, potentially affecting Station 2 in this study. In the past, oil (possibly containing Polychlorinated Biphenyls) has been applied to the Perimeter Road for dust control. Pesticides are used throughout the area, predominantly around the NAS golf course, where there are two pesticide disposal areas. Preliminary sampling has determined the presence of pesticides in soils at the Fairway 7 Disposal Site. There is a potential for contaminated stormwater from the airfield operations area to reach Sal Taylor Creek via culverts and open swales. Finally, Cecil Field operates a 1.2 MGD wastewater treatment plant which discharges into Rowell Creek, south of Lake Fretwell.

Wastewater at the Cecil Field domestic wastewater treatment facility receives flow equalization, grit removal, primary clarification, biological (activated sludge) treatment, secondary clarification, chlorination for disinfection, and dechlorination prior to discharge into the Class III Rowell Creek. Mean wastewater flow to the creek has been 0.9 MGD (see Facility Summary in Appendix A).

Water Quality Based Effluent Limits (WQBEL's as monthly averages) for this facility are as follows: flow (1.2 MGD), dissolved oxygen (6.0 mg/L minimum), CBOD (5.0 mg/L), ammonia (1.0 mg/L, except during the current Temporary Operating Permit, where the limit is 5.7 mg/L). No discharge is allowed when the temperature of Rowell Creek exceeds 26.4 $Q^{0.08}$ °C, where Q is the flow from Lake Fretwell in CFS. Other effluent limits include pH (6 to 8.5 SU), total residual chlorine (0.5 mg/L minimum for disinfection, 0.01 mg/L maximum at discharge), fecal coliforms (less than or equal to 200 organisms/100 mL as a monthly average, 800 organisms/100 mL maximum), and TSS (20 mg/L as an annual average, 30 mg/L as a monthly average, 45 mg/L as a weekly average, 60 mg/L maximum). Additionally, the permit requires monitoring for nutrients and acute toxicity.

Without the TOP to relax ammonia limits, the facility would have exceeded the WQBEL ammonia limits on four separate occasions in the past two years. Except for a dissolved oxygen violation (4.9 mg/L in July, 1995), the facility has been meeting other

Major characteristics of invertebrate community structure of study sites (see map in Appendix A for station locations).

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Macroinvertebrate Qualitative								
Stream Condition Index (SCI)	27	21	29	33	29	29	29	29
Number of Taxa	40	17	36	36	35	38	39	28
Florida Index	24	6	18	22	11	26	23	17
EPT Index	8	2	4	6	3	7	6	3
% Contribution of Dominant Taxon	12.9	31.0	26.2	15.1	36.3	13.0	13.6	23.3
# Crustacean+Mollusks	2	3	4	4	6	4	3	4
% Crustacean+Mollusks	15.2	13	14.8	17.2	17.8	17.6	21.1	30.1
% Oligochaeta	5.3	5.0	16.3	7.5	9.6	1.5	20.4	5.8
% Diptera	28.0	48.0	21.6	30.1	62.3	33.6	46.3	46.6
% Ephemeroptera	6.1	1.0	4.2	2.2	6.2	9.2	4.1	0
% Trichoptera	15.9	20.0	7.1	8.6	0.7	5.3	3.4	11.7
% Odonata	6.1	5.0	1.1	4.3	0.7	5.4	2.0	1.0
% Coleoptera	23.5	7.0	34.6	22.6	1.4	25.2	2.0	4.9
% Other	0	1.0	0.4	7.5	1.4	2.2	0.7	0
% Predators	20.1	6.0	3.9	13.4	11.0	17.6	16.3	8.7
% Above Surface Deposit Feeders	23.5	9.0	29.5	29.6	34.6	28.2	27.6	24.8
% Below Surface Deposit Feeders	5.3	5.0	16.3	7.5	6.2	1.5	19.7	5.8
% Suspension Feeders	18.9	67.5	24.2	12.9	13.7	20.6	16.3	35.0
% Scrapers	25.8	9.0	20.3	21.0	8.2	19.1	3.1	9.2
% Shredders	6.4	1.5	5.0	14.5	23.0	9.9	7.5	16.5
% Unknown FFG	0	2.0	0	0	3.4	0	0.7	0
Macroinvertebrate Hester-Dendy			**Only 1 HD Rep**					
Number of Taxa	31	38	13					
Florida Index	20	20	9					
Shannon-Weaver Diversity	4.31	2.84	3.42					
EPT Index	6	7	2					
% Diptera	39.4	35.6	66.7					
% Ephemeroptera	13.1	1.7	0					
% Trichoptera	9.5	58.9	23.3					
% Gastropoda	7.3	0.9	0					
% Coleoptera	21.2	1.6	10.0					
% Other	9.5	1.3	0					
% Predators	20.6	7.4	19.5					
% Above Surface Deposit Feeders	31.2	7.0	32.2					
% Below Surface Deposit Feeders	1.5	0.4	0					
% Suspension Feeders	15.3	79.1	26.7					
% Scrapers	24.5	2.6	5.0					
% Shredders	6.6	3.5	16.7					

permit limitations. In September, 1995, the facility began accepting contaminated stormwater from a remediation site, which is stored and metered into the WWTP. In October, 1995, a routine inspection by DEP determined, among other problems, that the contaminated water from the remediation site was impacting the operation of the treatment plant, and that jet fuel was being discharged into the sewer system.

Methods

The focus of this investigation was to determine potential effects from stormwater, leachate from waste disposal areas, and the Cecil Field WWTP on the receiving waters (see station map in Appendix A). Station 1, in Rowell Creek near Highway 228, served as the upstream reference site for Station 2, also in Rowell Creek, which receives the WWTP effluent, as well as leachate from at least one hazardous waste site. Station 3 was located farther downstream in Rowell Creek, where far field effects of the effluent could potentially be detected. Station 4 was situated in Sal Taylor Creek, approximately 1000 m upstream of the confluence of Rowell Creek. Station 5 was also located in Sal Taylor Creek, approximately 500 m upstream of its confluence with Yellow Water Creek. Station 6 was in Yellow Water Creek on the north side of Highway 228. Station 7, in Yellow Water Creek, was approximately 1000 m downstream of Moore Branch. Station 8 was the farthest downstream sampling point in the watershed, in Yellow Water Creek approximately 500 m below its confluence with Sal Taylor Creek. A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, volatile organic compounds, and pesticide extractables). Additionally, nutrient analyses were performed on the effluent and receiving water sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Major characteristics of algal community structure of study sites.

	Sta 1	Sta 2	Sta 3
Periphyton			
Number of Taxa	19	38	26
Shannon-Weaver Diversity	3.57	2.75	4.03
Algal Density (#/sq. cm)	16,467	256,424	25,774
Chlorophyll a (mg/sq. m)	0.77	17.45	2.74
Diatom/Diatom + B-G Abundance Ratio	0.79	0.97	0.95
% Blue-green	20.0	3.3	3.8
% Green	4.0	3.0	18.8
% Diatoms	76.0	92.7	73.8
% Cryptophytes	0	0.2	0
Phytoplankton Algae			
Number of Taxa	13	15	17
Shannon-Weaver Diversity	3.61	3.20	3.69
Chlorophyll a (µg/L)	1.98 U	2.2 U	2.2 U
Algal Density (#/mL)	184.9	410.9	370.2
% Blue-green	33.3	57.5	51.1
% Green	22.2	7.5	12.8
% Diatoms	22.2	15.0	25.5
Algal Growth Potential (mg dry wt/l)	0.2	54.2	19.1

Benthic macroinvertebrate communities were evaluated at all 8 receiving water sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections at Stations 1, 2, and 3 were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Note that 2 of the 3 Hester-Dendy samplers were lost at Station 3, limiting the usefulness of the artificial substrate data at this particular station. Periphyton was sampled at Stations 1, 2, and 3 by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Phytoplankton was sampled at these same sites by subsurface grabs. Chlorophyll *a* was also determined for periphyton and phytoplankton communities (Ross 1990). Bacterial populations at all 8 stations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

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

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

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

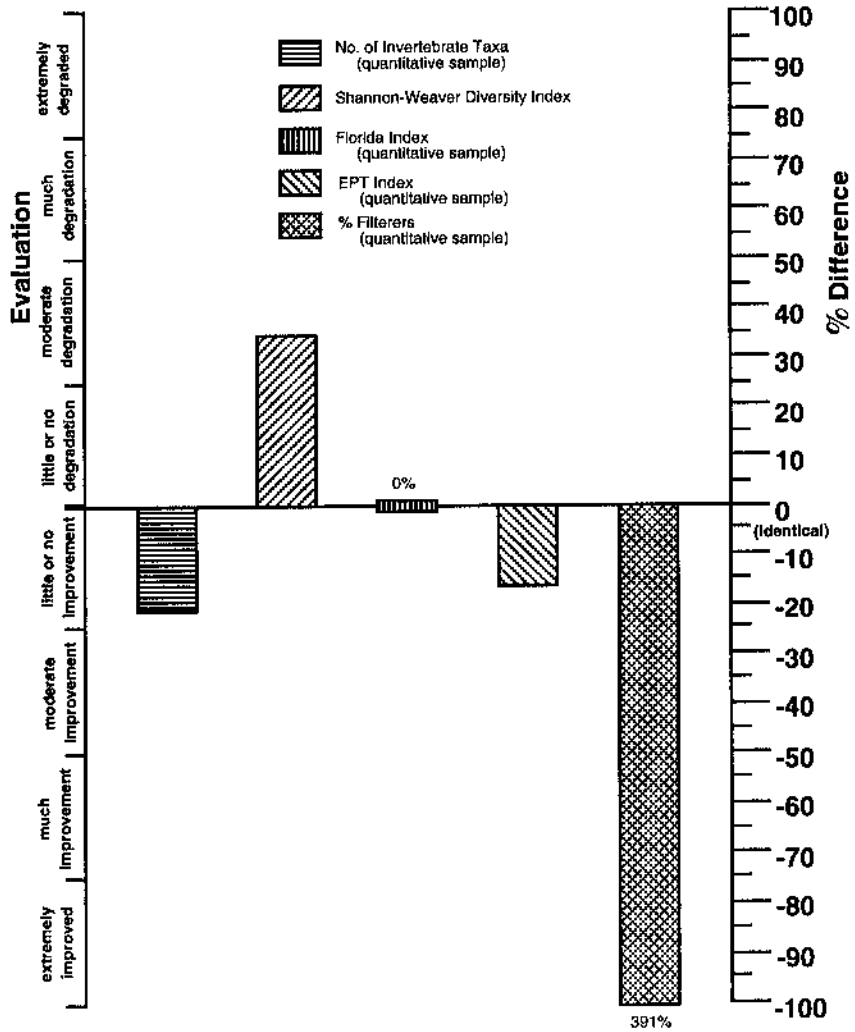
Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index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

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

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

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

Trophic composition/feeding guilds: Disturbance can shift the feeding strategies of inverte-



Effect of discharge on the benthic macroinvertebrate community, comparing the reference site (Station 1) with the near-field test site (Station 2). Hester-Dendy samplers lost at Station 3 (far-field test site).

Chemsitry Summary Table for the Cecil Field basin.

	Eff-luent	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Organic Constituents (ug/L)									
None detected	None detected								
Metals (ug/L)									
Aluminum	100 U								
Arsenic	10 U								
Cadmium	0.26 I								
Copper	6 I								
Chromium	10 U								
Iron	42 A								
Lead	10 U								
Mercury	0.1 U								
Nickel	4 U								
Selenium	30 U								
Silver	0.05 U								
Zinc	14 I								
Nutrients (mg/L)									
Ortho-phosphate	0.84	0.02 U	0.077 Q	0.047 I	0.049 I	0.029 I	0.036 I	0.034 I	0.03 I
Total phosphorus	0.92	0.015 U	0.092	0.056	0.02 I	0.046	0.051	0.058	0.053
Ammonia	0.02 U	0.027 I	0.043	0.07	0.023 I	0.028	0.028 I	0.02 I	0.064
Nitrate+Nitrite	4.5	0.02 U	0.8	0.28	0.027 I	0.088	0.02 U	0.34 I	0.051 I
TKN	0.62	0.78 J	0.89 J	0.81 J	0.72 J	1.4	2.2	2.3	2.3
General Phys-Chem Parameters									
Habitat Assessment		93	113	117	105	130	134	140	129
D. O. (mg/L)	5.8	5.6	6.7	7.4	5.9	5.7	5.7	5.7	6.1
pH (SU)	6.4	5.0	6.2	6.0	5.5	5.8	5.5	5.7	5.8
Specific Conductance (µmhos/cm)	335	43	93	79	68	66	50	55	57
Temperature (°C)	27.4	24.0	25.2	25.0	23.8	24.9	23.9	24.7	24.4
Total Suspended Solids (mg/L)	1 U	1	4	4	1	3	3	4	4
Biological Oxygen Demand, 5 day (mg/L)	2 U	2 U	2 U	2 U	.5 U	0.9	1.0	1.0	1.1
Turbidity (NTU's)					2.4	2.8	4.2	4.3	4.0
Color (PCU's)					200	250	300	300	250
Hardness (mg CaCO3)	115								
Algal Growth Potential (mg dry wt/L)	129.3	0.2	54.2	19.1	0.4	2.5	1.9	4.6	2.4
Toxicity									
Bioassay Fish	Not Toxic								
Bioassay Invertebrate	Not Toxic								
Microbiological Communities (org/100 mL)									
Fecal Coliform	1 AQ	30 Q	250 Q	265 AQ	200 Q	400 Q	660 Q	2000 Q	570 Q
Total Coliform	20 AQ	300 Q	500 Q	775 AQ	950 Q	2100 Q	1500 Q	4600 Q	4000 Q

A - Value reported is the mean of two or more determinations
I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit
J - Estimated value
Q - Sample held beyond normal holding time
U - Material analyzed for but not detected; value reported is the minimum detection limit

brates. In Florida, for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

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

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

The following personnel were involved in this investigation: Tim McKelvey, Mike Hollingsworth, Amy Kalmbacher, Pat O'Connor, Ruth Bouman, and Lee Banks (DEP Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, Landon Ross, Lisa Tamburello, David Whiting, Vicki Whiting, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.

Results and Discussion

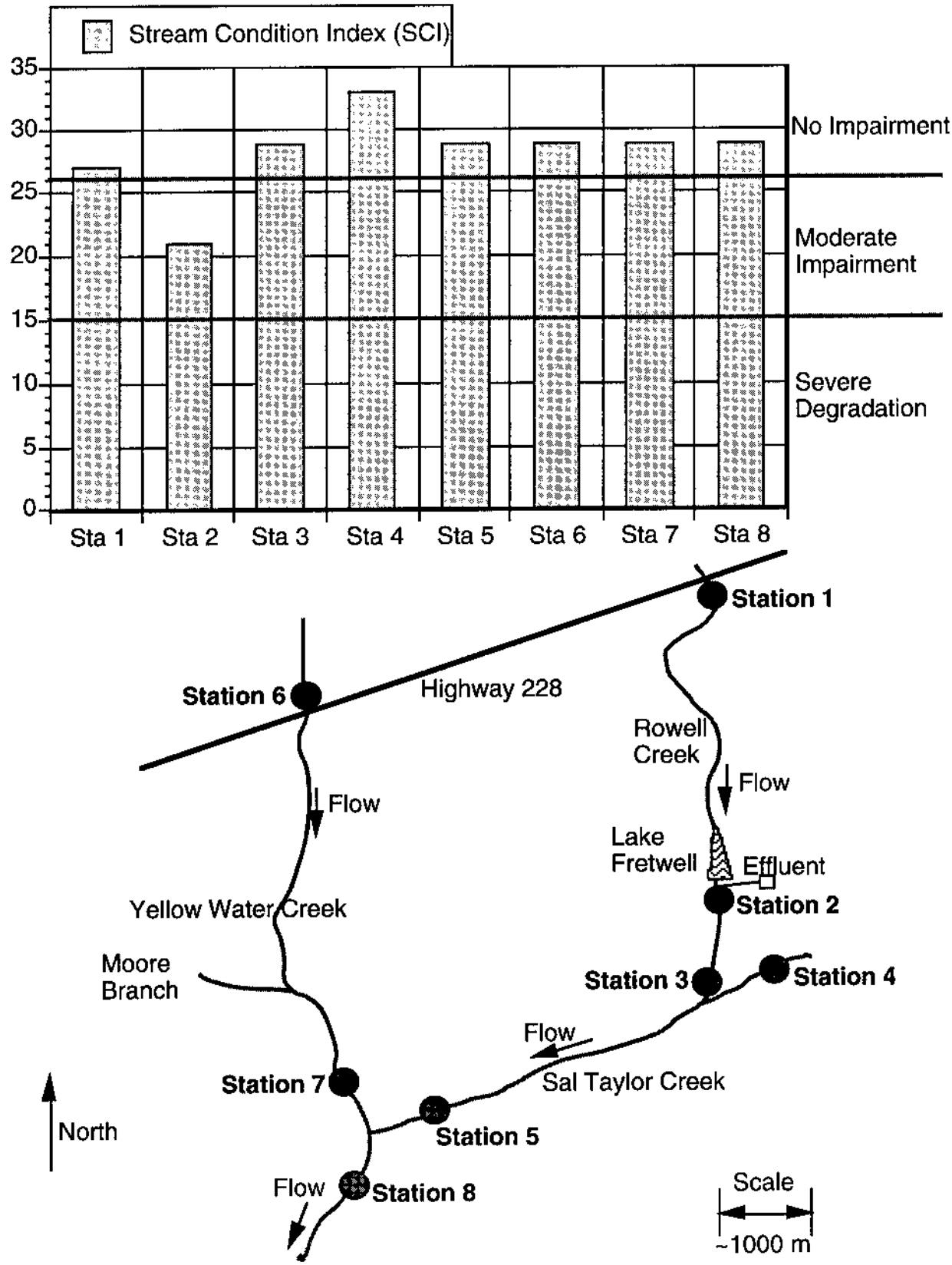
Habitat quality was determined for each station during an *in situ* assessment. Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 possible points for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points) (see habitat assessment field sheets in Appendix B). With one exception, habitat quality throughout the watershed was in the optimal category, equal to, or exceeding, 105 points (see Figure C-1 in Appendix). Habitat at Station 1 was suboptimal, scoring 93 points, mostly due to evidence of artificial channelization, deposition, reduced bank stability, and reduced riparian zone buffer width. The NAS golf course was adjacent to this site. Although Station 2, below the WWTP discharge, scored well on the habitat assessment, a chemical odor was noted in sediments from that site. Station 4, with 105 points, had evidence of artificial channelization, and somewhat reduced instream substrates. Substrates present at most stations included snags, leaf packs, and undercut banks/roots. Water velocity was above 0.25 m/sec at all sites.

Dissolved oxygen throughout the basin was sufficient to support aquatic life, ranging from 5.6 mg/L at Station 1 to 7.4 mg/L at Station 3 (see Table on p. 5). All sites complied with Class III dissolved oxygen standards. Water was slightly acidic at all stations (between 5.0 and 6.2 SU), with fairly low conductivity (from 43 µmhos/cm at Station 1 to 93 µmhos/cm at Station 2). Temperature, which was similar throughout the study area (23.8 °C to 25.2 °C), was typical for October.

The Cecil Field WWTP effluent was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia* (Appendix C).

No pesticides or other organic compounds were detected in the Cecil Field WWTP effluent grab sample. Cadmium (0.26 µg/L), copper (6 µg/L), and zinc (14 µg/L) were detected in the effluent at levels below the minimum quantitation limit, but greater than or equal to the minimum detection limit. None of these values exceeded Class III water quality standards.

The Cecil Field WWTP appeared responsible for total phosphorus and nitrate-nitrite enrichment in Rowell Creek. For example, total phosphorus was below the detection limit of 0.015 mg/L at Station 1, increasing to 0.092 mg/L downstream of the discharge at Station 2 (see Figure C-2 in Appendix). The total phosphorus concentration of the effluent was 0.92 mg/L. Total phosphorus at Station 3 decreased to 0.056 mg/L, a value which is higher than that of Station 1, but similar to the values found in Yellow Water Creek (Stations 6 and 7). Nitrate-nitrite of the effluent was 4.5 mg/L, which led to a significant increase in nitrate-nitrite between Stations 1 and 2 (see Figure C-3 in Appendix). Nitrate-nitrite at Station 2 was 0.8 mg/L, which is higher than the values found in 90% of other Florida streams (see Table of Typical Water Quality Parameters in Appendix C). Station 3, farther downstream of the discharge in Rowell



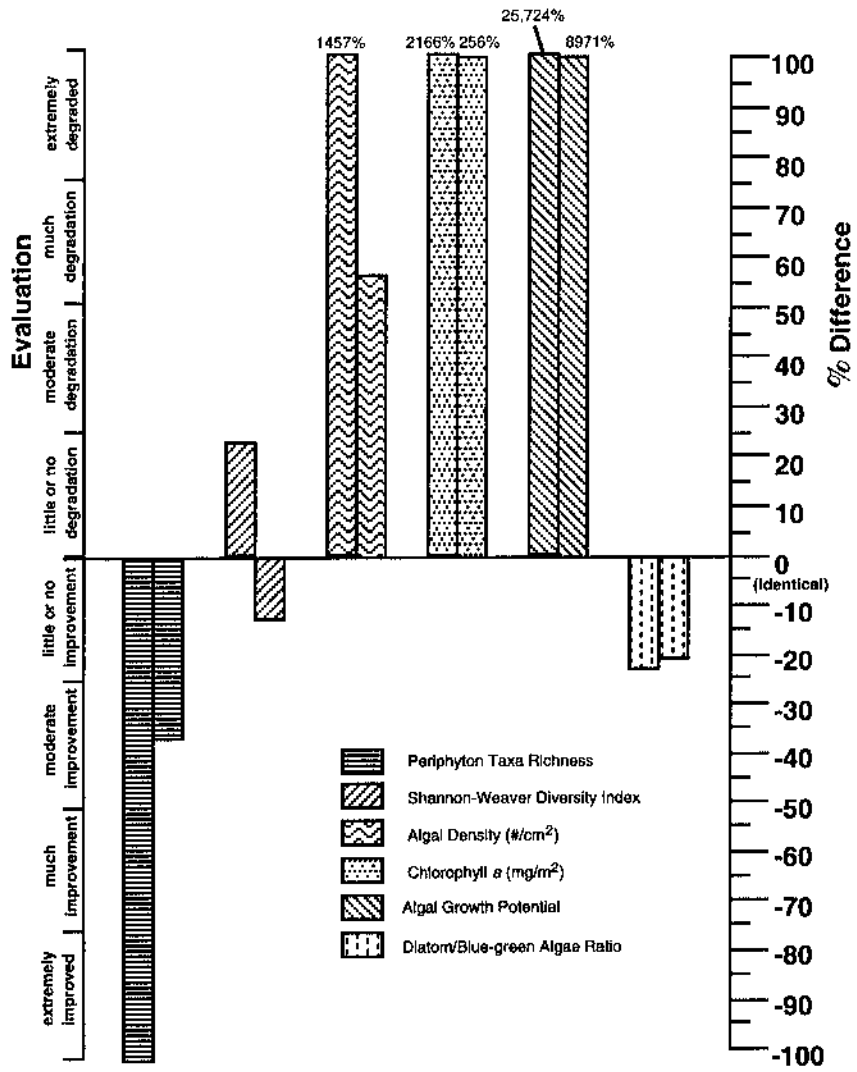
Graph showing the Stream Condition Index (SCI) for stations in the Cecil Field basin, calculated from macroinvertebrate data collected with the 20 dip net sweep method.

Creek, was also enriched with nitrate-nitrite (0.28 mg/L), where it was higher than 70% of other Florida streams. Another source of nitrate-nitrite in this watershed appeared to be present in the vicinity of Station 7, downstream of Moore Branch, where the nitrate-nitrite value (0.34 mg/L) also exceeded the 70th percentile.

Algal growth potential (AGP) at Station 2 (54.2 mg dry wt/L) and Station 3 (19.1 mg dry wt/L) greatly exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987) (see Figure C-4 in Appendix). All other receiving water stations had AGP's below this threshold. The Cecil Field effluent, with an AGP of 129.3 mg dry wt/L, appeared directly responsible for dramatic increases in the AGP's of the Rowell Creek stations.

Total coliform levels at Station 7 (4,600 organisms/100 mL) and at Station 8 (4,000 organisms/100 mL) exceeded Class III water quality standards. Because all samples exceeded the 6 hour holding time, this does not constitute a violation, but does suggest inputs from the Moore Branch area. Total and fecal coliforms at all other sites were below ambient standards (Appendix Figure C-5).

One quantitative measure of benthic macroinvertebrate community health (Shannon-Weaver diversity) indicated adverse effects associated with the Cecil Field discharge. Compared with all other stations in the watershed, Station 2 was also the only one where the metrics calculated using the dipnet data showed moderate degradation. The Figure on p.4 indicates the degree of difference between the invertebrate populations (sampled via Hester-Dendys) of Stations 1 and 2. Larger differences (that is,



Effect of discharge on the algal community.

The left bar for each parameter shows differences between the reference site (Station 1) and near-field test site (Station 2). The right bar shows differences between the reference site and the far-field test site (Station 3).

higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference.

Hester-Dendy sampling indicated a 34.1% decrease in Shannon-Weaver diversity between Stations 1 and 2, a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). Other Hester-Dendy parameters (*e.g.*, taxa richness, the Florida Index, and the EPT Index) did not suggest degradation at Station 2. Two Hester-Dendy replicates were lost at Station 3, limiting the usefulness of the artificial substrate data at this particular station.

The primary biological sampling at all 8 stations throughout the watershed consisted of the 20 dipnet sweep method for calculation of the Stream Condition Index for Florida (SCI). Using this standard qualitative method, macroin-

vertebrate taxa richness ranged from 17 taxa at Station 2 to 40 taxa at Station 1 (see Figure C-6 in Appendix). Based upon the current SCI, one expects to find 27 taxa at an unimpaired site in the Florida Peninsula. With the exception of Station 2, all other stations in the watershed achieved this threshold. Again, with the exception of Station 2 (downstream of the WWTP discharge), all stations exceeded the minimum Florida Index score (7) expected for an unimpaired ecoregional reference stream. In fact, the Florida Index values at Stations 1, 3, 4, 6, 7, and 8 were 16 or higher, indicating the presence of many pollution sensitive taxa. The Florida Index at Station 2, with a value of 6, placed it in the moderate impairment category (Figure C-7 in Appendix). The EPT Index fluctuated from 8 at Station 1, to a low of 2 at Station 2 (Figure C-8 in Appendix). An EPT Index of 4 or higher is expected from a healthy stream in the Peninsula.

The Stream Condition Index summarizes nine different measures of macroinvertebrate community structure and function, including the parameters mentioned in the preceding paragraph. The SCI ranged from a low of 21 at Station 2 to a high of 33 at Station 4 (see SCI graph, p. 6). A minimum score of 26 points is expected for an unimpaired classification. Again, all stations except the site downstream of the WWTP discharge received an unimpaired rating. Station 2 was classified as moderately impaired. A one tailed t-test determined that the SCI score at Station 2 (a value of 21) was significantly different ($p = 0.0005$) from the mean SCI throughout the watershed (which was 28.25) (see Figure C-9 in Appendix).

These results suggest two conclusions. The first conclusion is that despite the widespread potential sources of pollution in the Cecil Field Basin, the vast majority of the stream communities were healthy. Secondly, the biota inhabiting the area of Rowell Creek immediately downstream of the WWTP appeared to be moderately degraded. This was corroborated by a violation of the biological integrity criterion at this same site. Degradation in this Rowell Creek site may potentially be due to: sporadically poor effluent quality (remediation water from hazardous waste sites is occasionally discharged into the treatment system), contaminated stormwater inputs or leachate from waste sites upstream of this station, and/or the effects of stream impoundment (Lake Fretwell is directly upstream of this site).

"Biorecon", a rapid macroinvertebrate assessment method using field identifications (which is currently being perfected), was performed on Stations 4 through 8 (see field sheets in Appendix C). These results generally agreed with the more rigorous 20 dipnet sweep sampling. For example, at Stations 4, 6, and 8, all three Biorecon measures (taxa richness, the Florida Index, and the EPT Index) exceeded the interim thresholds required for a "no impairment" rating (see Figures C-10 to C-12 in Appendix). Similarly, the taxa richness and Florida Index values placed Station 7 in the "no impairment" category, while the EPT Index there fell below the interim Biorecon expectation. Only Station 5, where both the Florida and EPT Indices were below the expected threshold, received a "suspected impaired" rating. In practice, a station receiving a "suspected impaired" rating would then be sampled for the SCI (20 dipnet sweep method). In this case, the more intensive SCI sampling method determined that Station 5 was "unimpaired", providing the final evaluation on the health of the site. These Biorecon results are encouraging, in that there was direct agreement in the rating of 4 out of 5 stations during this study.

Periphyton was sampled at Stations 1, 2, and 3 only. The Figure on p. 7 represents changes in the periphyton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. The left bar indicates the comparison between Stations 1 and 2, and the right bar shows the comparison between Stations 1 and 3.

Periphyton parameters indicated a moderate decline (23%) in diversity between Stations 1 and 2, as well as large increases in density and chlorophyll *a* at both Stations 2 and 3, compared to Station 1. These increases in density and chlorophyll *a* can be attributed to the elevated AGP values at Stations 1 and 2, which in turn were caused by nutrient enrichment (especially nitrate-nitrite) from the discharge. It should be noted, however, that periphyton taxa richness and the diatom to blue-green ratio were improved downstream of the WWTP discharge, compared with the upstream data. The periphyton, therefore, appeared only moderately affected by the effluent.

Conclusions

Optimal aquatic system habitat was present throughout the Cecil Field watershed, except for the upper reaches of Rowell Creek, where habitat was suboptimal. Standard physical/chemical measures (e.g., dissolved oxygen, pH, and conductivity) were normal at all stations.

The Cecil Field WWTP effluent was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

No pesticides or other organic compounds were detected in the Cecil Field WWTP effluent grab sample. No effluent metals exceeded Class III water quality standards.

The Cecil Field WWTP appeared responsible for total phosphorus and nitrate-nitrite enrichment in Rowell Creek. For example, nitrate-nitrite of the effluent was 4.5 mg/L. Nitrate-nitrite concentrations at Station 2 (0.8 mg/L) and Station 3 (0.28 mg/L), were higher than the values found in 90% and 70% of other Florida streams, respectively. Another source of nitrate-nitrite in this watershed appeared to be present in the vicinity of Station 7, downstream of Moore Branch, where the nitrate-nitrite value (0.34 mg/L) also exceeded the 70th percentile.

Algal growth potential (AGP) at Station 2 (54.2 mg dry wt/L) and Station 3 (19.1 mg dry wt/L) greatly exceeded the 5 mg dry wt/L "problem threshold". All other receiving water stations had AGP's below this threshold. The Cecil Field effluent, with an AGP of 129.3 mg dry wt/L, appeared directly responsible for dramatic increases in the AGP's of the Rowell Creek stations.

Total coliform levels at Station 7 (4,600 organisms/100 mL) and at Station 8 (4,000 organisms/100 mL) exceeded Class III water quality standards. Again, this suggests inputs from the Moore Branch area. Total and fecal coliforms at all other sites were in compliance with Class III standards.

Macroinvertebrate measures, as summarized in the Stream Condition Index, indicated that all stations in the watershed were healthy, except for the site downstream of the WWTP, which was classified as moderately impaired. A one tailed t-test determined that the SCI score at the station below the WWTP (a value of 21) was significantly different ($p = 0.0005$) from the mean SCI's throughout the watershed (which was 28.25). These results suggest that despite the widespread potential sources of pollution in the Cecil Field Basin, the vast majority of the stream communities were healthy. Secondly, the biota inhabiting the area of Rowell Creek immediately downstream of the WWTP appeared to be moderately degraded. This was corroborated by a violation of the biological integrity criterion at this same site (Rule 62-302.530(11) FAC). Degradation in this Rowell Creek site may potentially be due to: sporadically poor effluent quality (remediation water from hazardous waste sites is occasionally discharged into the treatment system), contaminated stormwater inputs or leachate from waste sites upstream of this station, and/or the effects of stream impoundment (Lake Fretwell is directly upstream of this site).

Biorecon results generally agreed with the SCI results.

Periphyton parameters indicated a moderate decline (23%) in diversity between Stations 1 and 2, as well as large increases in density and chlorophyll *a* at both Stations 2 and 3, compared to Station 1. These increases in density and chlorophyll *a* can be attributed to the elevated AGP values at Stations 1 and 2, which in turn were caused by nutrient enrichment (especially nitrate-nitrite) from the discharge.

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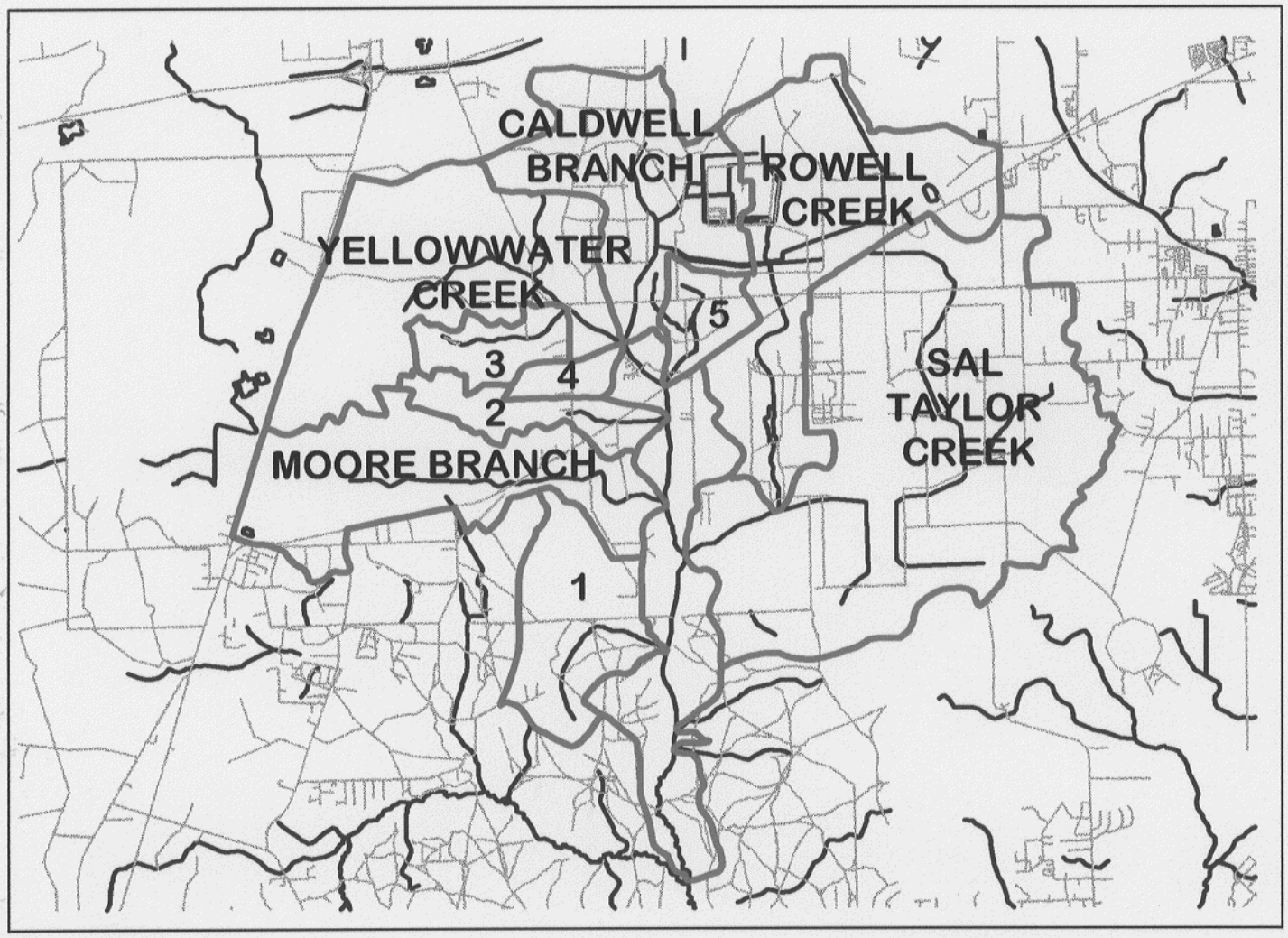
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APPENDIX A

Yellow Water and Sal Taylor Creek Watersheds

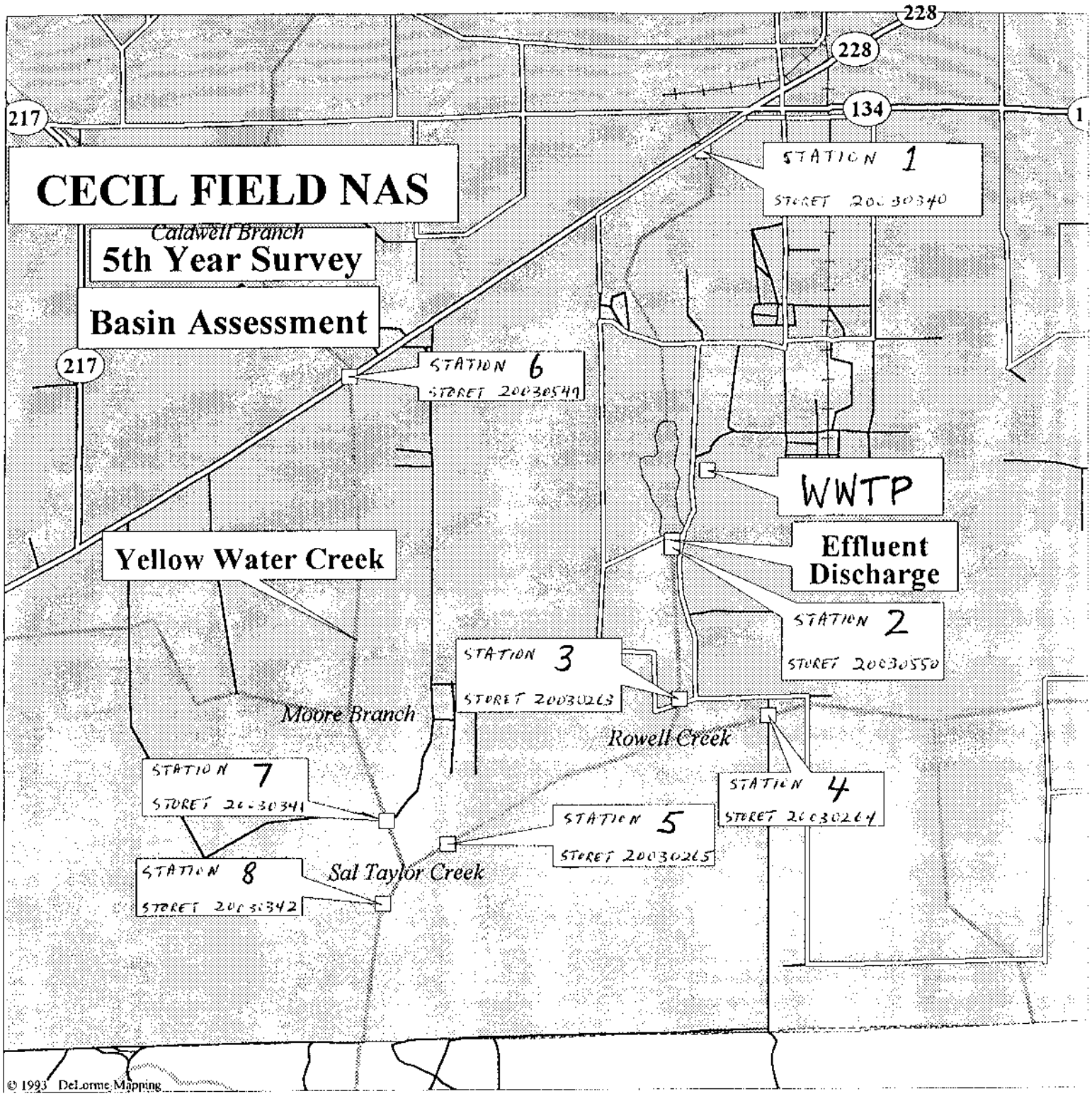


Subbasins

Roads

Streams

Subbasins	Area (sq. miles)
Caldwell Branch	6.0
Rowell Creek	8.8
Sal Taylor Creek	17.5
Moore Branch	6.7
Yellow Water Creek	14.3
#1	1.8
#2	1.7
#3	1.4
#4	0.6
#5	1.2



LEGEND

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

Scale 1:37,500 (at center)

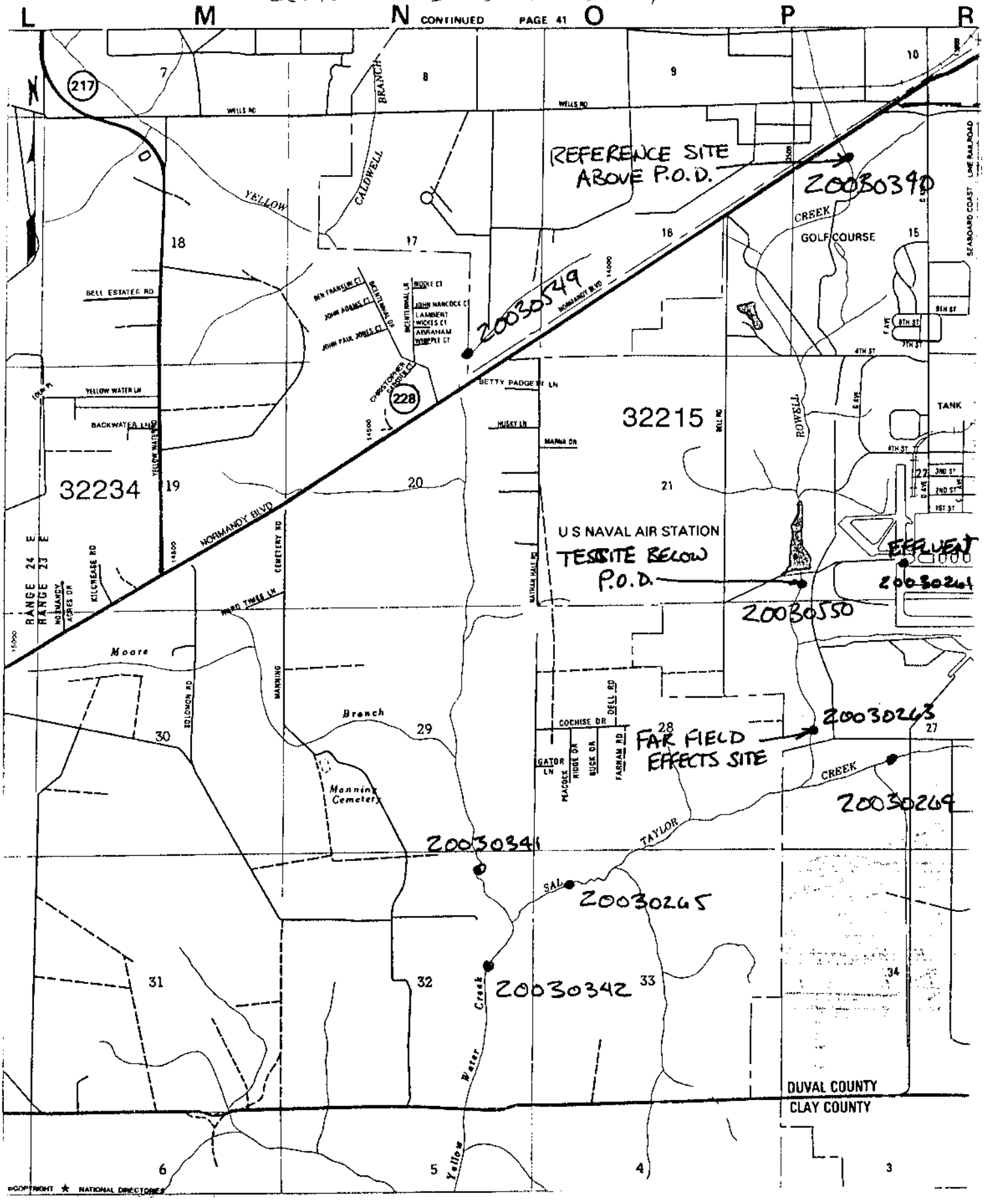
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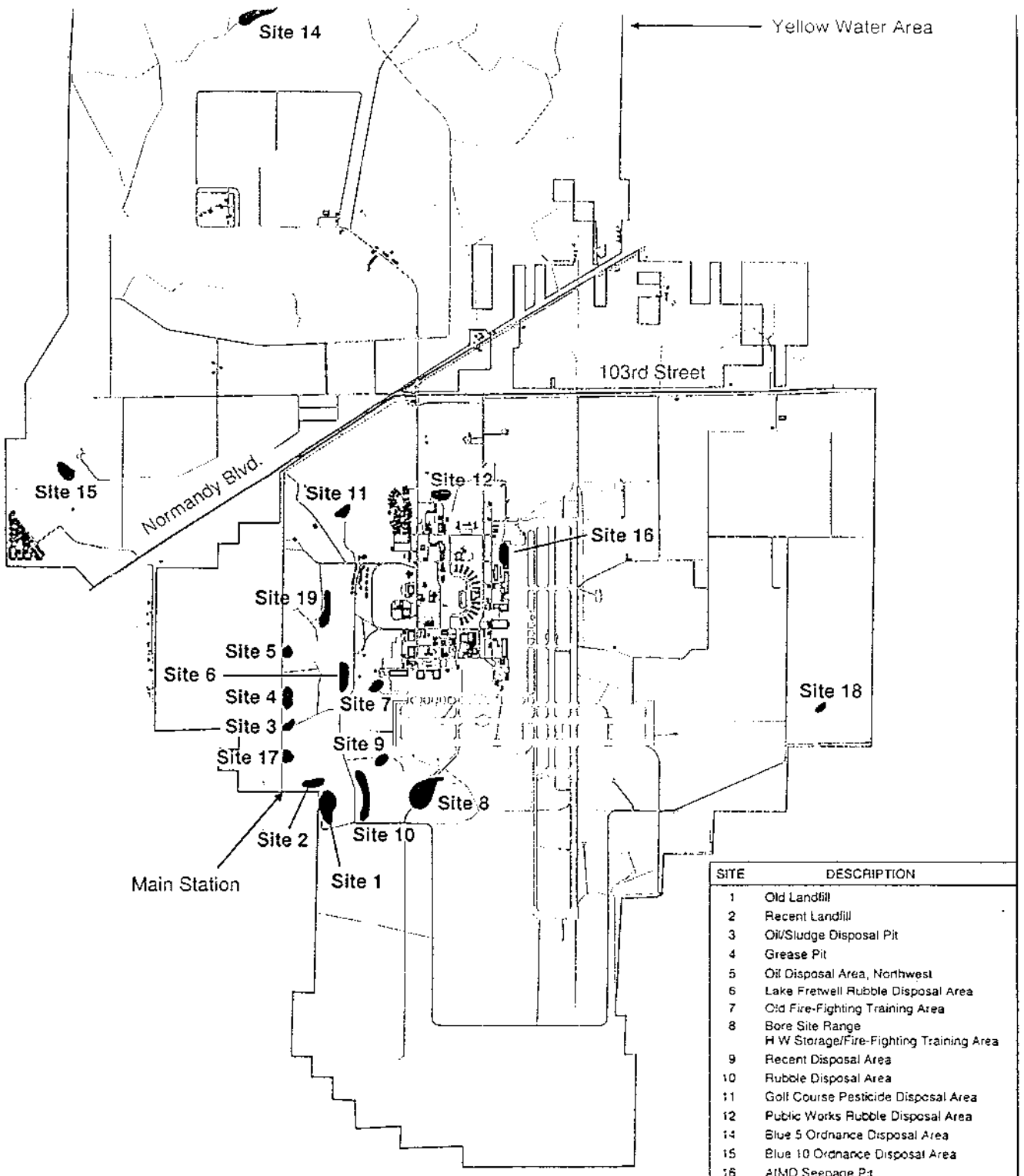
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CECIL FIELD BASIN STUDY





SITE	DESCRIPTION
1	Old Landfill
2	Recent Landfill
3	Oil/Sludge Disposal Pit
4	Grease Pit
5	Oil Disposal Area, Northwest
6	Lake Fretwell Rubble Disposal Area
7	Old Fire-Fighting Training Area
8	Bore Site Range H W Storage/Fire-Fighting Training Area
9	Recent Disposal Area
10	Rubble Disposal Area
11	Golf Course Pesticide Disposal Area
12	Public Works Rubble Disposal Area
14	Blue 5 Ordnance Disposal Area
15	Blue 10 Ordnance Disposal Area
16	AIMD Seepage Pit
17	Oil/Sludge Disposal Pit, Southwest
18	Ammunition Disposal Area

LOCATION OF HAZARDOUS WASTE REMEDIATION SITES IN THE CECIL FIELD WATERSHED.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: USN CECIL FIELD WWTP		Date Summary Prepared :
Location (attach detailed map):	County: DUVAL	District: NORTHEAST
Federal Permit # FL0020966 and expiration date:	State GMS # and State expiration date: 5116F00271 4-2-96	Facility Type: Industrial Municipal (Federal) Agricultural Other (list):

Function of facility:
DOMESTIC WASTEWATER TREATMENT

Description of treatment process:
1.2 MGD activated sludge domestic wastewater treatment facility w/ flow equalization, grit removal, primary clarification, biological (activated sludge) treatment, secondary clarification, chlorination disinfection and dechlorination with gravity discharge to Rowell Creek.

Receiving waters: ROWELL CREEK	Classification: I II (III)

Design Flow: 1.2 MGD	Mean Flow: 0.9 MGD	Flow during survey: UNK.

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

therefore, the best time to sample is: Anytime

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

N/A

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

Parameter	Limit (units)
SEE SC. II	

Describe special permit conditions and permit modifications:

WQBELs

	30 day Avg
FLOW	1.2 MGD
DO	6.0 mg/L
$CBOD_5$	5.0 mg/L
* NH_3-N	1.0 mg/L
Temp	$\leq 26.4\,Q^{0.08}$ °C

* TOP allows NH_3-N = 5.7 mg/L

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

USN Cecil Field
(Facility)

Description of permitted outfall(s):

Discharge to Rowell Creek immediately south of Lake Fretwell.

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

Based on a review of last year's MORs, the plant is operating satisfactory with only one violation of D.O (4.9 mg/l) in July 1995. The plant appears to be meeting permit limitations.

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

Facility currently operating under a temporary operation permit.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:

Without the TOP relaxation of the NH3-N limit, the facility would have violated the NH3-N limit in March and April 1994 and in February and June 1995. The WWTP is not designed for nutrient removal and therefore can not be certified to meet the WQBEL. There are no current plans to provide nutrient removal or any other improvements. The quality of the effluent is expected to remain the same.

Additional information:

Facility begun accepting stormwater run off from a remediation site (on Sept 95). This contaminated run off is stored on site and metered into the WWTP (see attached letter for more info.)

Staff contributing to this review (signature):

(Biologist)

(Inspector)

(Engineer)

( )

( )

( )

CECIL FIELD WASTE DISPOSAL SITES.

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
1	OU 1	Old landfill (9 acres)	1950s - 1965	Solid waste, oils, fuels, paints, paint stripper, solvents, and municipal solid waste.	Municipal solid waste and industrial operations.	Trench and fill landfill for commercial and residential wastes (solid and liquid).	Remedial investigation complete. RI/RA/FS draft reports submitted March 28-29, 1994.
2	OU 1	Recent landfill (5 acres)	1965 - 1975	Solid waste, oils, fuels, paints, paint stripper, and solvents.	Industrial operations and shops.	Trench and fill landfill for commercial and residential wastes (solid and liquid).	Remedial investigation complete. RI/RA/FS draft reports submitted March 28-29, 1994.
3	OU 8	Oil/sludge disposal pit (50-100 feet in diameter and 3 to 5 feet deep)	1950s-1975	Waste fuels, oils, paints, paint strippers, and solvents.	Fuel farm, AIMD, squadrons, and public works shops.	At least four shallow pits were used to dispose of liquid wastes and sludge. Extent of contamination is much larger than originally anticipated.	Surface water and sediment samples collected, screening of subsurface soil and groundwater completed, screening of subsurface soil and groundwater of additional contaminated areas completed, screening of surface soil completed. Evaluation of groundwater screening data in progress, 27 monitoring wells have been installed to date. Site-related contaminants in groundwater have been traced to Rowell Creek. Treatability Study Workplan completed.
4	—	Grease pits (9 acres)	1950s-1983	Waste oils and mess greases.	Installation dining facilities and facility oil-water separators.	Multiple shallow pits excavated to dispose of liquid wastes (grease from dining facilities and waste oils from oil-water separators) and then covered with fill. Drums seen floating in pit; source of drums unknown. Extent of contamination may be larger than anticipated (22 acres).	Passive soil gas survey completed (final report available). Screening activities scheduled include groundwater sampling with the TerraProbe for volatile organics. A Remedial Investigation report is scheduled to be submitted in January 1995.

Key at end of table.

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
5	OU 2	Oil Disposal Area Northwest (100 feet in diameter)	1950s	Oil and fuel.	Fuel farms.	Shallow, unlined pit where liquid wastes were disposed (petroleum products present).	Screening of subsurface soil and groundwater completed. Confirmatory sampling of groundwater and subsurface soil completed. Completed surface soil sampling in January 1994. Delineation of free product has been completed. Sample of free product has been submitted to laboratory for fingerprinting (Jet A, JP-8, or kerosene). The City of Jacksonville has detected polychlorinated biphenyls (PCBs) in the free product (28 milligrams per liter). Treatability Study Workplan has been completed. Interim remedial action (IRA) for free product removal in fiscal year (FY) 1994. Draft Focused Feasibility Study report submitted April 20, 1994.
6	—	Lake Fretwell Rubble Disposal Area (3.5 acres)	1950s-1984	Inert rubble.	Concrete and asphalt from demolition of runway, construction debris, lumber, scrap metal, and cut foliage.	Rubble disposed along banks of a low-lying marsh area by public works. Some of the rubble has been overlain with soil and sod; additional rubble is uncovered.	Six surface soil samples collected for on-site USEPA Methods 8010 and 8020 analyses. Letter report submitted to Navy on May 21, 1993 (evaluation and prioritization proposed).
7	OU 3	Old Firefighting Training Area (1/3 acre)	1950s-1975	Waste fuels, oil, solvents, paint, and paint strippers.	Fuel farm, AIMD, squadrons and public works shops.	Burnable liquid wastes were poured onto metal objects (jets) in shallow, unlined pits and ignited for firefighting training.	Draft Field Screening Workplan submitted to Navy in August 1993. Draft RI/FS Workplan submitted in May 1994.

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
8	OU 3	Boresite Range/Hazardous Waste Storage Area/Fire Fighting Training (6 acres)	1975-1984	Waste fuels, oil, solvents, paint, paint strippers, and lead.	Fuel farm, AIMD, squadrons and public works shops.	Burnable liquid wastes were poured onto metal objects (jets) in shallow, unlined pits and ignited for firefighting training. Boresite range was used for machine gun and small arms practice. 55-gallon drums of waste were stored at the site and were used as targets for practice.	Draft Field Screening Workplan submitted to Navy in August 1993. Draft RI/FS Workplan submitted in May 1994.
9	—	Recent Grease Pits (0.5 acre)	1983-1984	Grease mixed with water.	Installation messes.	Three shallow pits were used to dispose of kitchen grease; pits were used until full and then a new pit was excavated.	No field activities in progress (evaluation and prioritization proposed).
10	OU 4	Rubble Disposal Area (6.5 acres)	1950s-1960s	Inert rubble.	Building demolition debris and runway debris.	Surface disposal area with debris (demolition, roadway, and metal); information is limited.	Draft Field Screening Workplan submitted to Navy in August 1993. RI/FS Workplan submitted in May 1994.

Key at end of table.

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
11	OU 6	Golf Course Pesticide Disposal Area	1970s-1978	Pesticide, fungicide, and herbicide containers; vehicles; and metal debris.	Golf course maintenance area.	Between 200 and 400 empty 5-gallon cans containing pesticides were reportedly buried at the site; a limited number of full containers of pesticides were buried in 1978.	IRA in progress. Focused Feasibility Study for source control submitted. Proposed Plan and public comment period completed. 100 percent design submitted to Navy, and final design was submitted in April 1994. Public meeting held on March 8, 1994. Approximately 2 acres of the historical site has been cleared and a geophysical survey of the cleared area has been completed. Test pitting located the presence of 41 pesticide containers. An IRA to remove these containers is in progress. Full and partially full containers were sampled and placed in overpack drums. Two soil samples were collected for analyses. Samples of contents of two drums submitted for offsite analyses for organophosphorus pesticides, target list compound pesticides and PCBs, and herbicides (final report available). Draft Field Screening Workplan submitted to Navy in August 1993. Draft RI/FS Workplan submitted in May 1994.
12	—	Public Works Rubble Disposal Area (0.5 acre)	1970s-1984	Inert rubble, lumber, concrete, wire, cable, scrap metal, and drums.	Public works.	Majority of rubble has been buried approximately 3 feet below land surface; some rubble is above ground.	No field activities in progress (evaluation and prioritization proposed).
13	—	Day Tank 1 - Fuel Spill (1.5 acres)	1981	JP-5 fuel.	Day tank.	Location of fuel spill in 1981; approximately 500,000 gallons of JP-5 fuel was spilled; approximately 250,000 gallons was recovered.	Transferred to the underground storage tank program for assessment (evaluation and prioritization proposed).

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
14	OU 5	Blue 5 Ordnance Disposal Area (4.5 acres)	1967-1977	Fuses, 100-pound bombs, large munitions, lulu fuses, and other explosive materials.	Installation ordnance disposal operations.	Ordnance disposal by open detonation or burning.	Surface water and sediment sampling completed. Draft Field Screening Workplan submitted to Navy in August 1993. Draft RI/FS Workplan submitted in May 1994.
15	OU 5	Blue 10 Ordnance Disposal Area (10 acres)	1960s-1977	Small arms, parachute and distress flares, Mark IV signal cartridges, rocket ignitors, CADs, and 5- and 2.75-inch rockets.	Installation ordnance disposal operations.	Ordnance disposal by combustion in a chamber with ashes being spread over the site.	Surface water and sediment sampling completed. Draft Field Screening Workplan submitted to Navy in August 1993. Draft RI/FS Workplan submitted in May 1994.
16	OU 7	AIMD Seepage Pit (40 by 3 by 10 feet)	1960-1980	Solvents, heavy metals, acids, blasting grit, paint residue, and photographic wastes.	Building 313, jet engine maintenance shop.	Seepage pit used to drain wastewater (containing solvents, paint, grease, and metals) generated from Building 313 operations into area soils. Resource Conservation and Recovery Act (RCRA) holding tank for wastewater is also located at Site 16. Glass bead separator and associated piping also present.	Field screening of soil and groundwater in progress for volatile organic compounds. IRA in progress. Focused Feasibility Study and Remedial Design completed. Proposed Plan completed. Public comment period completed. Final responsiveness summary and Interim Record of Decision (IROD) submitted in March 1994. Construction activities began in May 1994.
17	OU 2	Oil and Sludge Disposal Pit Southwest (2 acres)	Late 1960s - early 1970s	Waste fuels and oils.	Fuel farm.	Unlined shallow disposal pit.	Screening of subsurface soil and groundwater has been completed. Chlorinated solvents and hydrocarbons have been identified in site soils and groundwater. Confirmatory groundwater and subsurface soil sampling programs have been completed. Surface soil sampling plan approved. Treatability Study Workplan completed. Draft Focused Feasibility Study report submitted on March 25, 1994. IRA for soil removal in FY 1994.

Key at end of table.

DISTRIBUTION

Table 3-20

INSTALLATION RESTORATION SITE DESCRIPTIONS

Site Number	Operable Unit (OU)	Site Name (Size)	Period of Operation	Waste Type	Sources	Description of Activity	Current Investigative Status
18	—	Ammunition Disposal Area (0.1 acre)	1950s	Ammunition crates and miscellaneous ordnance.	Magazine area.	Waste material from a nearby magazine area was trucked in and dumped over the site during the 1940s until 1950. Reportedly, all munitions were removed. As of July 1993, live munitions were still present at the site according to explosive ordnance disposal personnel.	Surface water and sediment sampling completed (evaluation and prioritization proposed).
19	—	Rowell Creek Rubble Disposal Area (3 acres)	NA	Concrete, construction debris, asphalt, wood debris, and trash.	Construction and operations.	Limited information on disposal practices.	Surface water and sediment sampling completed (evaluation and prioritization proposed).

Key:

BRAC = Base Realignment and Closure.
RI/RA/FS = Remedial Investigation/Remedial Action/Feasibility Study.
AIMD = Aircraft Intermediate Maintenance Department.
RI/FS = Remedial Investigation and Feasibility Study.
CAD = Cartridge actuated device.
NA = Not available.

Source: ABB-ES 1994b.

APPENDIX B

CECIL FIELD FYI 5

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED-JAX	STORET STATION NUMBER: 20030340	DATE (M/D/Y): 10-3-95	TIME: 10:55	RECEIVING BODY OF WATER: ROWELL CREEK

REMARKS: heavy rain prior to sampling, high water	LOCATION: REFERENCE SITE: ROWELL CREEK ABOVE CECIL FIELD FYIS P.O.D.	FIELD ID/NAME: CF1 REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category): Golf Course @ Cecil Field Naval Base

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
25	25				25 golf course		25

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

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

Width of riparian vegetation (m) on least buffered side: 2-3m

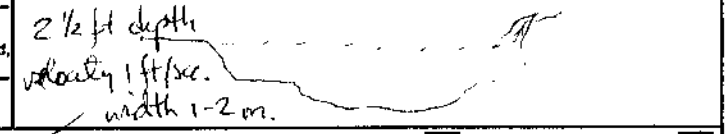
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1.6m

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



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)	25	6		Sand	50	2	
Leaf Packs or Mats	10	6		Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)	15	6					

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):	Sal.		Secchi (m):
Top								
Mid-depth	.4	23.99	4.96	5.64	43.3	0.0		.5
Bottom	.8							

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:

PC warm

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

SAMPLING TEAM: O'Connor / McKinney	SIGNATURE: O'Conn	DATE: 10/3/95

CECIL FIELD FYI 5

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: ~~FDEP-NED~~	STORET STATION NUMBER: 20030340	DATE (M/D/Y): 10-3-95	RECEIVING BODY OF WATER: ROWELL CREEK
REMARKS: high water levels due to heavy rains	LOCATION: ROWELL CREEK ABOVE CECIL FIELD P.O.D	FIELD ID/NAME: CTA 1 REFERENCE SITE	

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [16]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 (16)	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity [15]	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec (15) 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization [11]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 (11)	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition [16]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 (16)	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability [15]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. (15) 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width [5]	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities (5) 4 3 2 1
Riparian Zone Vegetation Quality [10]	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. (10) 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

[93] **TOTAL SCORE**

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/3/95	PAT O'Connor/Tim McKelvey	

CECIL FIELD FYI'S

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 9031 / SUBMITTING AGENCY NAME: DEP-NED-JAX	STORET STATION NUMBER: 20030550	DATE (M/D/Y): 10-3-95	TIME: 1320	RECEIVING BODY OF WATER: ROWELL CREEK

REMARKS: heavy rain prior to sampling, high water	LOCATION: ROWELL CREEK BELOW CECIL FIELD P.O.D.	FIELD ID/NAME: TEST SITE -TH ...

RIPARIAN ZONE/INSTREAM FEATURES

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

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

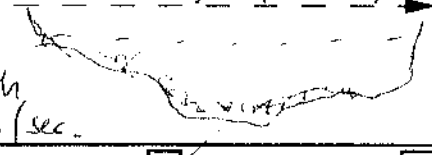
Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☑ Heavy ☐

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

Width of riparian vegetation (m) on least buffered side: 6m

List & map dominant vegetation on back

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



Artificially Channelized ☑ no ☐ ☐ ☐ ☐

Artificially Impounded ☐ yes (some areas) — recent, severe | some recovery | mostly recovered, more sinuous

High Water Mark (m above bed): 2m

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)	30	5	dipnet	Sand			
Leaf Packs or Mats	20	5	dipnet	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble	30	5	dipnet	Other:			
Shorezone (Roots/Veg.)	20	5	dipnet	***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Sal.		Secchi (m):
Top								
Mid-depth	.6m	25.24	6.2	6.74	93	0.0		.4
Bottom	1.3m							

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

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

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

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

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

Weather Conditions/Notes: Warm 80°F + partly cloudy N.E. breeze 10-15

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Toni McKelvey / Pat O'Connor	Toni McKelvey	10/3/95

USN Cecil Field Combustion Site - see attachment.

STATE OF FLORIDA
CECIL FIELD F425

DEPARTMENT OF ENVIRONMENTAL PROTECTION

FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (v2)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP NED	STORET STATION NUMBER: 20030550	DATE (M/D/Y): 10-3-95	RECEIVING BODY OF WATER: ROWELL CREEK

REMARKS: high water levels due to heavy rains	LOCATION: ROWELL CREEK BELOW CECIL FIELD P.O.D	FIELD ID/NAME: TEST SITE STA 2

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 18	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 (18) 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity 20	Max. observed: >0.25 m/sec. but < 2 m/sec (20) 19 1 8 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization 15	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 1 8 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern (15) 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition 20	Less than 20% of habitats affected by sand or silt accumulation (20) 19 1 8 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability 15	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 1 8 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. (15) 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width 5	Width of native vegetation (least buffered side) greater than 18 m 20 19 1 8 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities (5) 4 3 2 1
Riparian Zone Vegetation Quality 15	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 1 8 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. (15) 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

Comments

113 **TOTAL SCORE**

ANALYSIS DATE: 10-3-95	ANALYST: M'Kibey / O'Connor	SIGNATURE: Tom McKibey

DEPARTMENT OF ENVIRONMENTAL PROTECTION CECIL FIELD FYI'S

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED-JAX	STORET STATION NUMBER: 20030263	DATE (M/D/Y): 10-3-95	TIME:	RECEIVING BODY OF WATER: ROWELL CREEK

REMARKS: Recent flooding level down since 10/02/95	LOCATION: ROWELL CREEK BELOW CECIL FIELD P.O.D.	FIELD ID/NAME: FARFIELD EFFECTS SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

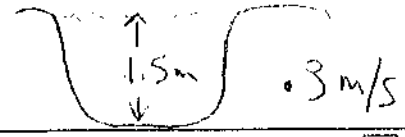
Width of riparian vegetation (m) on least buffered side: 7 18

List & map dominant vegetation on back

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

High Water Mark (m above bed): 2.5

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



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)	10	5	Dipnet	Riffles			
Leaf Packs or Mats	5 %	5	"	Sand	70	5	Dipnet
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Other:			
Undercut Banks/Roots	15	5	Dipnet	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.3	24.96	6.01	7.41	79			0.4
Bottom								

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

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

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

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

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

Weather Conditions/Notes: Partly Cloudy/Warm

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Hollingsworth / Banks / Morton	Mike Holy	10/03/95

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP - NED - JAX	STORET STATION NUMBER: 20030263	DATE (M/D/Y): 10-3-95	RECEIVING BODY OF WATER: ROWELL CREEK

REMARKS: Recent flooding. waste cleanup sites upstream	LOCATION: ROWELL CREEK BELOW CECIL FIELD P.O.D.	FIELD ID/NAME: FAR FIELD EFFECTS SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [13]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity [17]	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization [12]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition [16]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability [14]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width [20]	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality [20]	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

[117] **TOTAL SCORE**

Comments

ANALYSIS DATE: 10/03/95	ANALYST: Mike Hollingsworth	SIGNATURE: Mike Hollingsworth

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030264	DATE (M/D/Y): 10/3/95	TIME: 1030	RECEIVING BODY OF WATER:

REMARKS: Cecil Field NAS Basin Assessment / 5th Year Survey	LOCATION: Sal Taylor Creek ½ mi. above Rowell Creek	FIELD ID/NAME: STP 11

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

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

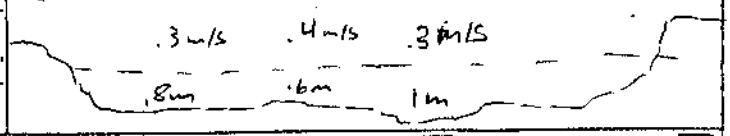
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 2.5

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



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)	5	7	Dipnet	Sand	80	6	Dipnet
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)	15	7	Dipnet	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								0.8
Mid-depth	0.3	23.83	5.45	5.89	68			
Bottom								

System Type : Stream: ☑ (1st (3rd) 2nd order 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:
PC + warm
Wind SW 5 mph

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

SAMPLING TEAM: Hollingsworth / Bunks / Morton	SIGNATURE:	DATE: 10/3/95

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

SUBMITTING AGENCY CODE: 8131 / SUBMITTING AGENCY NAME: DEP-Jax	STORET STATION NUMBER: 20030264	DATE (M/D/Y): 10/03/95	RECEIVING BODY OF WATER:

REMARKS: box cut 120 years ago still straight, cleared on south side 5m from stream at some time. Now grassed over	LOCATION: Sal Taylor Creek 1/2 mi. above Rowell Creek	FIELD ID/NAME: Sta #4

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [11]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity [17]	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization [8]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern (15) 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition [17]	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability [14]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 (14) 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width [19]	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality [14]	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

[105] TOTAL SCORE

Comments

ANALYSIS DATE: 10/03/95	ANALYST: Mike Hollingsworth	SIGNATURE: Mike Hollingsworth

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 5031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030265	DATE (M/D/Y): 10/02/95	TIME: 1610	RECEIVING BODY OF WATER:

REMARKS: Cecil Field NAS Basin Assessment / 5th Year Survey	LOCATION: Sal Taylor Creek 1/4 mi. above Yellow Water Creek	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

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

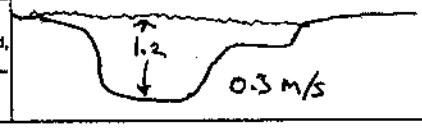
Local Watershed Erosion (check box): None [X] Slight [ ] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [X] Some potential sources [ ] Obvious sources [ ]

Width of riparian vegetation (m) on least buffered side: 20

List & map dominant vegetation on back

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



Artificially Channelized [X] no [ ] recent, severe [ ] some recovery [ ] mostly recovered, more sinuous

Artificially Impounded [ ] yes

High Water Mark (m above bed): 1.7

Canopy Cover % : Open : [ ] Lightly Shaded (11-45%): [X] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	15	7		Sand	80	6	
Leaf Packs or Mats	5	7		Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								0.6
Mid-depth	0.6	24.88	5.81	5.72	66			
Bottom								

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

Water Odors (check box): Normal: [ ] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

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

Clarity (check box): Clear: [ ] Slightly turbid: [ ] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [ ] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions/Notes:

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Banks / O'Connor / Morton	Lee Banks	10/02/95

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Tmo	STORET STATION NUMBER: 20030265	DATE (M/D/Y): 10/02/95	RECEIVING BODY OF WATER:

REMARKS:	LOCATION: Sal Taylor Creek 1/4 mi. above Yellow Water Creek	FIELD ID/NAME: STP 5

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **11**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 (11)	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity **17**	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 (17) 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization **20**	No artificial channelization or dredging. Stream with normal, sinuous pattern (20) 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition **20**	Less than 20% of habitats affected by sand or silt accumulation (20) 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **20**	Stable. No evidence of erosion or bank failure. Little potential for future problems. (20) 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **20**	Width of native vegetation (least buffered side) greater than 18 m (20) 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality **17**	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 (17) 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

130 TOTAL SCORE

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/02/95	Lee Banks	Lee Banks

DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030549	DATE (M/D/Y): 10/02/95	TIME: 1100	RECEIVING BODY OF WATER:

REMARKS: Cecil Field NAS Basin Assessment / 5th Year Survey	LOCATION: Yellow Water Creek at Normandy Blvd. (SR228)	FIELD ID/NAME: 6

RIPARIAN ZONE/INSTREAM FEATURES

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

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

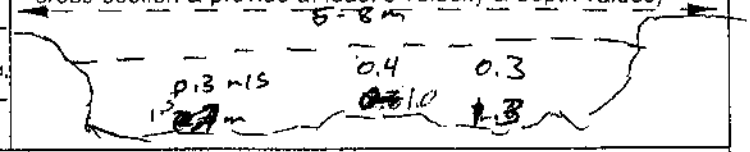
Local Watershed Erosion (check box): None ☐ Slight ☒ Moderate ☐ Heavy ☐

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

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

List & map dominant vegetation on back

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



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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 2 m

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)	10%	5	Dipnet	Sand	70%	5	Dipnet
Leaf Packs or Mats	5%	5	Dipnet	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut Banks/Roots	15%	5	Dipnet	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.7	23.9	5.53	5.73	50.3			0.5
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
Partly cloudy, warm
Heavy rain previously

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

SAMPLING TEAM: Hollingsworth / Kalmbacher	SIGNATURE: Michael J. Hollingsworth	DATE: 10/02/95

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

SUBMITTING AGENCY CODE: 5231 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030549	DATE (M/D/Y): 10/02/95	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:
Water level - HIGH	Yellow Water Creek at Normandy Blvd. (SR 228)	STH 6

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **14**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity **19**	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization **20**	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition **18**	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **18**	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **20**	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality **20**	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

134 TOTAL SCORE

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/02/95	Mike Hollingsworth	Mike Holl

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 20030341	DATE (M/D/Y): 10/02/95	TIME: 1545	RECEIVING BODY OF WATER:

REMARKS: Cecil Field NAS Basin Assessment / 5th Year Survey	LOCATION: Yellow Water Creek 1/4 mile above Sal Taylor Creek	FIELD ID/NAME: STA 7

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
70	30						

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

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

Width of riparian vegetation (m) on least buffered side: 718

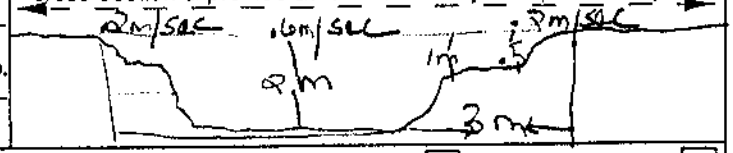
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 2.5

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



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)	20	5	Mt	Sand	50	5	net
Leaf Packs or Mats	5	5	net	Mud/Muck/Silt			
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)	25	5	Net	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								0.5
Mid-depth	0.8	24.69	5.70	5.67	55			
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
PC + warm
10 mpH E

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Hollingsworth / Kalmbacher	Mike Hollingsworth	10/02/95

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

SUBMITTING AGENCY CODE: DEPJax	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
SUBMITTING AGENCY NAME: 8031	20030341	10/02/95	

REMARKS: H_2O level High	LOCATION: Yellow Water Creek 1/4 mi. above Sal Taylor Cr.	FIELD ID/NAME: 97 7

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **19**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity **19**	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization **20**	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition **18**	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **19**	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **20**	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality **20**	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

140 TOTAL SCORE

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/02/95	Mike Hollingsworth	Mike Hollingsworth

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP NE	STORET STATION NUMBER: 20030342	DATE (M/D/Y): 10-02-95	TIME: 1030	RECEIVING BODY OF WATER:

REMARKS: Cecil Field Basin Study	LOCATION: Yellow Water Cr e of bridge, 1/4 mile below Sal Taylor Cr.	FIELD ID/NAME: STA 8

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
40	50	10					

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

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

Width of riparian vegetation (m) on least buffered side: 8*

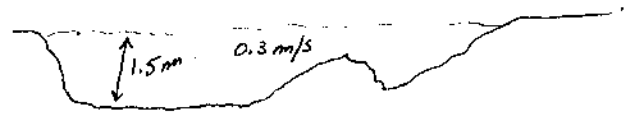
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 2.0

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



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)	20	7	Dip Net	Sand	5	3	Dip Net
Leaf Packs or Mats	70	7	Dip Net	Mud/Muck/Silt	5	3	Dip Net
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								0.5
Mid-depth	1.0	24.4	5.8	6.06	57			
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
Partly Cloudy & Mild.
* Riparian Zone - East bank high ridge with silviculture uphill.
West shore >20m riparian zone.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Banks - O'Connor - Morton	Lee Banks	10-02-95

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: DEP Jax	STORET STATION NUMBER: 21FLA 20030342	DATE (M/D/Y): 10/02/95	RECEIVING BODY OF WATER:

REMARKS:	LOCATION: Yellow Water Creek 1/4 mi. below Sal Taylor Creek	FIELD ID/NAME: SW

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **20**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity **17**	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization **20**	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition **20**	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **18**	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **9**	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality **20**	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

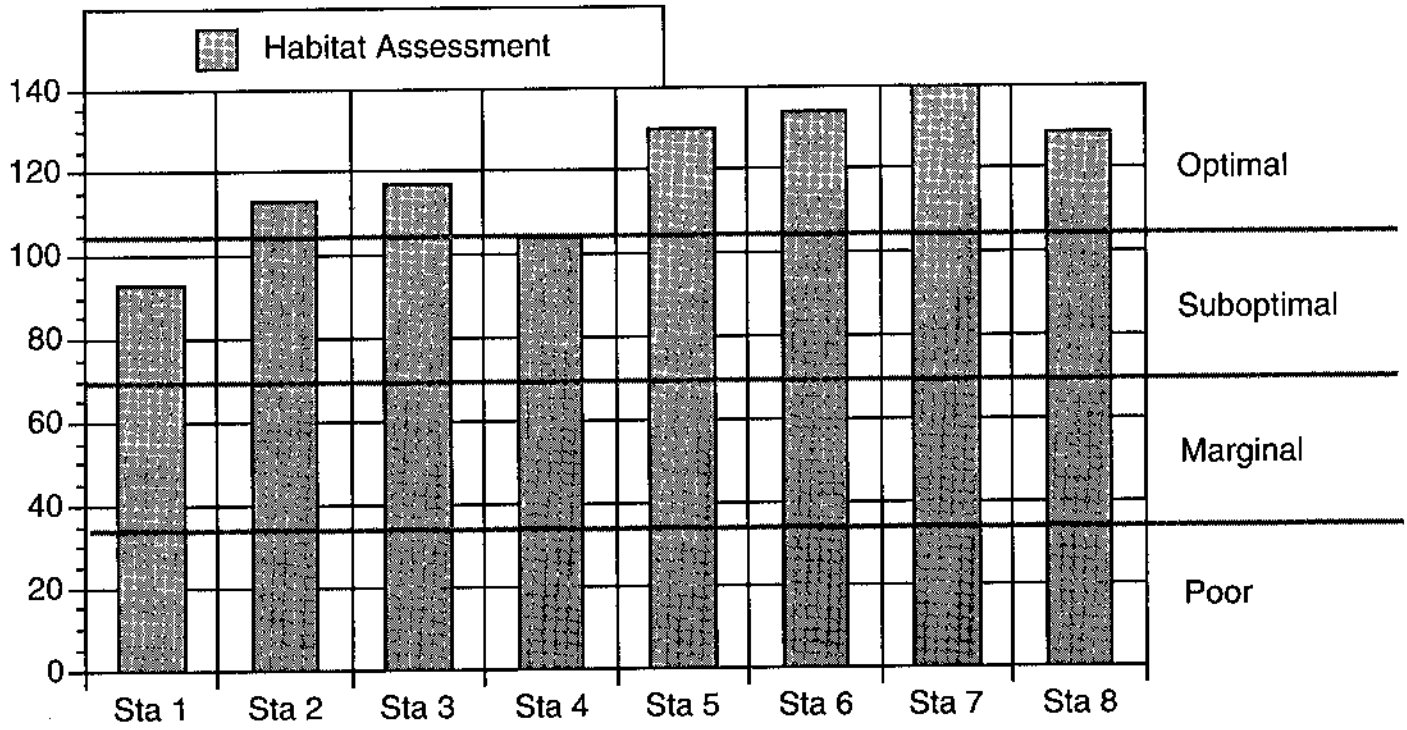
129 TOTAL SCORE

Comments

ANALYSIS DATE: 10/02/95	ANALYST: Lee Banks	SIGNATURE: Lee Banks

APPENDIX C

Figure C-1. Cecil Field Basin Study – Habitat Assessment



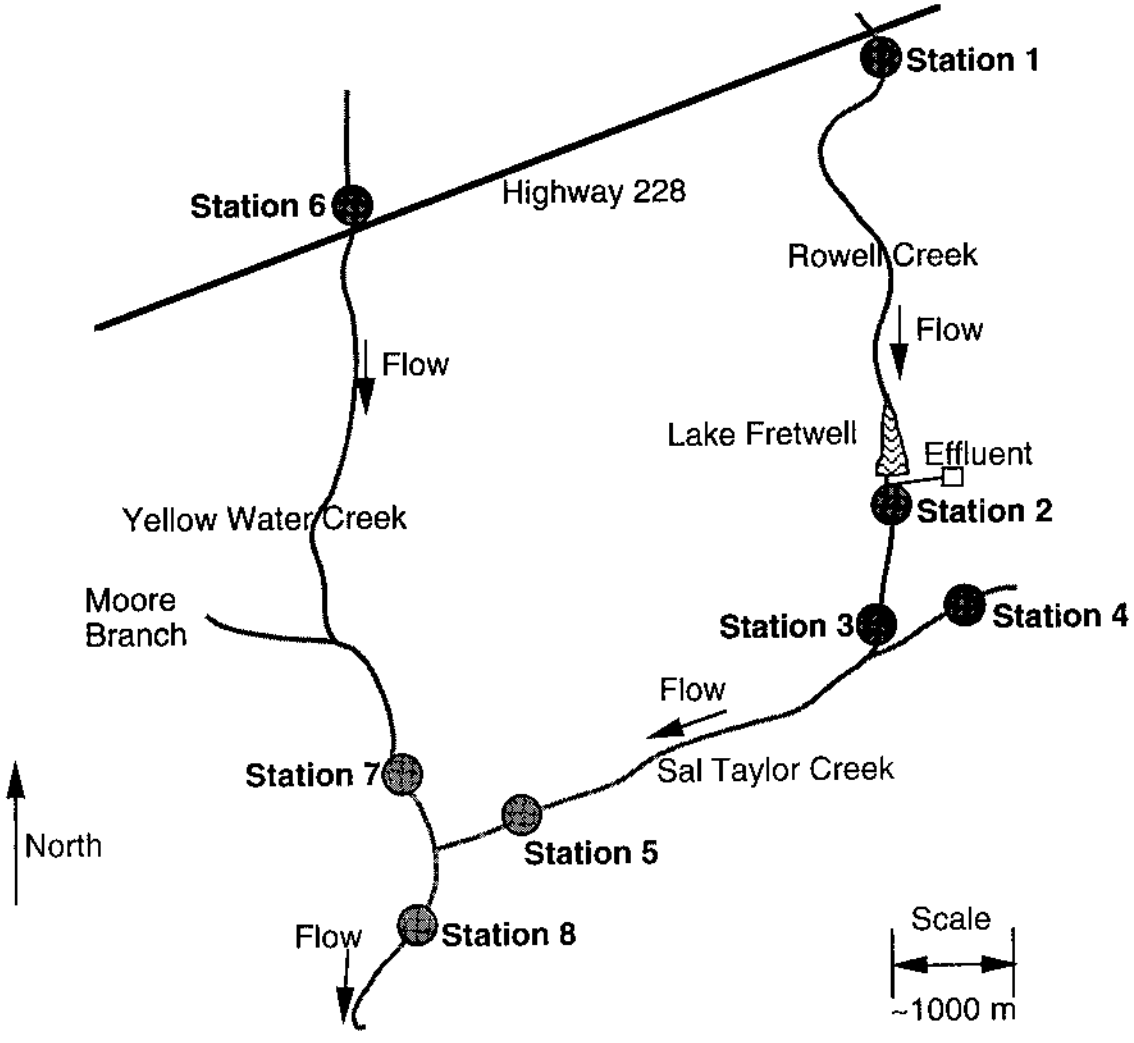
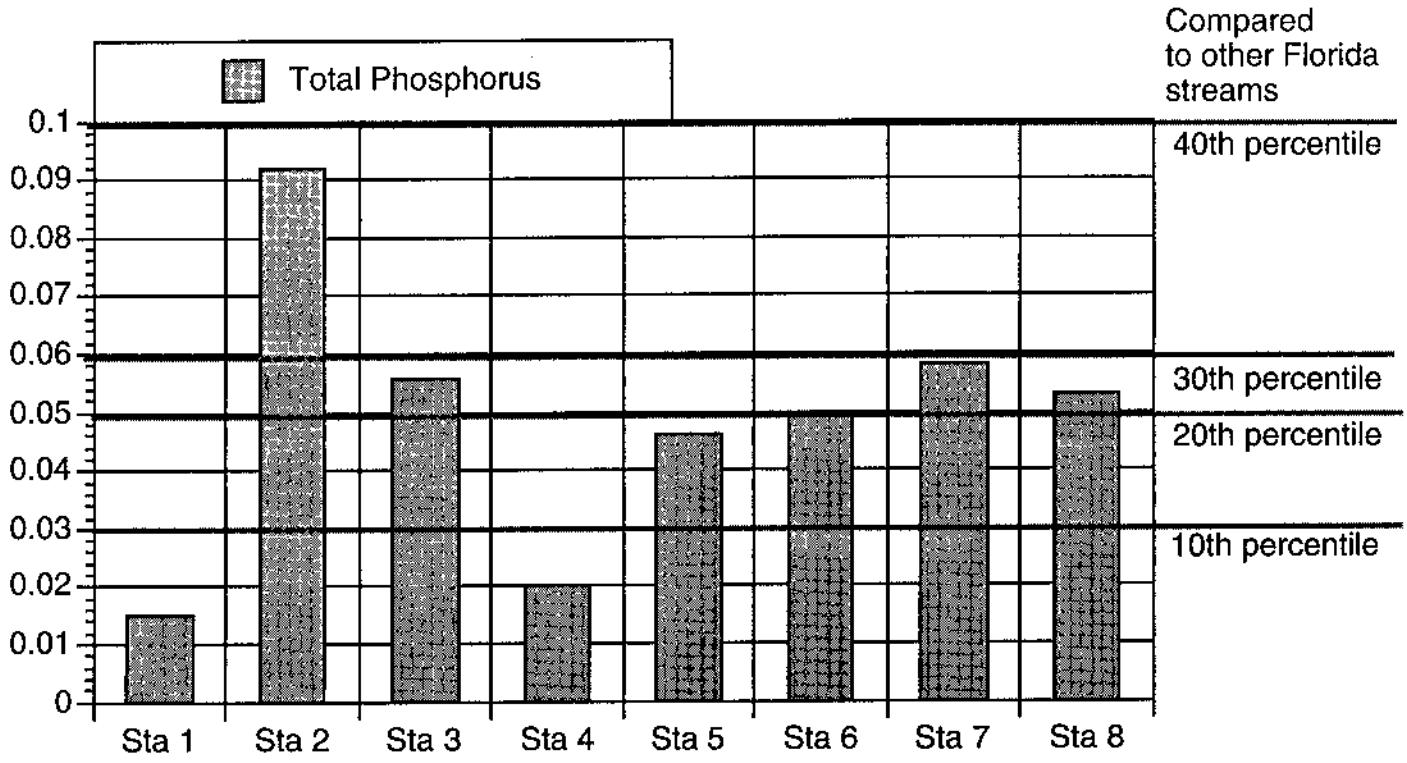


Figure C-2. Cecil Field Basin Study – Total Phosphorus



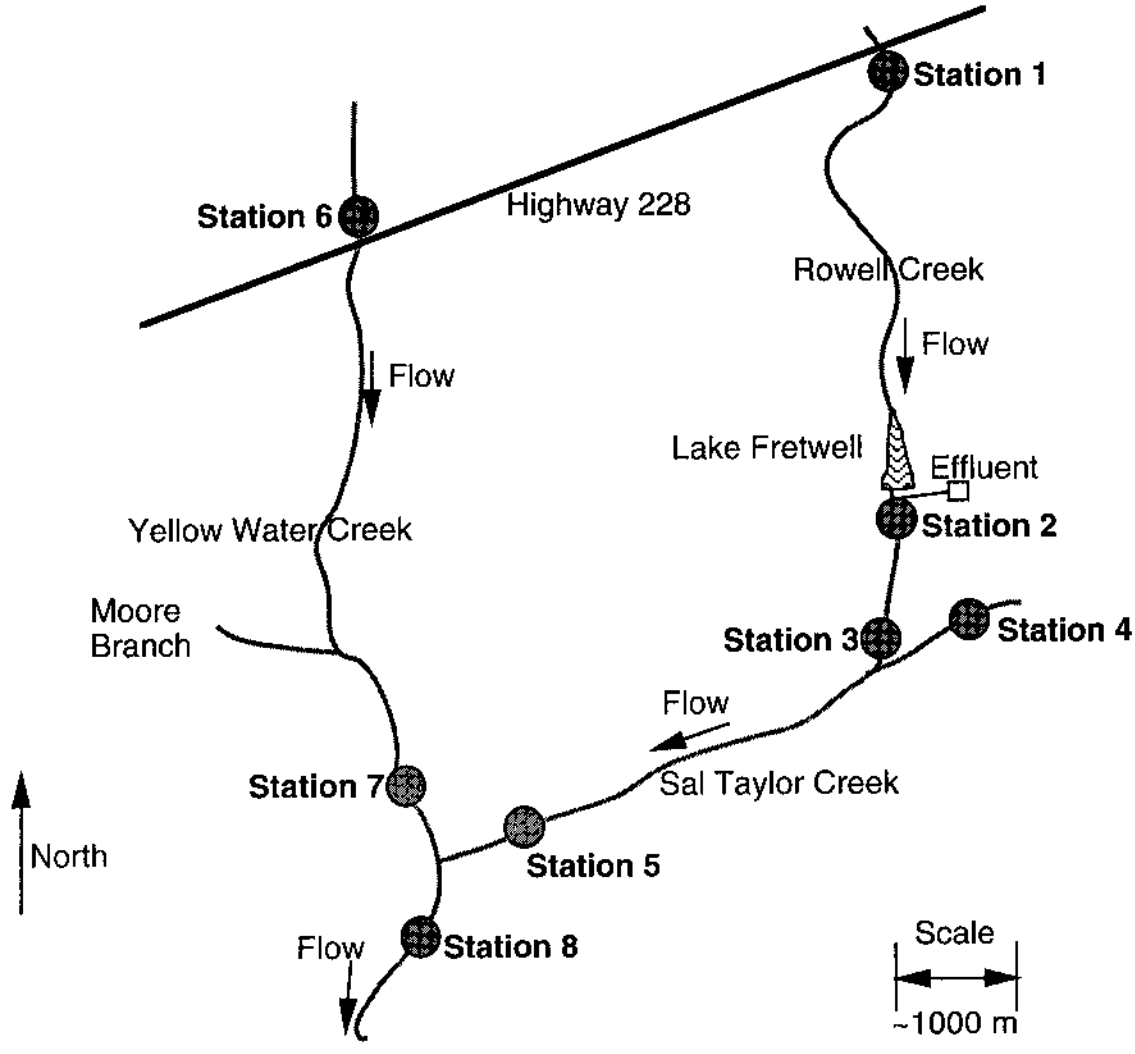
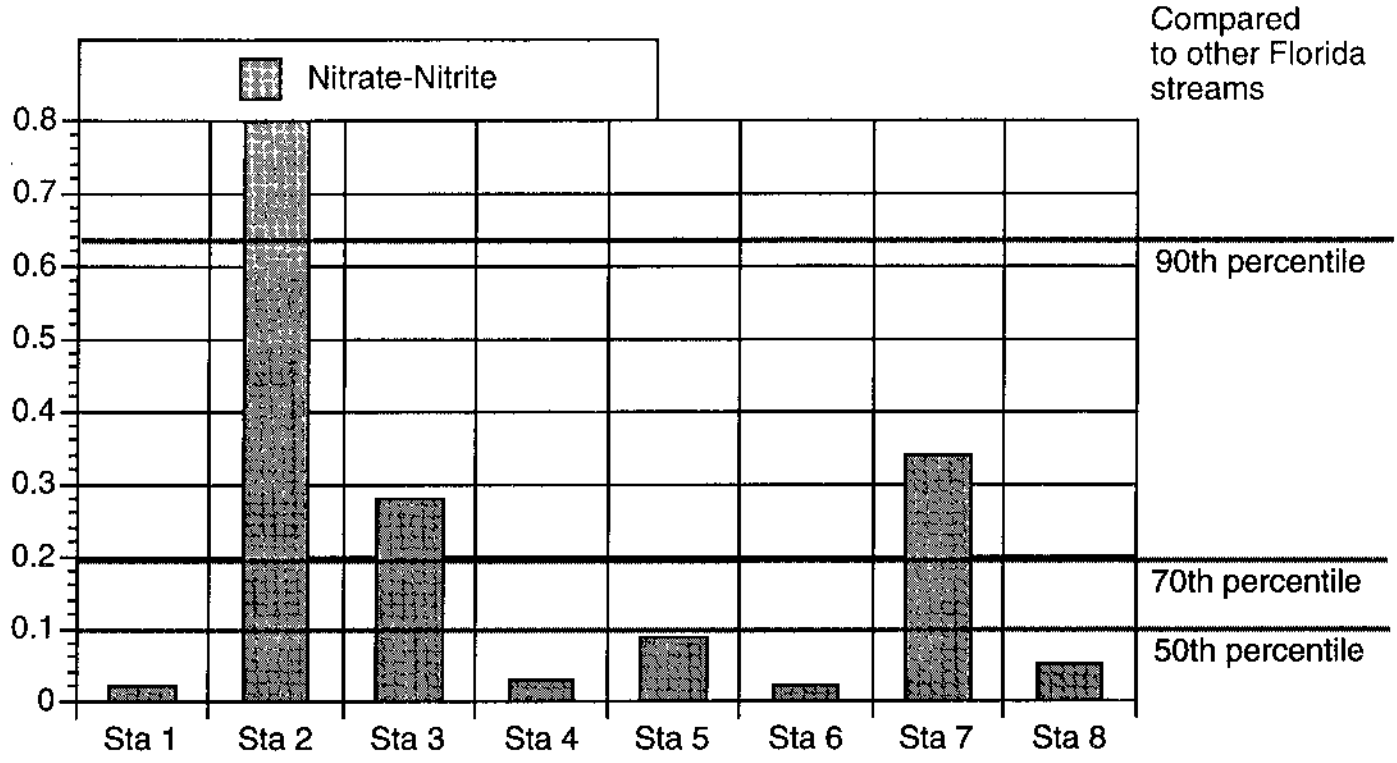
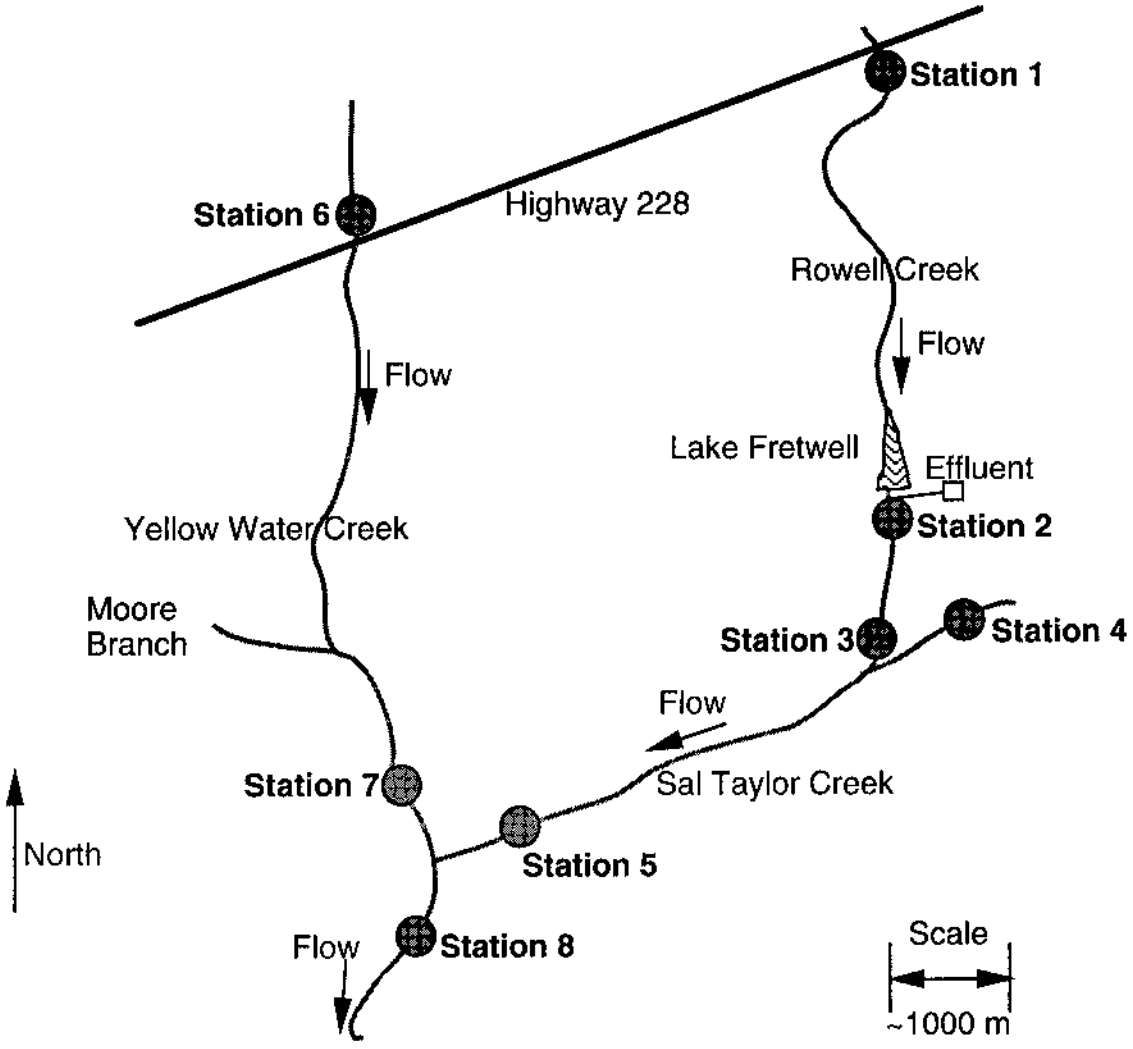


Figure C-3. Cecil Field Basin Study – Nitrate-Nitrite





Typical Values for Selected Parameters in Florida Waters

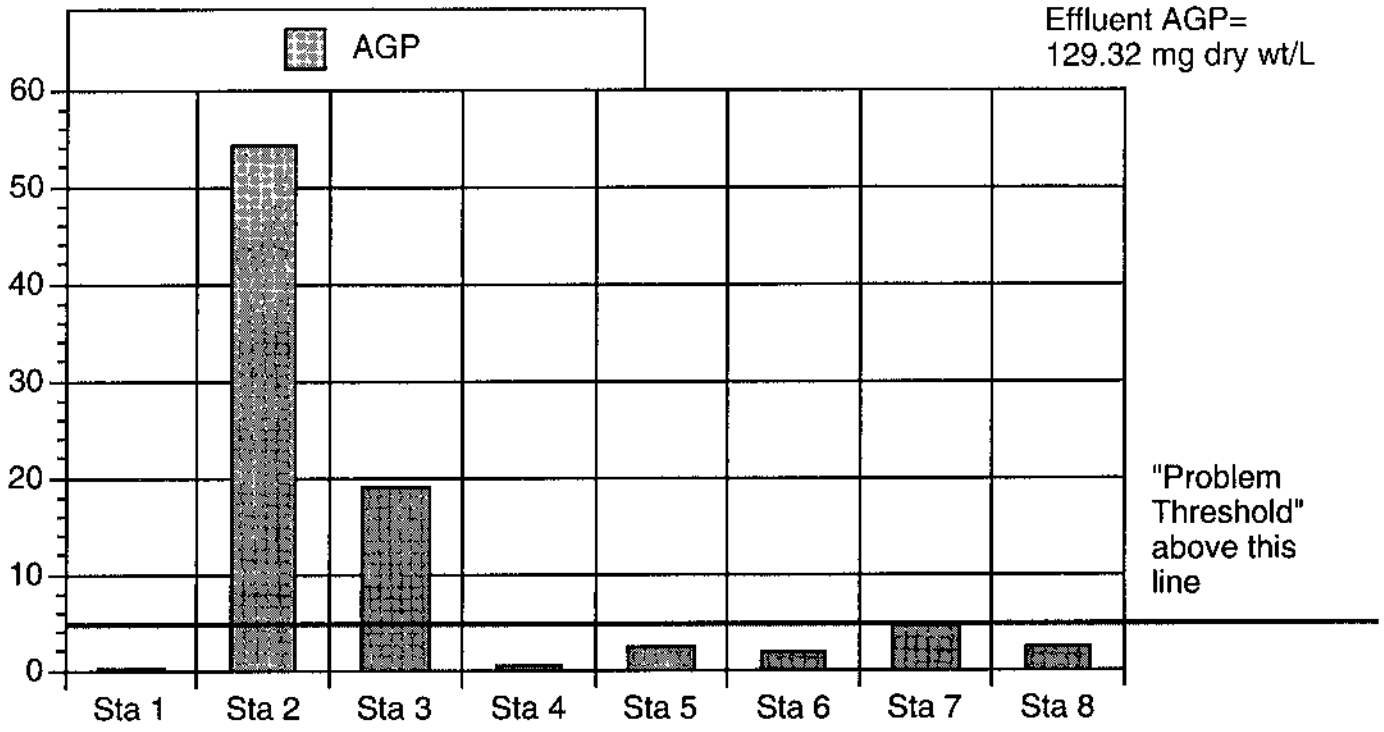
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

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

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

Figure C-4. Cecil Field Basin Study – Algal Growth Potential



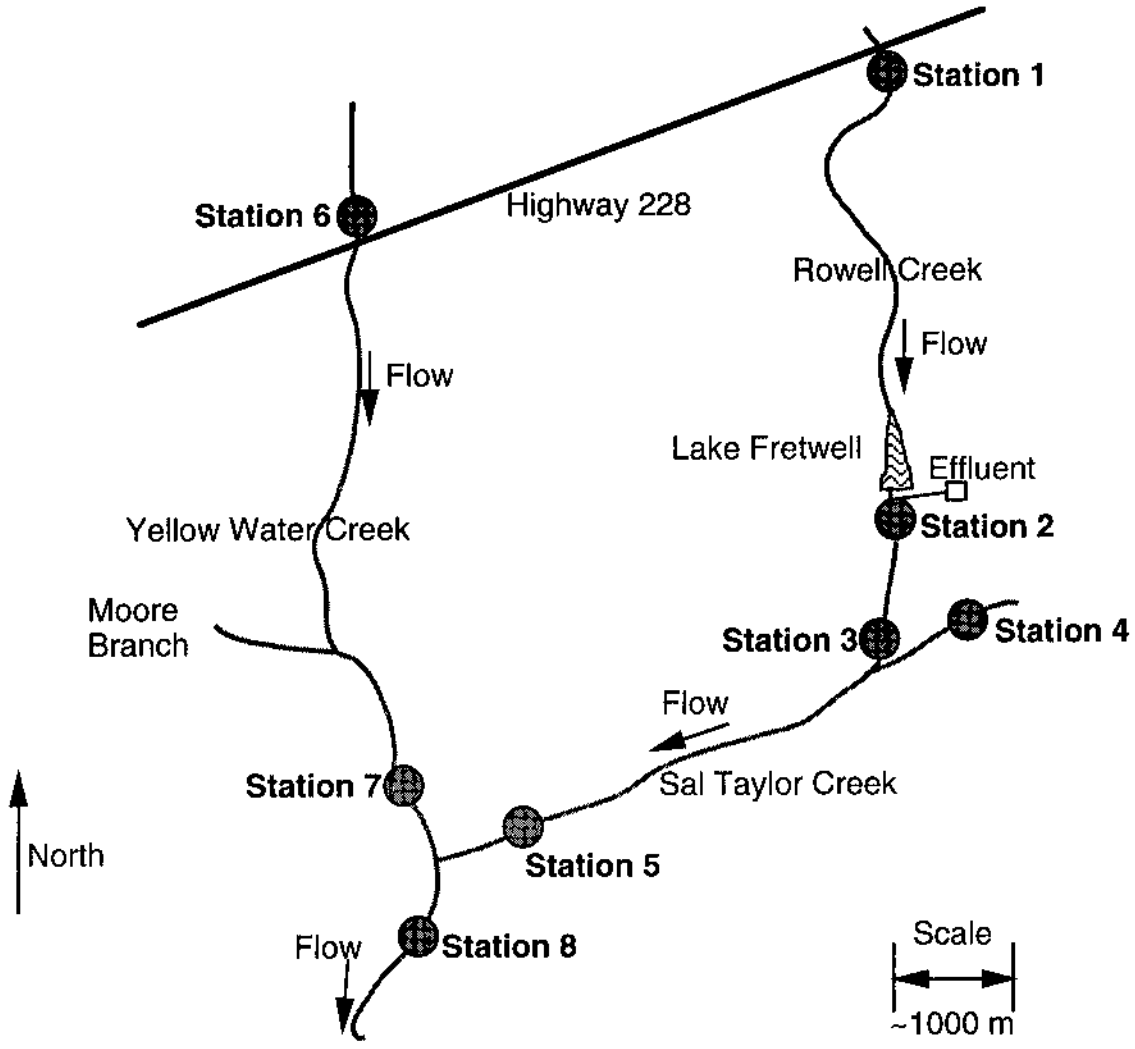
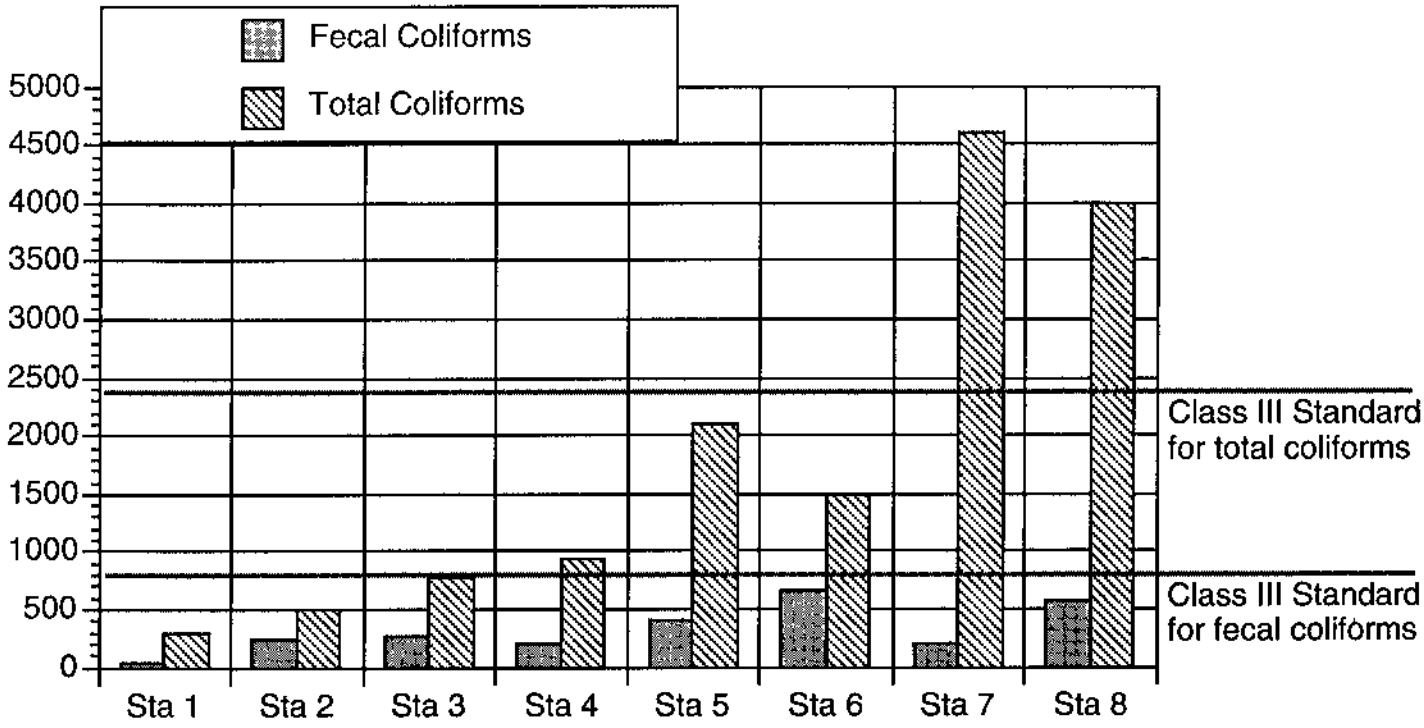


Figure C-5. Cecil Field Basin Study – Fecal and Total Coliforms



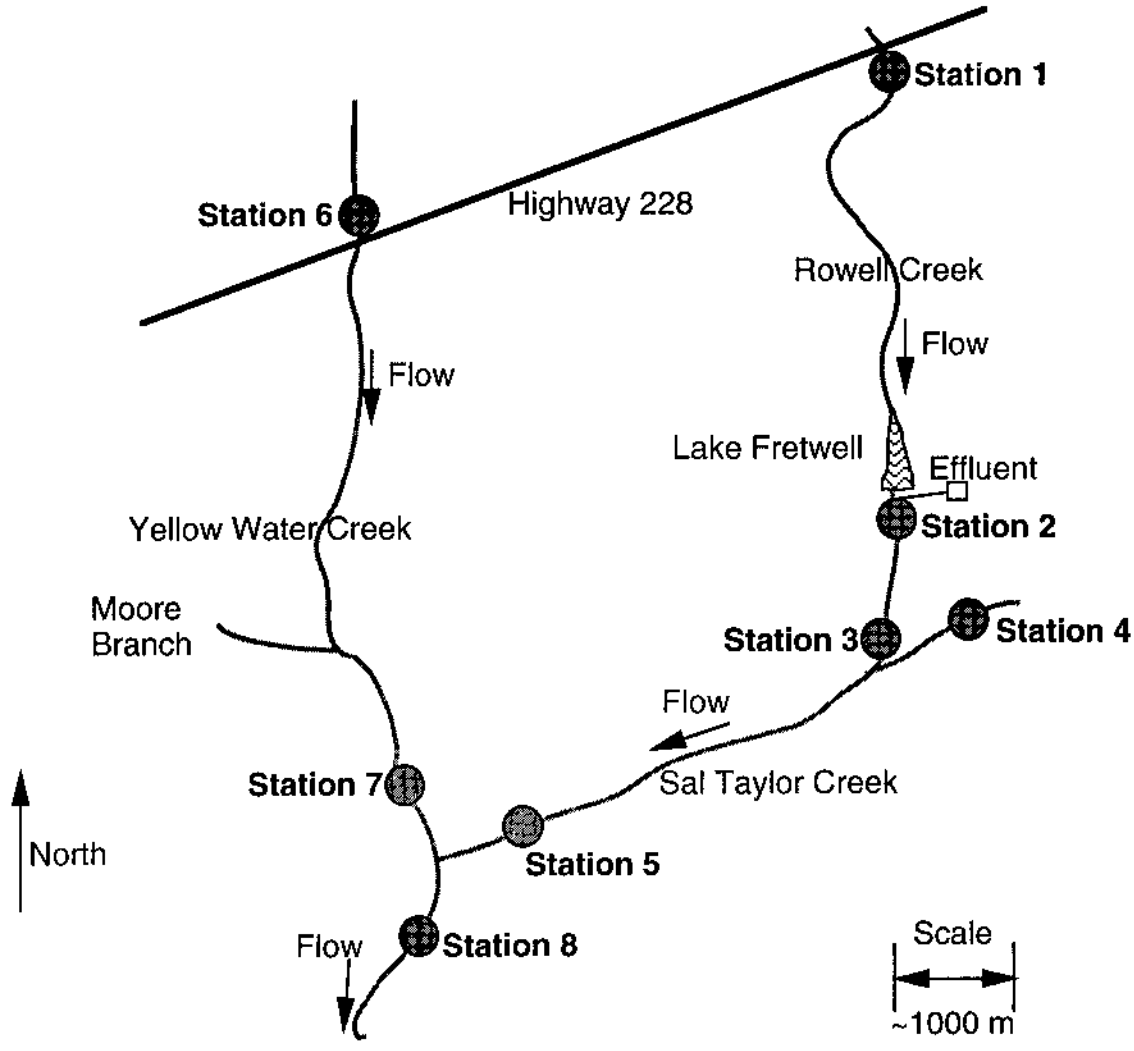
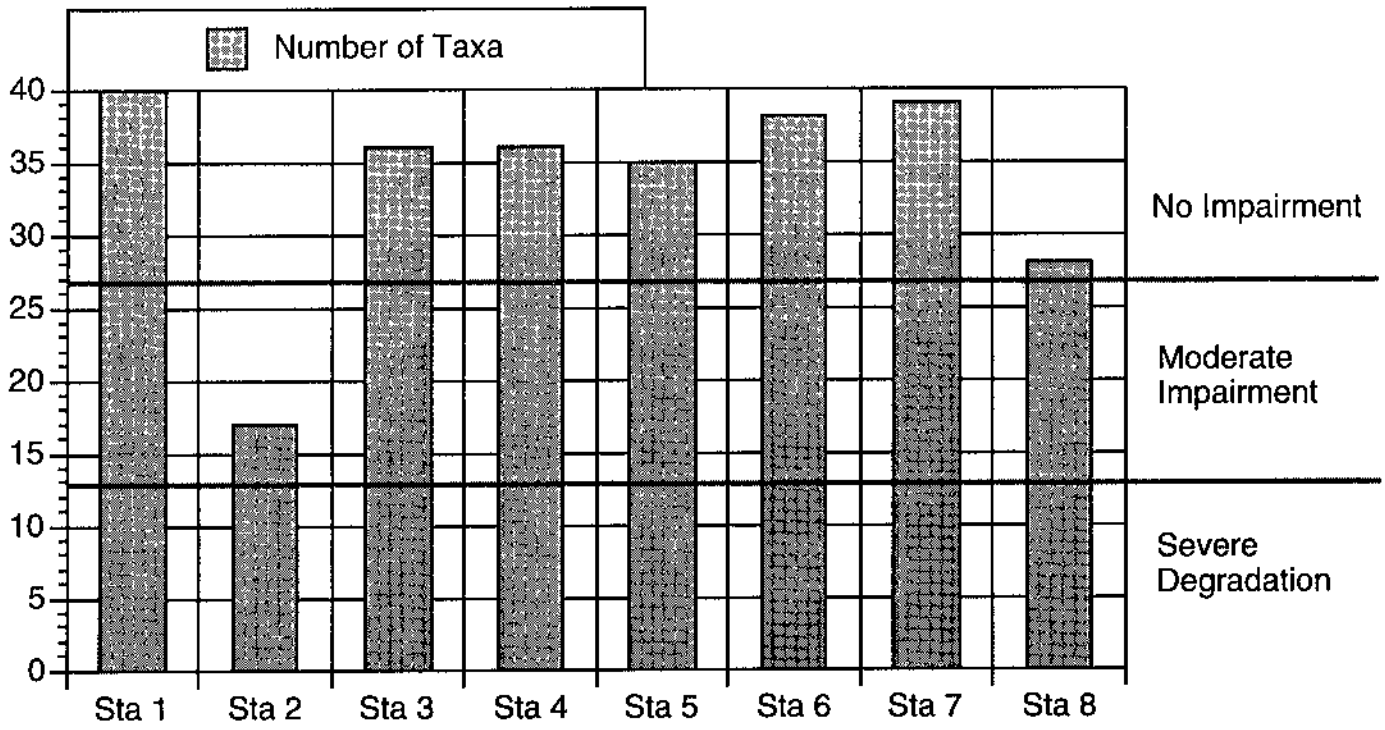


Figure C-6. Cecil Field Basin Study – Taxa Richness for Macroinvertebrates (Dipnet)



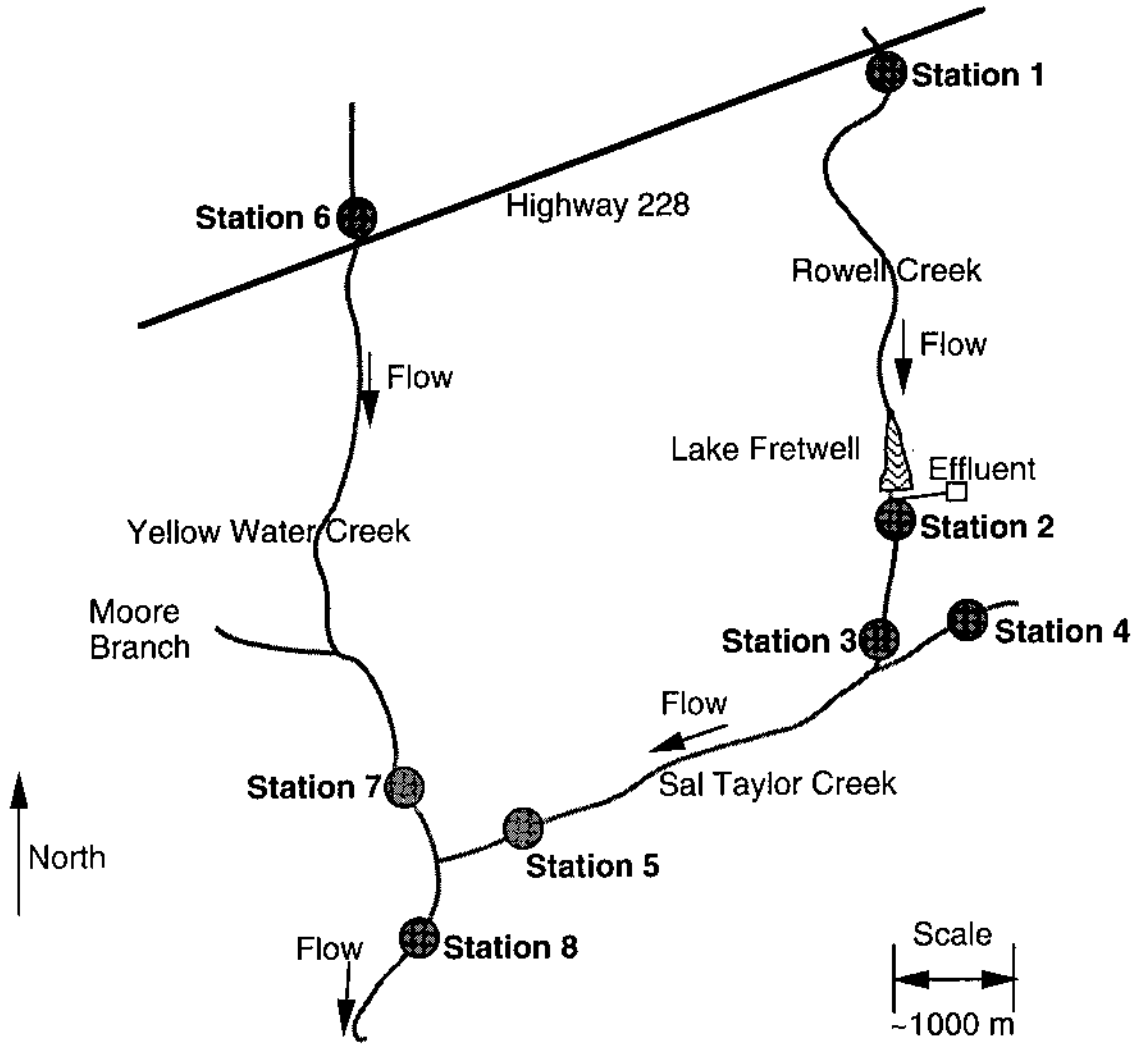
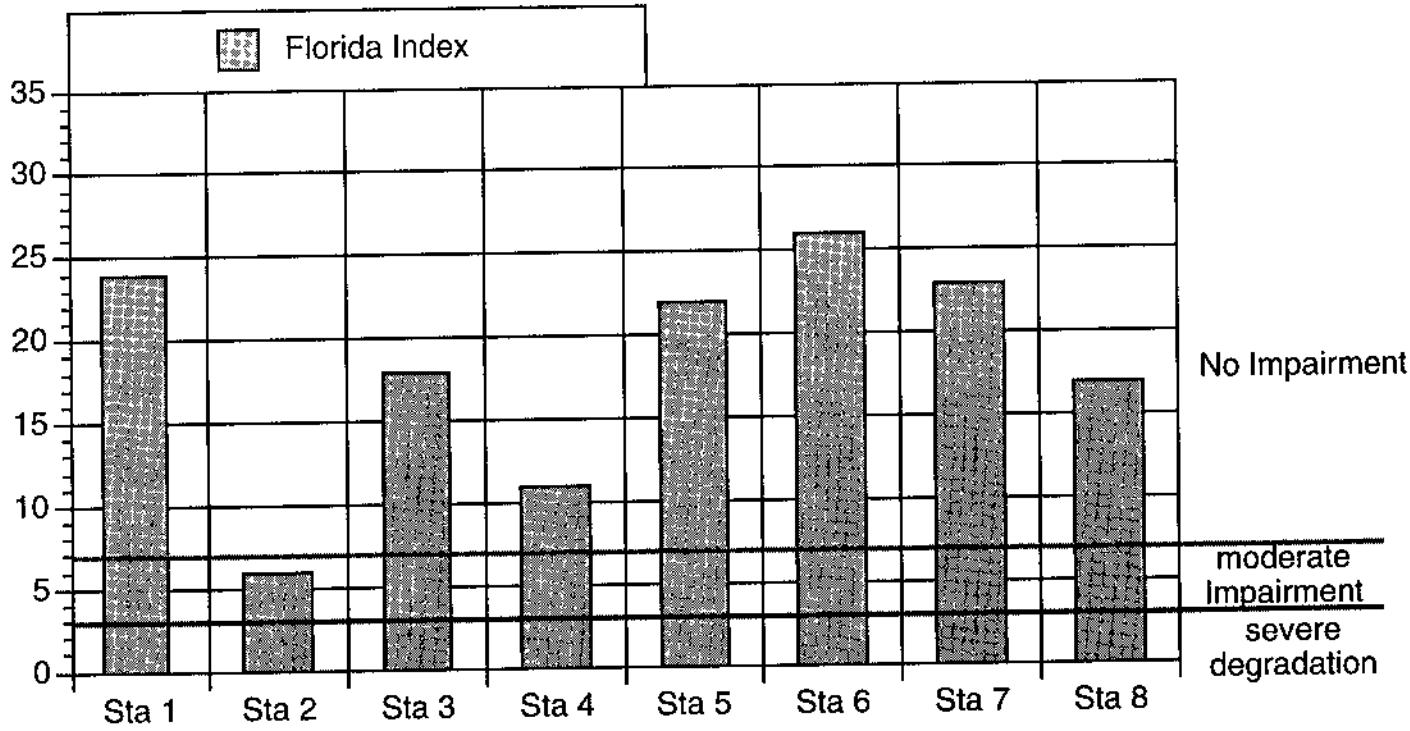


Figure C-7. Cecil Field Basin Study – Florida Index for Macroinvertebrates (Dipnet)



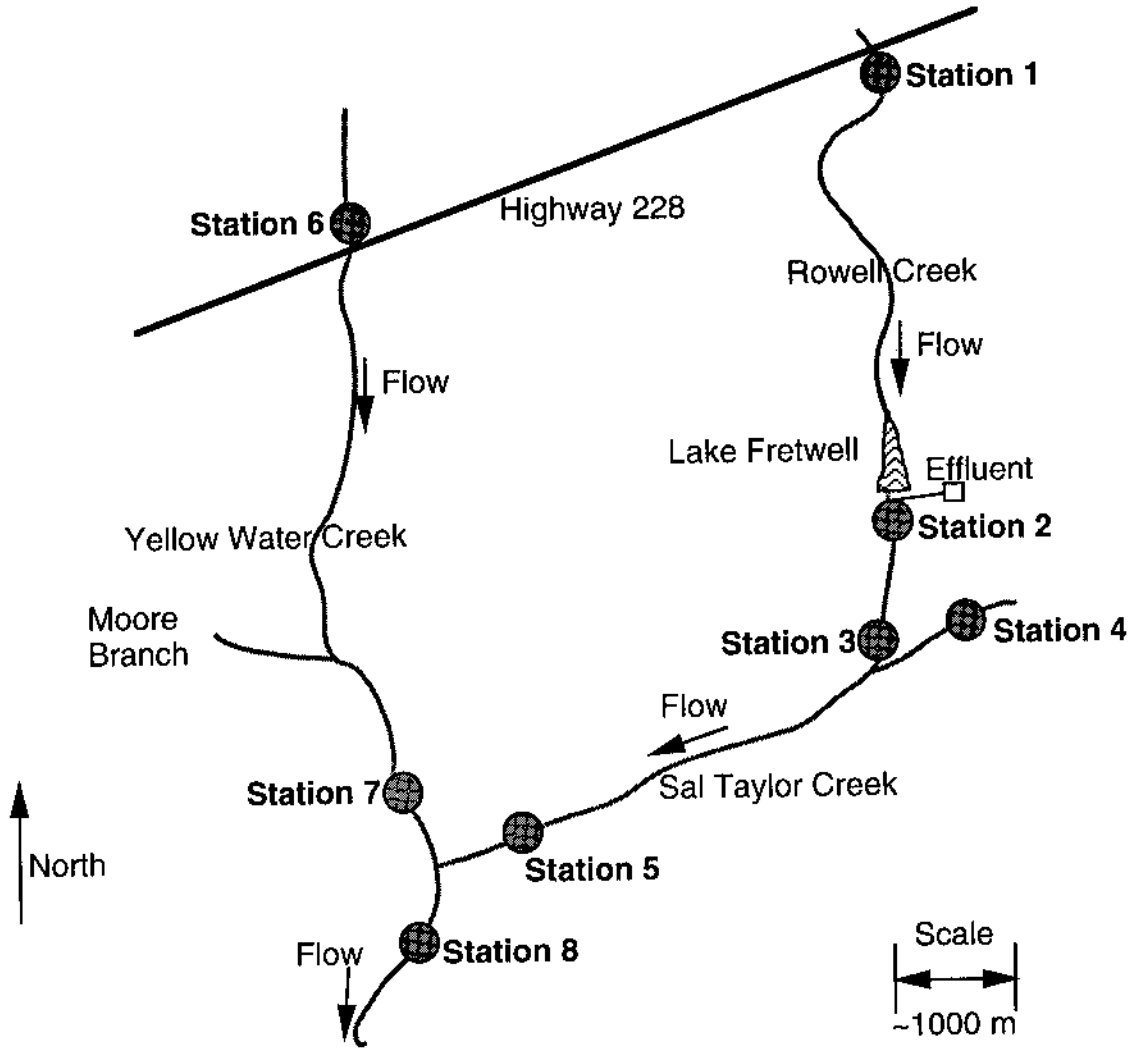
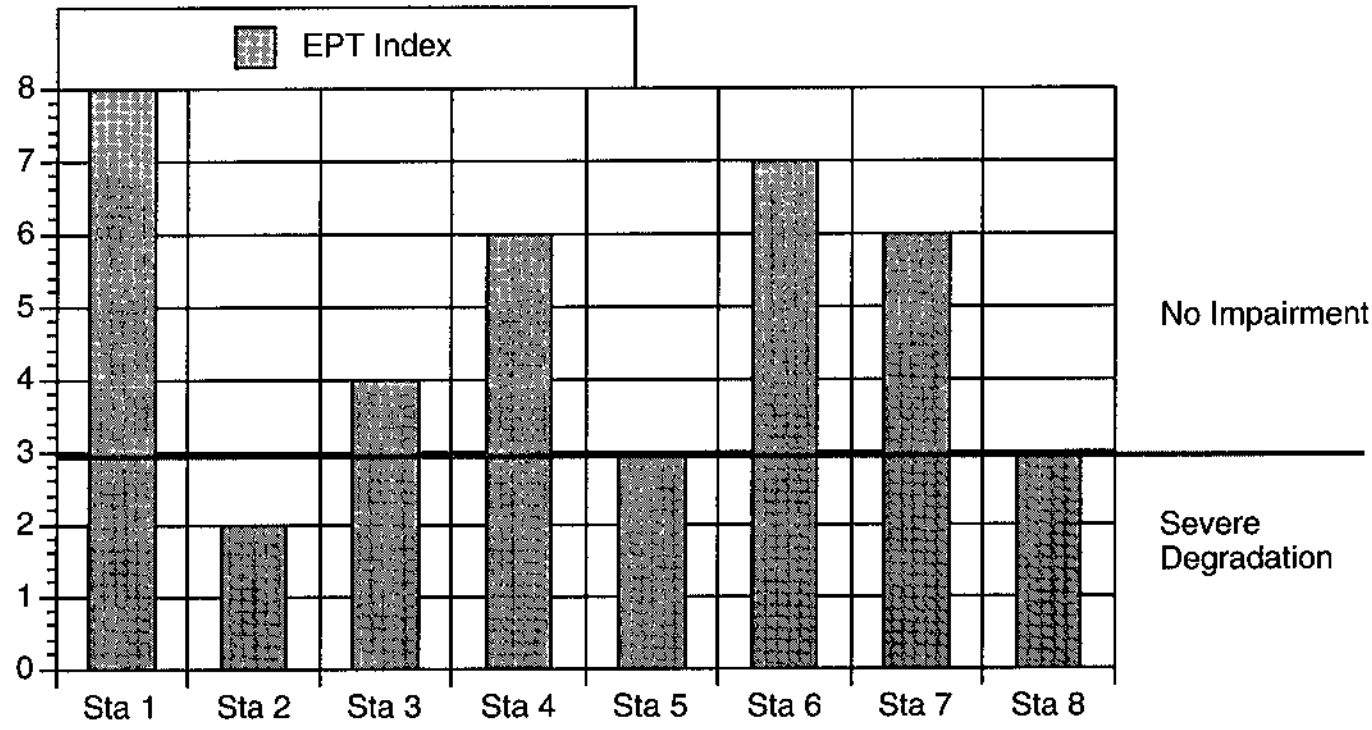


Figure C-8. Cecil Field Basin Study – Ephemeroptera/Trichoptera/Plecoptera Index for Macroinvertebrates (Dipnet)



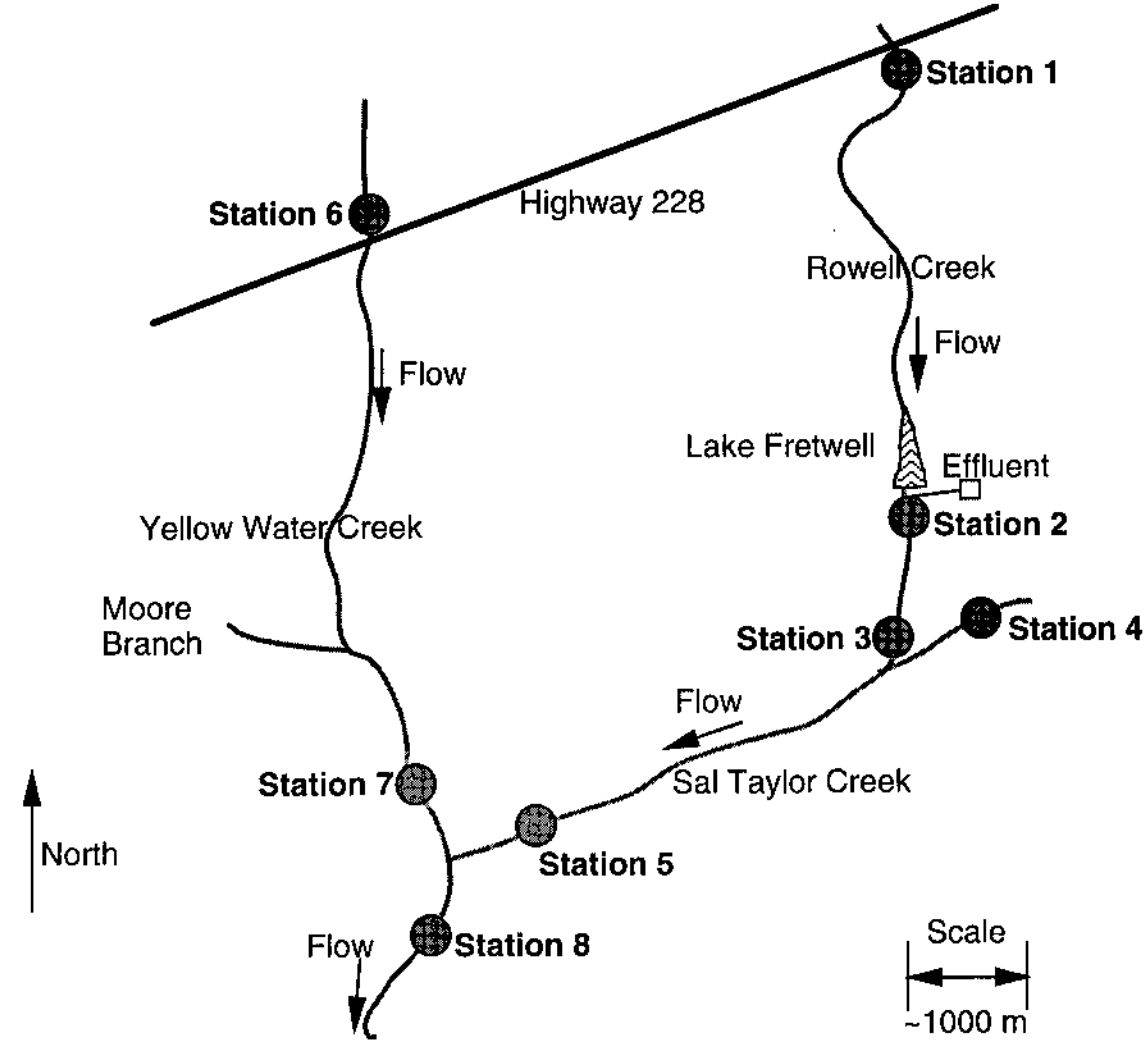


Figure C-9. Statisical Analysis of Cecil Field Basin Study Stream Condition Index Data

Descriptive Statistics

	Stream Condition Index
Mean	28.250
Std. Dev.	3.370
Std. Error	1.191
Count	8
Minimum	21.000
Maximum	33.000
# Missing	0

SCI of Station 2, downstream of effluent

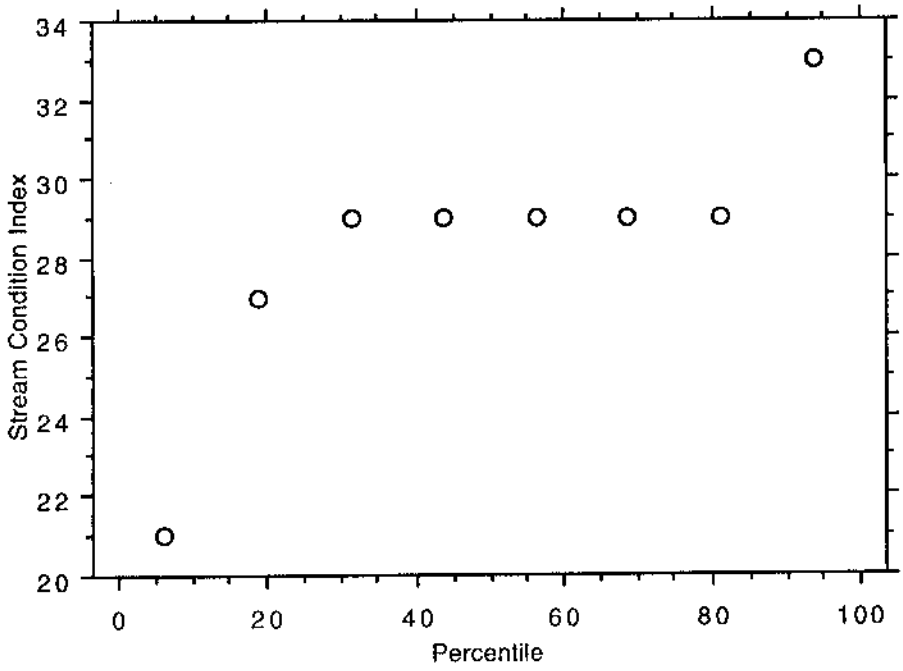
One Sample t-test
Hypothesized Mean = 21

	Mean	DF	t-Value	P-Value
Stream Condition Index	28.250	7	6.085	.0005

Significant

Average SCI of all stations in watershed

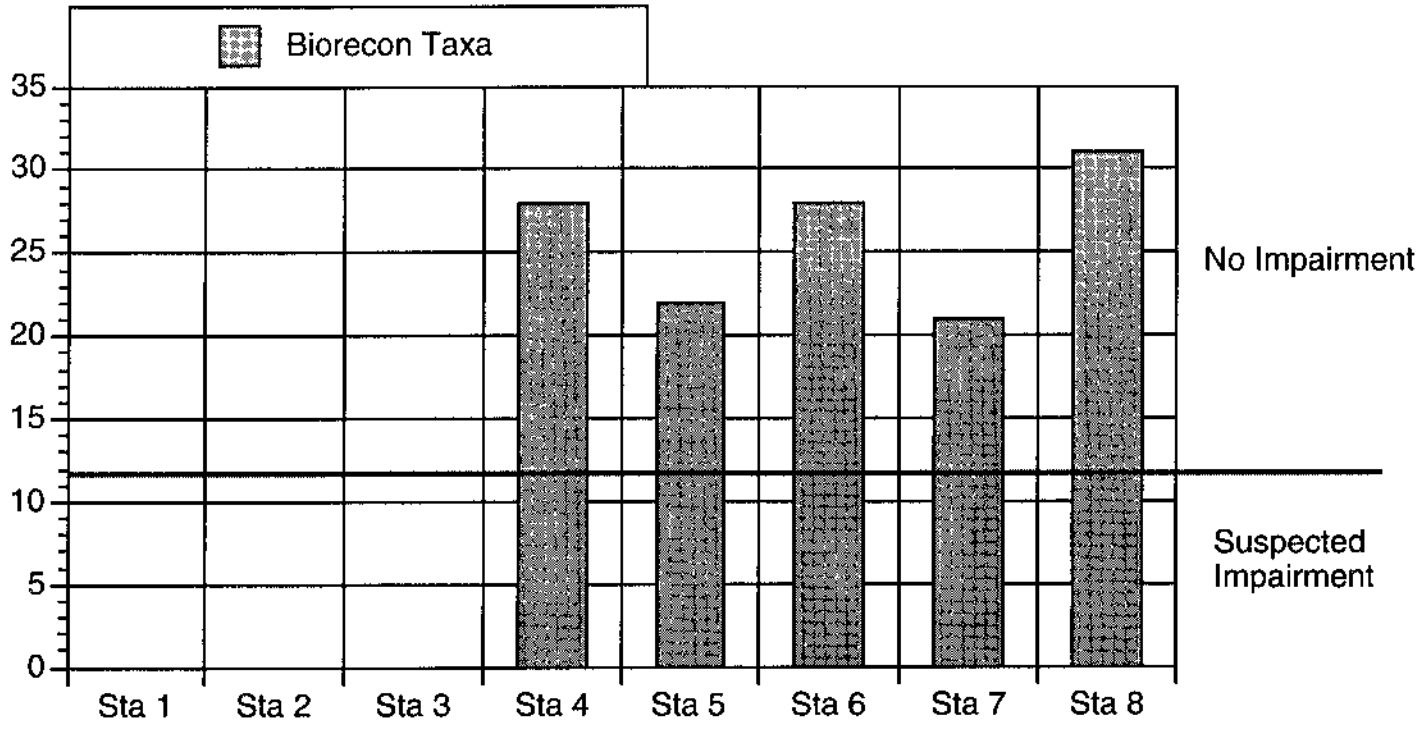
Percentiles Plot



Percentiles

	Stream Condition Index
10	22.800
25	28.000
50	29.000
75	29.000
90	31.800

Figure C-10. Cecil Field Basin Study – Biorecon Taxa Richness (Dipnet)



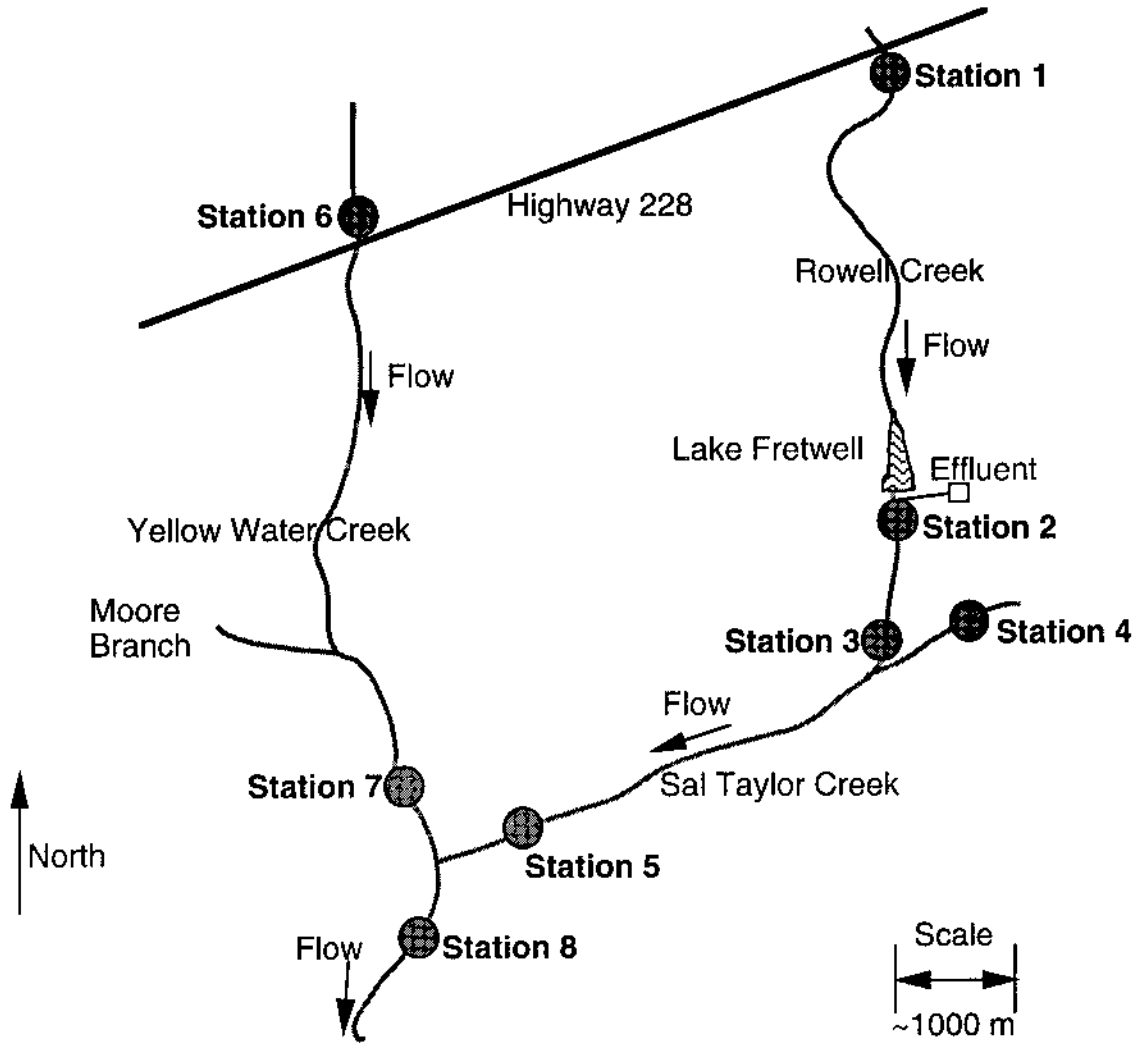
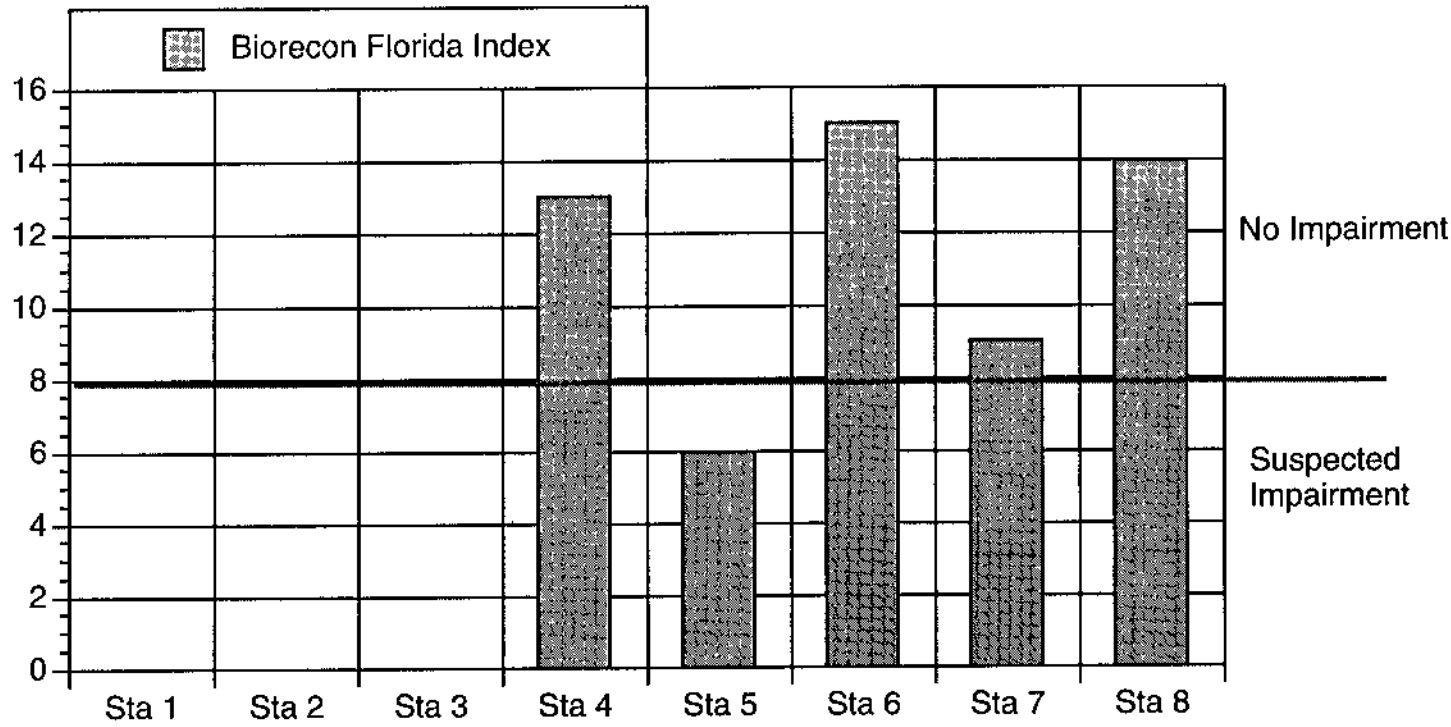


Figure C-11. Cecil Field Basin Study – Biorecon Florida Index (Dipnet)



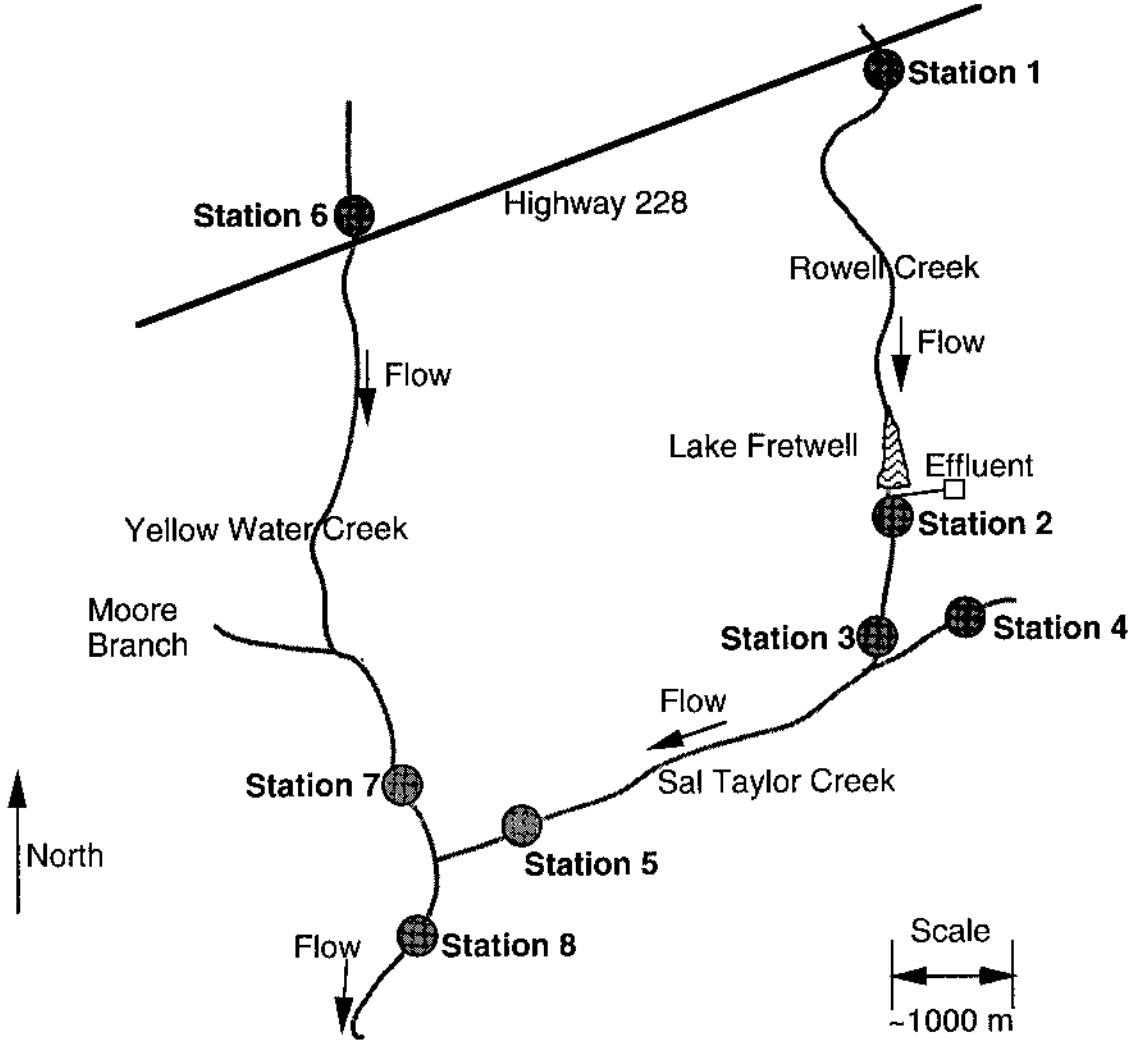
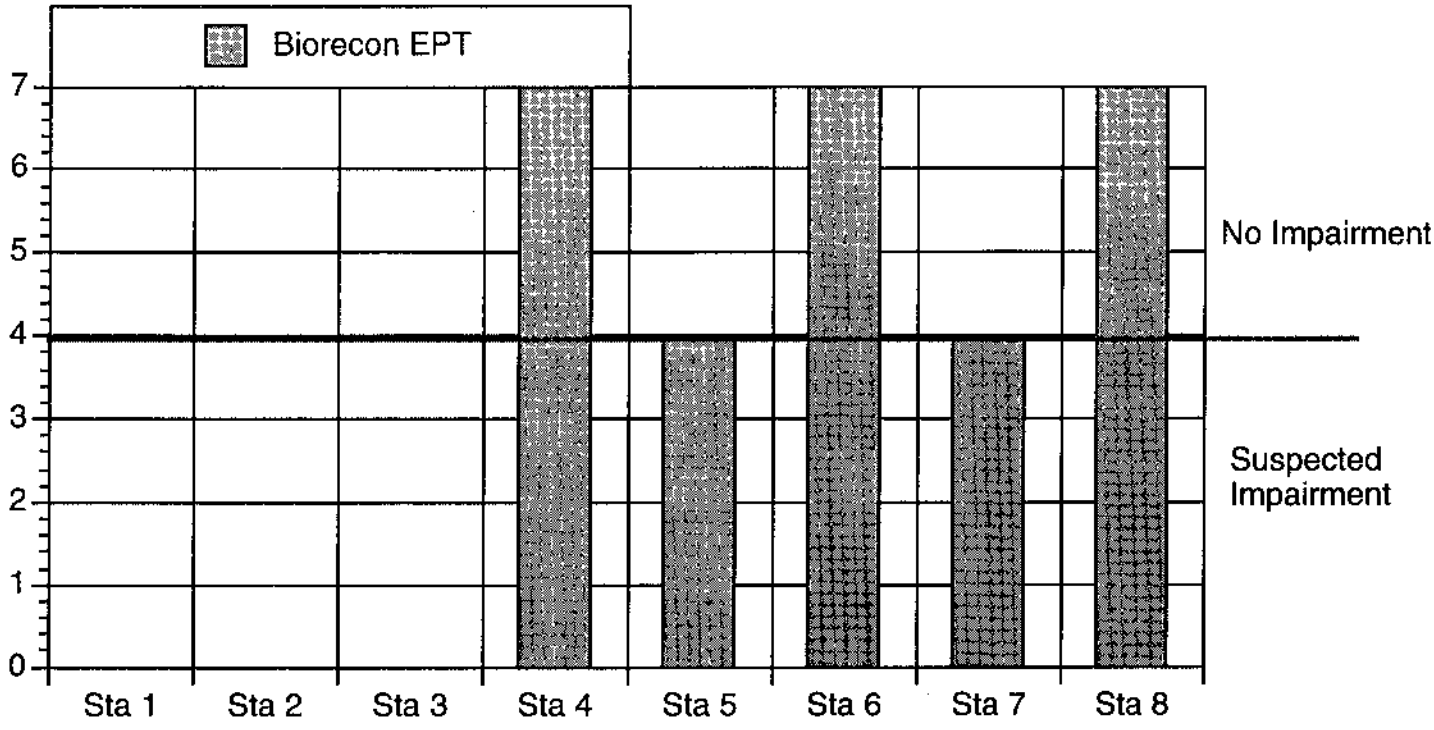
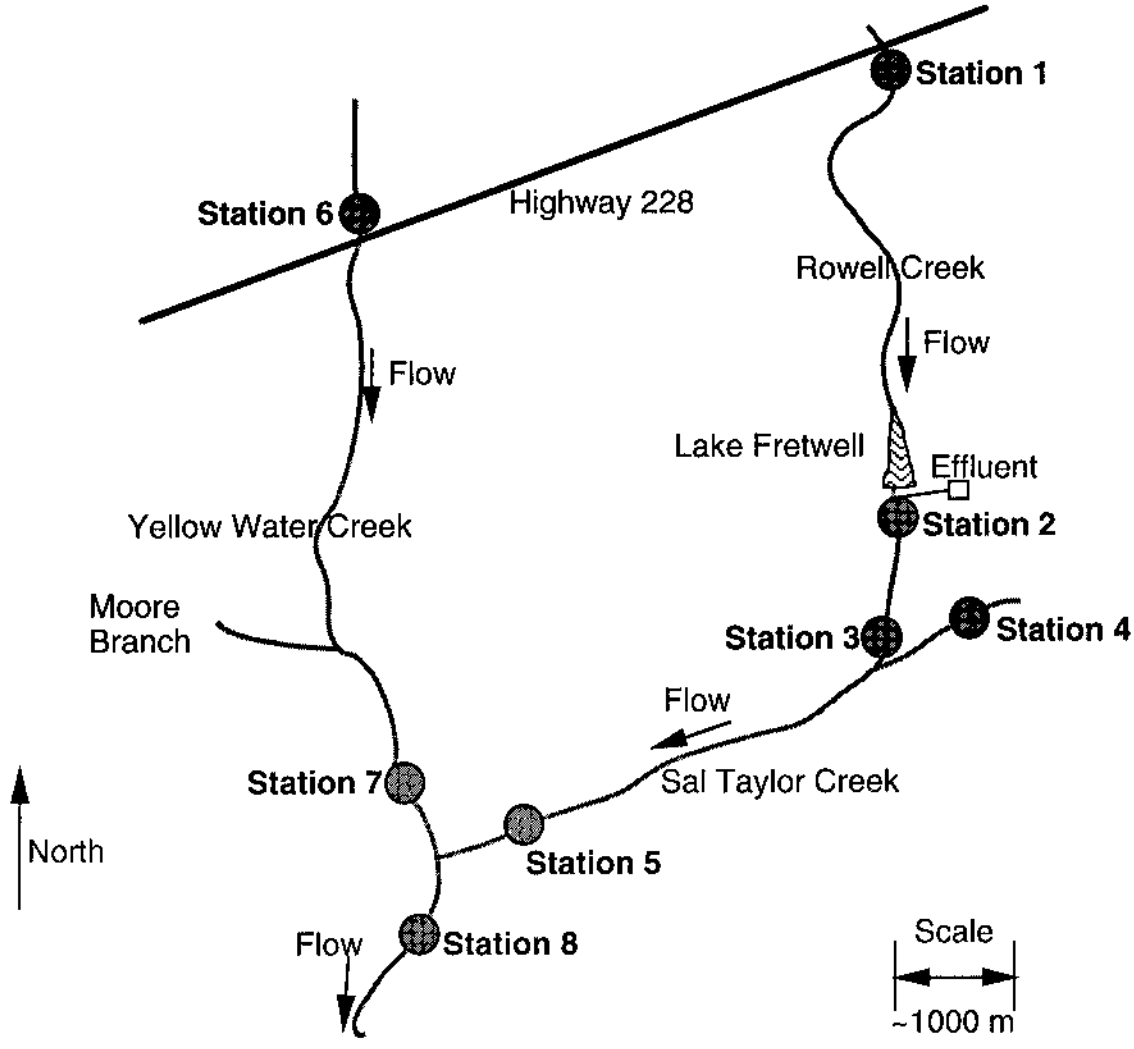


Figure C-12. Cecil Field Basin Study – Biorecon EPT (Dipnet)





Field Sheet

Preliminary Assessment Score Sheet for Pilot Study

STORET Station #	Location
2 20030264	Sal Taylor Creek ½ mi. above Rowell Creek
Station Nickname: Cecil Field Basin Study Station 4	Watershed Name:
Date Collected: 10/03/95	Collected & ID'ed By (print & sign): Mike Hollingsworth, Lee Banks

Taxa found in: 5 sweeps; undercut bank, snags, sand roots, fine sand; Types of habitats sampled: fixed 2 hr, 4 hrs picking & ID time.

Taxa	Fl	#/Sweep** 1-3	4	5
Diptera				
Corynoneura sp.	2			
Pentaneura inconspicua	2			
Rheotanytarsus sp.	2			
Simulium sp.	2			
Stenochironomus sp. ?	2	R		
Chironominae		C		
Centropogoninae		R		
Unident.		R		
Gastropoda				
Ancylidae				
Elimia sp.	2			
Physella sp.				
Viviparus sp.				
Hydrobiidae unident?		C		
Odonata				
Argia sp.	2			
Boyeria sp.	2			
Calopteryx sp.	2			
Gomphus sp.	1			
Hetaerina sp. ?	2	R		
Macromia sp.	2			
Neurocordulia sp.	1			
Progomphus sp.	2			
Erythemis			R	
Dromogomphus			R	
Coleoptera				
Ancyronyx variegatus		R		
Dubiraphia sp.				
Microcylleopus sp.				
Stenelmis sp.		C		

Taxa	Fl	#/Sweep** 1-3	4	5
Trombidiformes				
Oligochaeta				
Lumbriculidae		R		
Tubificidae		R		
Pelecypoda				
Corbicula sp.				R
Elliptio sp.				
Pisidiidae		C		
Unionidae		R		
Megaloptera				
Corydalis cornutus	2			
Sialis sp.				
Other (name groups)				
Asian "Big Red" Dark		A		
		A		
Lepidoptera Pyralidae				R
Decapoda				
Palaemonetes sp.	1	R		
Procambarus sp.			C	
Amphipoda				
Gammaridae	1	R		
Isopoda				
Caecidotea (Asellus)	1			

Taxa	Fl	#/Sweep** 1-3	4	5
Ephemeroptera				
Baetis sp. Dark		C		
Baetisca sp.				
Caenis sp.				R
Callibaetis sp.				
Centroptilum sp.				
Heptagenia sp.				
Hexagenia sp.				
Isonychia sp.				
Leptophlebia sp.				
Neoephemera sp.				
Stenacron sp.	1			
Stenonema sp.	2	R		
Tricorythodes sp.	1			
Plecoptera	2			
Acroneuria sp.	2			
Amphinemura sp.	2			
Hydroperla sp.	2			
Isoperla sp.	2			
Leuctra sp.	2			
Neoperla sp.	2			
Paragnetina sp.	2			
Peltoperla sp.	2			
Perlesta sp.	2			
Perlinella sp.	2			
Pteronarcys sp.	2			
Taeniopteryx sp.	2			
	2			
	2			
Trichoptera				
Anisocentropus sp.				
Brachycentrus sp.	2			
Cheumatopsyche sp. ?	1	R		
Chimarra sp.	2			
Diplectrona sp.				
Hydroptila sp.	2			
Hydropsyche sp.	2			
Lype diversa				
Macrostema sp.	2			
Nectopsyche sp. ?	1	A		
Oecetis sp.	1			
Oxyethira sp.	2			
Polycentropus sp.	2			
Phylocentropus sp.		R		
Triaenodes			R	

ColumnTotal: Fl/Taxa	4	8	2
ColumnTotal: Fl/Taxa	2	8	1	2
ColumnTotal: Fl/Taxa	4	5	1	1

** For first 3 sweeps: Rare (1-3), Common (4-10), Abundant (11-100), Dominant (>100). Record only new taxa in 4 and 5.

Site Total Taxa Richness	28	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is: Healthy
Site Total Florida Index	10	Peninsula > 8 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is: Suspected Impaired
Site Total EPT	7	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired	

STORET Station #	Location
20030265	Sal Taylor Creek 1/4 mile above Yellow Water Creek
Station Nickname	**Watershed Name**
Cecil Field Basin Study Station 5	St. Johns River
Date Collected	**Collected & ID'ed By (print & sign)**
10-02-95	Lee Banks - Lee Banks

Taxa found in: 5 sweeps; 1-Snag, 2-Sand, 3-Leaf Pack, 4-Vegetated Bank, 5-Woody Debris types of habitats sampled; 2.5 hrs picking & ID time.

Taxa	FI	#/Sweep** 1-3	4	5
Diptera				
Corynoneura sp.	2			
Pentaneura inconspicua	2			
Rheotanytarsus sp.	2			
Simulium sp.	2			
Stenochironomus sp.	2			
Chironominae		C		
Ceratopogonidae		R		
Tanypodinae		R		
Gastropoda				
Ancylidae				R
Elimia sp.	2			
Physella sp.				
Viviparus sp.				
Hydrobiidae		R		
Campeloma sp.		C		
Odonata				
Argia sp.	2			
Boyeria sp.	2			
Calopteryx sp.	2			
Gomphus sp.	1			
Hetaerina sp.	2			
Macromia sp.	2			
Neurocordulia sp.	1			
Progomphus sp.	2	R		
Dromogomphus			R	
Anisoptera - small			R	
Coleoptera				
Ancyronyx variagatus				
Dubiraphia sp.				
Microcylleopus sp.				
Stenelmis sp.		R		
ColumnTotal: FI/Taxa	2	7	2	1

Taxa	FI	#/Sweep** 1-3	4	5
Trombidiformes				
Oligochaeta				
Lumbriculidae		C		
Tubificidae		C		
Pelecypoda				
Corbicula sp.		A		
Elliptio sp.				
Pisidiidae		R		
Megaloptera				
Corydalis cornutus	2			
Sialis sp.				
Other (name groups)				
ACARIFORMES Hard Black		C		
HIRUDINEA		R		
Decapoda				
Palaemonetes sp.	1			
Procambarus sp.				R
Amphipoda				
Gammaridae	1			
Isopoda				
Caecidotea (Asellus)	1	R		
ColumnTotal: FI/Taxa	1	7	0	1

Taxa	FI	#/Sweep** 1-3	4	5
Ephemeroptera				
Baetis sp.		C		
Baetisca sp.				
Caenis sp.				
Callibaetis sp.				
Centroptilum sp.				
Heptagenia sp.				
Hexagenia sp.				
Isonychia sp.				
Leptophlebia sp.				
Neoephemera sp.				
Stenacron sp.	1			
Stenonema sp.	2			C
Tricorythodes sp.	1			
Plecoptera	2			
Acroneuria sp.	2			
Amphinemura sp.	2			
Hydroperla sp.	2			
Isoperla sp.	2			
Leuctra sp.	2			
Neoperla sp.	2			
Paragnetina sp.	2			
Peltoperla sp.	2			
Perlesta sp.	2			
Perlinella sp.	2			
Pteronarcys sp.	2			
Taeniopteryx sp.	2			
	2			
	2			
Trichoptera				
Anisocentropus sp.				
Brachycentrus sp.	2			
Cheumatopsyche sp.	1			
Chimarra sp.	2			
Diplectrona sp.				
Hydroptila sp.	2			
Hydropsyche sp.	2			
Lype diversa				
Macrostema sp.	2			
Nectopsyche sp.	1			
Oecetis sp.	1	R		
Oxyethira sp.	2			
Polycentropus sp.	2			
Triaenodes sp.		R		
ColumnTotal: FI/Taxa	3	3	0	1

** For first 3 sweeps: Rare (1-3), Common (4-10), Abundant (11-100), Dominant (>100). Record only new taxa in 4 and 5.

Site Total Taxa Richness	22	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is **Healthy**
Site Total Florida Index	6	Peninsula > 8 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is **Suspected Impaired**
Site Total EPT	4	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired	

Field Sheet 4

STORET Station # 20030549

Location: Yellow Water Creek at Normand, Blvd. (SR228)

Station Nickname: Cecil Field Basin Study Station 6

Watershed Name:

Date Collected: 10/02/95

Collected & ID'ed By (print & sign): Mike Hollingsworth

Taxa found in: 5 sweeps; root mats, leaf pack, sing, sand types of habitats sampled; _____ picking & ID time.

Taxa	FI	#/Sweep** 1-3	4	5
Diptera				
Corynoneura sp.	2			
Pentaneura inconspicua	2			
Rheotanytarsus sp.	2			
Simulium sp.	2	R		
Stenochironomus sp.	2			
Orthocladidae		A		
"Red Wiggler"		A		
Conyantura (2)?		R		
Chironomidae		R		
Gastropoda				
Ancylidae				
Elimia sp.	2			
Physella sp.				
Viviparus sp.				
Odonata				
Argia sp.	2		R	
Boyeria sp.	2			
Calopteryx sp. ?	2	R		
Gomphus sp.	1			
Hetaerina sp.	2			
Macromia sp.	2			
Neurocordulia sp.	1			
Progomphus sp.	2			
Dromogomphus ?		R		
Coleoptera				
Ancyronyx variegatus		C		
Dubiraphia sp.				
Microcylleopus sp.				
Stenelmis sp.		R		
Elmidae (larvae)		R		
Dineutus (larvae)		R		
Hydrophilidae ?		C		
Sictes sp.		R		
ColumnTotal: FI/Taxa	6	13	1	

Taxa	FI	#/Sweep** 1-3	4	5
Trombidiformes				
Oligochaeta				
Tubificidae		C		
Lumbriculidae				R
Pelecypoda				
Corbicula sp.				
Elliptio sp.				
Pisidiidae				
Megaloptera				
Corydalis cornutus	2			
Sialis sp.				
Other (name groups)				
Acari:				
large, red		A		
blue and orange spot		R		
Hemiptera				
Belostoma sp.		R		
Decapoda				
Palaemonetes sp.	1	C		
Procambarus sp.		R		
Amphipoda				
Gammaridae	1			
Isopoda				
Caecidotea (Asellus)	1	R		
ColumnTotal: FI/Taxa	2	7		1

Taxa	FI	#/Sweep** 1-3	4	5
Ephemeroptera				
Baetis sp.		A		
Baetisca sp.				
Caenis sp.				
Callibaetis sp.				
Centroptilum sp.				
Heptagenia sp.				
Hexagenia sp.				
Isonychia sp.				
Leptophlebia sp.				
Neoephemera sp.				
Stenacron sp.	1			
Stenonema sp.	2	C		
Tricorythodes sp.	1			
Plecoptera	2			
Acroneuria sp. ?	2	R		
Amphinemura sp.	2			
Hydroperla sp.	2			
Isoperla sp.	2			
Leuctra sp.	2			
Neoperla sp.	2			
Paragnetina sp.	2			
Peltoperla sp.	2			
Perlesta sp.	2			
Perlinella sp.	2			
Pteronarcys sp.	2			
Taeniopteryx sp.	2			
	2			
	2			
Trichoptera				
Anisocentropus sp.				
Brachycentrus sp.	2			
Cheumatopsyche sp. ?	1	R		
Chimarra sp.	2			
Diplectrona sp.				
Hydroptila sp.	2			
Hydropsyche sp.	2			
Lype diversa				
Macrostema sp.	2			
Nectopsyche sp.	1			
Oecetis sp.	1	R		
Oxyethira sp.	2			
Polycentropus sp.	2			
Triaenodes sp.		C		
Phylocentropus sp. ?		R		
ColumnTotal: FI/Taxa	6	7		

** For first 3 sweeps: Rare (1-3), Common (4-10), Abundant (11-100), Dominant (>100). Record only new taxa in 4 and 5.

Site Total Taxa Richness	29	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is **Healthy**
Site Total Florida Index	14	Peninsula > 6 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is **Suspected Impaired**
Site Total EPT	7	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired	

Preliminary Assessment Score Sheet for Pilot Study

STORET Station # 20030341	Location: Yellow Water Creek Yuni above Sul Taylor Creek
Station Nickname: Cecil Field Basin Study Station 7	Watershed Name:
Date Collected: 10/02/95	Collected & ID'ed By (print & sign): Mike Hollingsworth Mike Hollingsworth

Taxa found in: 5 sweeps; root, snag, leaf pk, sand, root types of habitats sampled; _____ picking & ID time.

Taxa	FI	#/Sweep** 1-3	4	5
Diptera				
Corynoneura sp.	2			
Pentaneura inconspicua	2			
Rheotanytarsus sp.	2			
Simulium sp.	2	C		
Stenochironomus sp. !	2	R		
Tanypodinae		A		
Orthocladidae		R		
Chironomidae		C		
Gastropoda				
Ancylidae				
Elimia sp.	2			
Physella sp.				
Viviparus sp. ? small		R		
Odonata				
Argia sp.	2			
Boyeria sp.	2			
Calopteryx sp. ?	2	R		
Gomphus sp.	1			
Hetaerina sp.	2			
Macromia sp.	2	R		
Neurocordulia sp.	1			
Progomphus sp.	2			
Ischnura		R		
Enallagma		R		
Coleoptera				
Ancyronyx variegatus		R		
Dubiraphia sp.				
Microcylleopus sp.				
Stenelmis sp.		C		
Stenelmis (larvae)		R		
Pinnetus (larvae)		R		
ColumnTotal: FI/Taxa	8	14		

Taxa	FI	#/Sweep** 1-3	4	5
Trombidiformes				
Oligochaeta				
Tubificidae		R		
Pelecypoda				
Corbicula sp.		R		
Elliptio sp.				
Pisidiidae				
Megaloptera				
Corydalis cornutus	2			
Sialis sp.				
Other (name groups)				
Ascari black		A		
Decapoda				
Palaemonetes sp.	1			
Procambarus sp.		C		
Amphipoda				
Gammaridae	1			
Isopoda				
Caecidotea (Asellus)	1			
ColumnTotal: FI/Taxa		4		

Taxa	FI	#/Sweep** 1-3	4	5
Ephemeroptera				
Baetis sp. light		C		
Baetisca sp.				
Caenis sp. dark ?		A		
Callibaetis sp.				
Centroptilum sp.				
Heptagenia sp.				
Hexagenia sp.				
Isonychia sp.				
Leptophlebia sp.				
Neoephemera sp.				
Stenacron sp.	1			
Stenonema sp.	2			
Tricorythodes sp.	1			
Plecoptera	2			
Acroneuria sp.	2			
Amphinemura sp.	2			
Hydroperla sp.	2			
Isoperla sp.	2			
Leuctra sp.	2			
Neoperla sp.	2			
Paragnetina sp.	2			
Peltoperla sp.	2			
Perlesta sp.	2			
Perlinella sp.	2			
Pteronarcys sp.	2			
Taeniopteryx sp.	2			
	2			
	2			
Trichoptera				
Anisocentropus sp.				
Brachycentrus sp.	2			
Cheumatopysche sp.	1	R		
Chimarra sp.	2			
Diplectrona sp.				
Hydroptila sp.	2			
Hydropsyche sp.	2			
Lype diversa				
Macrostema sp.	2			
Nectopsyche sp.	1			
Oecetis sp.	1			
Oxyethira sp.	2			
Polycentropus sp.	2			
Triaenodes		C		
ColumnTotal: FI/Taxa	1	4		

** For first 3 sweeps: Rare (1-3), Common (4-10), Abundant (11-100), Dominant (>100). Record only new taxa in 4 and 5.

Site Total Taxa Richness	22	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is **Healthy**
Site Total Florida Index	9	Peninsula > 8 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is **Suspected Impaired**
Site Total EPT	4	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired	

STORET Station #	Location
20030342	Yellow Water Ck @ old bridge 1/4 mile below Sal Taylor Ck. 75A
Station Nickname Cecil Field Basin Study Station 8	**Watershed Name** St. Johns River
Date Collected 10-02-95	**Collected & ID'ed By (print & sign)** Lee Banko - Lee Banko

Taxa found in: 5 sweeps; 1-Sweep - 2 Leaf mat; 3 Leaf mat; 4-Sweep types of habitats sampled; 2 hrs picking & ID time.

Taxa	FI	#/Sweep** 1-3	4	5
Diptera				
Corynoneura sp.	2			
Pentaneura inconspicua	2			
Rheotanytarsus sp.	2			
Simulium sp.	2			
Stenochironomus sp.	2			
Tanypodinae		R		
Chironominae		C		
Ceratopogonidae		R		
Gastropoda				
Ancylidae				R
Elimia sp.	2			
Physella sp.				
Viviparus sp.				
Hydrobiidae		A		
Campeloma sp.		A		
Odonata				
Argia sp.	2	R		
Boyeria sp.	2			
Calopteryx sp. ?	2	R		
Gomphus sp.	1			
Hetaerina sp.	2			
Macromia sp.	2	R		
Neurocordulia sp.	1			
Progomphus sp.	2			
Hagenius		R		
Dromogomphus		R		
Coleoptera				
Ancyronyx variegatus				
Dubiraphia sp.				
Microcylleopus sp.				
Stenelmis sp.		C		
Hydrophilidae ?		C		
ColumnTotal: FI/Taxa	6	12	0	1

Taxa	FI	#/Sweep** 1-3	4	5
Trombidiformes				
Oligochaeta				
Lumbriculidae		A		
Pelecypoda				
Corbicula sp.		C		
Elliptio sp.		R		
Pisidiidae		A		
Megaloptera				
Corydalis cornutus	2			
Sialis sp.				
Other (name groups)				
ACARIFORMES				
Hard / Black		A		
Big Red		R		
HIRUDINEA				
unident		R		
HEMIPTERA				
Pelocoris			R	
Decapoda				
Palaemonetes sp.	1			
Procambarus sp.		C		
Amphipoda				
Gammaridae	1	A		
Isopoda				
Caecidotea (Asellus)	1	A		
ColumnTotal: FI/Taxa	2	10	1	0

Taxa	FI	#/Sweep** 1-3	4	5
Ephemeroptera				
Baetis sp. Tan		A		
Baetisca sp.				
Caenis sp.				
Callibaetis sp.				
Centroptilum sp.				
Heptagenia sp.				
Hexagenia sp.				
Isonychia sp.				
Leptophlebia sp. ?		R		
Neoephemera sp.				
Stenacron sp.	1			
Stenonema sp.	2	C		
Tricorythodes sp.	1			
Baetis dark		A		
Plecoptera	2			
Acroneuria sp.	2			
Amphinemura sp.	2			
Hydroperla sp.	2			
Isoperla sp.	2			
Leuctra sp.	2			
Neoperla sp.	2			
Paragnetina sp.	2			
Peltoperla sp.	2			
Perlesta sp.	2			
Perlinella sp.	2			
Pteronarcys sp.	2			
Taeniopteryx sp.	2			
	2			
	2			
Trichoptera				
Anisocentropus sp.				
Brachycentrus sp.	2			
Cheumatopsyche sp.	1	C		
Chimarra sp.	2	R		
Diplectrona sp.				
Hydroptila sp.	2			
Hydropsyche sp.	2			
Lype diversa				
Macrostema sp.	2			
Nectopsyche sp. ?	1	A		
Oecetis sp.	1			
Oxyethira sp.	2			
Polycentropus sp.	2			
ColumnTotal: FI/Taxa	6	7	0	0

** For first 3 sweeps: Rare (1-3), Common (4-10), Abundant (11-100), Dominant (>100). Record only new taxa in 4 and 5.

Site Total Taxa Richness	31	Peninsula > 12 = unimpaired Panhandle > 20 = unimpaired	If 2 or more metrics are "unimpaired", site is **Healthy**
Site Total Florida Index	14	Peninsula > 8 = unimpaired Panhandle > 12 = unimpaired	If less than 2 metrics are "unimpaired", site is **Suspected Impaired**
Site Total EPT	7	Peninsula > 4 = unimpaired Panhandle > 6 = unimpaired	

Field Sheet

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cecil Field
County: Duval
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00
LIMS Sample #: 118890 (sampled 10/6/95) **LIMS Job #:** 95-OCT-03-06

Sample Collection: Date 10/2/95 Time 1045
Test Beginning: Date 10/3/95 Time 1145
Test Ending: Date 10-5-95 Time 1145
Organism Batch #: 47 **Diluent Batch #:** 40
Organism Age: <24hrs
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 2

Remarks:

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.6 @ 23.7	8.4 @ 23.8 °C	106.0 @ 102.3 983 @ 101.3 @ 24.6 °C
24 hr	___ @ 7.0 ___ @ ___	___ @ ___	___ @ ___ °C	___ @ ___ ___ @ ___ @ ___ °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.0 @ 25.1	8.3 @ 24.6 °C	106.9 @ 102.3 998 @ 101.3 @ 24.6 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
CTL A	A	5	5	5	8.2		8.2	24.0		24.5	7.7		7.9	175.0		190
CTL B	B	5	5	5			8.2			24.4			7.9			190
CTL C	C	5	5	5			8.2			24.4			7.8			190
CTL D	D	5	5	5			8.2			24.2			7.8			190
100% A	A	5	5	5	7.5		8.4	23.9		24.4	7.5		7.8	320.0		385
100% B	B	5	5	5			8.4			24.4			7.8			390
100% C	C	5	5	5			8.4			24.2			7.9			385
100% D	D	5	5	5			8.4			24.2			7.9			395
Measured/Loaded by:		MF	DW	MF	TR		MF	TR		MF	TR		MF	TR		MF
Recorded by:		MF	DW	MF	DR		MF	DR		MF	DR		MF	DR		MF

Investigators' Signatures

Tim McKelvey
Robin A. Kelley
Marshall Faircloth
Dean [illegible]

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.01	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-100	TR
Alkalinity (mg/L as $CaCO_3$):	—	75	85	Hach	TM
Hardness (mg/L as $CaCO_3$):	—	80	115	Hach	TM
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion	MF

Ammonia Meter #PR2126 Ammonia Meter Slope: -55.0 Ammonia Blank: (0.01) Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Cecil Field
County: Duval
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00
LIMS Sample #: 118890 **LIMS Job #:** 95-OCT-03-06
Sample log 10/6/95

Sample Collection: Date 10/2/95 Time 1045
Test Beginning: Date 10/3/95 Time 1200
Test Ending: Date 10-5-95 Time 1200
Organism Batch #: 47 **Diluent Batch #:** well
Organism Age: ~~<24 hrs~~ 10/2/95 conn 13 day conn 10/3/95
Test Organism: ~~Ceriodaphnia dubia~~ Cyprinella leedsi

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.6 @ 23.7	8.4 @ 23.8 °C	106.0 @ 102.3 983 @ 1013 @ 24.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.4	8.3 @ 24.9 °C	107.9 @ 102.3 996 @ 1013 @ 24.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	25.0 @ 25.1	8.3 @ 24.6 °C	106.9 @ 102.3 998 @ 1013 @ 24.6 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) / Cond. (µmhos/cm) 0 hr	24 h	48 h
CTL A	501	5	5	5	7.8	8.2	8.3	24.7	23.6	23.7	7.8	7.8	8.0	250	250	250
CTL B	43	5	5	5	7.8	8.2	8.3	24.7	23.6	23.7	7.8	7.7	8.0	250	250	245
CTL C	76	5	5	5	7.8	8.2	8.3	24.7	23.6	23.6	7.8	7.9	8.0	250	255	255
CTL D	414	5	5	5	7.8	8.2	8.3	24.7	23.8	23.6	7.8	7.9	8.0	250	250	245
100% A	412	5	5	5	7.4	7.9	8.1	24.2	23.7	23.7	7.7	7.8	7.9	385	385	390
100% B	602	5	5	4(1)	7.4	7.9	8.1	24.0	23.5	23.6	7.6	7.8	7.9	385	385	390
100% C	608	5	5	5	7.4	7.9	8.1	24.0	23.4	23.6	7.5	7.8	8.0	385	390	395
100% D	9	5	5	5	7.4	7.9	8.1	24.0	23.7	23.5	7.5	7.8	7.9	385	390	385
Measured/Loaded by:		MF	DW	MF	TR	DW	MF	TR	DW	MF	TR	DW	MF	TR	DW	MF
Recorded by:		TM	DW	MF	DR	VW	JN	DR	VW	JN	DR	VW	JN	DR	VW	JN

Investigators' Signatures

Tina McKelvey, David Flow, Robin C Reeder, Marshall Faircloth, [illegible], Vicki Winting, Joyce Martin

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.01	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR-100	TR
Alkalinity (mg/L as $CaCO_3$):	120	—	85	Hach	TM
Hardness (mg/L as $CaCO_3$):	125	—	115	Hach	TM
Total ammonia (mg/L as N):	<0.017	—	<0.017	Orion	MF

Ammonia Ammonia Ammonia Control Sample

APPENDIX D

Benthic macroinvertebrate taxa list for Cecil Field Bioassessment, collected via Hester-Dendy artificial substrate samplers on 3 October 1995. Three replicates were recovered from Stations 1 and 2, but only 1 replicate was recovered from Station 3. Abundance values are numbers/m^2.

	Station 1	Station 2	Station 3
Nemertina			
Prostoma rubrum	–	3	–
Oligochaeta			
Dero trifida	–	3	–
Eclipidrilus sp.	3	–	–
Limnodrilus hoffmeisteri	–	3	–
Nais communis	–	5	–
Slavina appendiculata	3	–	–
Gastropoda			
Hebetancylus excentricus	–	3	–
Micromenetus dilatatus	–	11	–
Planorbella duryi	–	5	–
Physella sp.	–	3	–
Ancylidae	26	5	–
Pelecypoda			
Pisidiidae	–	3	–
Acarina			
Hygrobates sp.	–	19	–
Trombidiformes	–	3	–
Crustacea			
Cambaridae	3	–	–
Ephemeroptera			
Acerpenna pygmaeus	–	3	–
Caenis sp.	8	3	–
Stenacron sp.	3	–	–
Stenonema smithae	34	37	–
Stenonema sp.	–	3	–
Heptageniidae	3	5	–
Odonata			
Argia sp.	16	–	–
Argia moesta	11	–	–
Coleoptera			
Ancyronyx variegata	50	26	–
Dubiraphia sp.	8	–	–
Microcylloepus pusillus	–	3	–
Stenelmis sp.	16	13	16
Elmidae	3	–	8
Coleoptera	–	5	–
Trichoptera			
Cheumatopsyche sp.	13	1130	48
Chimarra sp.	19	3	–
Cyrnellus fraternus	–	259	8

Hydropsyche sp.	3	29	–
Hydropsychidae	–	140	–
Trichoptera	–	175	–
Diptera			
Ablabesmyia mallochi	13	5	–
Ablabesmyia rhamphe grp.	–	8	8
Conchapelopia sp.	19	5	–
Glyptotendipes sp.	–	19	–
Glyptotendipes sp. B Epler	–	3	–
Labrundinia sp.	5	–	–
Labrundinia pilosella	–	–	8
Nilothauma sp.	3	–	–
Palpomyia/Bezzia grp.	3	–	–
Paratanytarsus sp. A Epler	–	–	8
Paratanytarsus sp. B Epler	–	3	–
Pentaneura inconspicua	–	13	8
Polypedilum convictum grp.	3	127	8
Polypedilum fallax	11	–	–
Polypedilum illinoense grp.	3	24	40
Polypedilum scalaenum grp.	24	13	16
Rheocricotopus robacki	3	3	16
Rheotanytarsus sp.	–	90	–
Rheotanytarsus distinctissimus grp.	5	90	–
Rheotanytarsus exiguus grp.	5	410	–
Stenochironomus sp.	5	19	–
Tanytarsus sp.	3	3	–
Tanytarsus sp. D Epler	–	3	–
Tanytarsus sp. L Epler	3	–	8
Tanytarsus sp. O Epler	13	–	–
Tanytarsus sp. S Epler	3	–	–
Thienemanniella sp. A Epler	–	–	8
Thienemannimyia grp.	–	3	–
Tribelos sp.	3	–	–
Tribelos fuscicornis	–	3	–
Chironomidae	19	209	32

Benthic macroinvertebrate taxa list for Cecil Field Basin Study, collected by 20 discrete dip net sweeps of multiple substrates on 3 October 1995.

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Nemertina								
Prostoma rubrum	–	–	–	–	1	–	–	–
Oligochaeta								
Aulodrilus pigueti	1	–	–	1	1	–	–	–
Dero pectinata	2	–	–	–	–	–	–	–
Eclipidrilus sp.	–	5	–	3	3	1	4	–
Eclipidrilus palustris	–	–	–	–	–	–	1	–
Haber speciosus	–	–	–	–	–	–	1	–
Limnodrilus hoffmeisteri	2	–	4	3	4	1	16	2
Lumbriculus variegatus	–	–	41	–	–	–	–	2
Spirosperma ferox	–	–	–	–	5	–	–	–
Enchytraeidae	2	–	1	–	1	–	8	2
Gastropoda								
Amnicola sp.	–	–	1	7	4	3	–	–
Amnicola dalli johnsoni	–	–	–	–	–	–	12	–
Campeloma limum	–	–	–	–	–	1	–	–
Laevapex sp.	–	–	–	–	1	–	–	–
Littoridinops monroensis	–	–	–	–	–	–	–	2
Micromenetus sp.	–	–	–	–	–	–	–	2
Micromenetus dilatatus	–	3	–	–	–	–	–	–
Physella sp.	–	1	–	–	1	–	–	–
Planorbella duryi	–	–	–	–	1	–	–	–
Ancylidae	17	–	–	1	–	–	–	3
Gastropoda	–	1	–	–	–	–	–	–
Pelecypoda								
Corbicula fluminea	–	–	–	–	1	–	–	–
Elliptio sp.	–	–	1	–	–	–	–	–
Pisidiidae	3	8	39	7	18	15	17	24

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Acarina								
Hydrodroma sp.	–	–	–	6	–	–	–	–
Hygrobates sp.	–	1	–	–	–	–	1	–
Oribatei	–	–	1	–	–	–	–	–
Crustacea								
Caecidotea sp.	–	–	1	–	–	–	–	–
Palaemonetes sp.	–	–	–	1	–	–	–	–
Palaemonetes paludosus	–	–	–	–	–	4	–	–
Procambarus sp.	–	–	–	–	–	–	2	–
Ephemeroptera								
Acerpenna pygmaeus	1	–	6	1	–	6	4	–
Caenis sp.	2	1	6	–	–	1	1	–
Stenacron sp.	–	–	–	–	–	1	–	–
Stenonema exiguum	–	–	–	1	5	–	–	–
Stenonema smithae	3	–	–	–	–	2	1	–
Stenonema sp.	1	–	–	–	–	–	–	–
Tricorythodes albilineatus	1	–	–	–	–	–	–	–
Baetidae	–	–	–	–	4	–	–	–
Heptageniidae	–	–	–	–	–	2	–	–
Odonata								
Argia sp.	3	1	1	–	–	2	1	–
Calopteryx sp.	1	–	–	–	–	3	1	–
Enallagma sp.	2	1	1	2	–	–	–	–
Enallagma cardenium	–	1	–	–	–	–	–	–
Gomphus minutus	–	–	–	–	–	–	1	–
Ischnura sp.	–	–	–	–	1	–	–	–
Macromia sp.	1	–	1	1	–	2	–	–
Progomphus sp.	–	–	–	1	–	–	–	–
Coenagrionidae	–	2	–	–	–	–	–	–
Zygoptera	–	–	–	–	–	–	–	1
Odonata	1	–	–	–	–	–	–	–

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Plecoptera								
Leuctra sp.	–	–	–	–	–	3	–	–
Hemiptera								
Hemiptera	–	–	–	–	1	–	–	–
Coleoptera								
Ancyronyx variegata	9	–	4	6	–	2	–	–
Deronectes sp.	–	–	–	–	–	1	–	–
Dineutus sp.	–	–	1	–	–	–	–	–
Dubiraphia sp.	4	2	9	1	–	–	1	1
Dubiraphia vittata	–	1	–	–	–	–	–	–
Hydroporus sp.	2	–	1	–	–	–	–	–
Microcylloepus sp.	–	–	–	–	–	–	1	–
Microcylloepus pusillus	3	–	46	14	–	11	–	–
Scirtes sp.	–	–	–	–	1	2	–	–
Stenelmis sp.	11	4	–	–	1	17	–	2
Stenelmis hungerfordi	–	–	–	–	–	–	1	–
Tropisternus sp.	2	–	–	–	–	–	–	–
Elmidae	–	–	37	–	–	–	–	2
Trichoptera								
Cheumatopsyche sp.	1	20	18	1	1	2	3	4
Chimarra sp.	15	–	–	–	–	–	–	–
Hydropsyche sp.	–	–	–	2	–	–	–	–
Macrostemum carolina	–	–	–	–	–	–	–	1
Nectopsyche sp.	–	–	1	1	–	–	–	–
Nectopsyche candida	–	–	–	–	–	–	1	–
Nectopsyche exquisita	1	–	–	–	–	–	–	–
Oecetis sp.	–	–	–	–	–	3	–	2
Oecetis inconspicua cmplx.	–	–	–	–	–	–	1	–
Triaenodes sp.	2	–	–	3	–	–	–	–
Hydropsychidae	1	–	–	–	–	1	–	5
Trichoptera	1	–	1	1	–	1	–	–

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Lepidoptera								
Pyralidae	–	–	–	1	–	–	–	–
Diptera								
Ablabesmyia mallochi	1	–	–	1	–	2	2	4
Ablabesmyia rhamphe grp.	–	–	7	1	–	2	–	4
Conchapelopia sp.	8	–	–	–	–	–	2	–
Cryptochironomus sp.	1	–	1	–	1	–	–	–
Cryptotendipes sp.	–	–	–	–	–	–	2	–
Dicrotendipes neomodestus	–	–	–	1	–	–	–	–
Goeldichironomus amazonicus	–	–	1	–	–	–	–	–
Labrundinia becki	1	–	–	–	–	–	–	1
Labrundinia neopilosella	–	–	–	–	–	1	–	–
Labrundinia pilosella	1	–	1	–	–	–	–	–
Labrundinia virescens	1	–	–	–	–	–	–	–
Larsia decolorata	–	–	–	–	–	1	–	–
Mesosmittia sp.	–	–	–	–	1	–	–	1
Nanocladius sp.	–	3	1	–	–	–	–	–
Nilothauma sp.	–	–	–	–	1	–	3	–
Orthocladius annectens	1	–	–	–	–	–	–	–
Pagastiella sp.	–	–	–	1	–	–	–	–
Palpomyia/Bezzia grp.	–	–	–	1	3	2	20	1
Paracladopelma undine	–	–	–	–	–	–	1	–
Paralauterborniella nigrohalterale	–	–	–	–	–	1	–	–
Parametriocnemus sp.	4	–	4	1	4	2	5	–
Paratanytarsus sp. A Epler	–	–	1	–	–	–	–	–
Paratanytarsus sp. B Epler	–	1	–	–	–	–	–	–
Paratendipes subaequalis	–	–	–	–	–	–	2	–
Pentaneura inconspicua	–	–	–	–	–	7	2	1
Polypedilum sp.	–	–	–	1	–	–	–	–
Polypedilum convictum grp.	5	–	10	–	1	2	4	3

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8
Polypedilum fallax	–	–	1	4	–	–	–	–
Polypedilum halterale grp.	–	–	–	1	–	–	6	1
Polypedilum illinoense grp.	4	3	15	3	53	6	4	13
Polypedilum scalaenum grp.	1	–	1	–	5	4	2	9
Procladius sp.	–	–	–	1	1	–	–	–
Psectrocladius sp.	–	–	5	–	–	–	–	–
Rheocricotopus robacki	–	–	–	1	1	–	3	1
Rheotanytarsus sp.	–	11	–	–	–	–	–	–
Rheotanytarsus distinctissimus grp.	2	6	3	1	–	–	–	1
Rheotanytarsus exiguus grp.	–	22	6	–	–	1	1	–
Simulium sp.	2	–	–	–	–	4	2	1
Stenochironomus sp.	1	–	–	6	4	–	1	4
Tabanus sp.	–	–	–	–	1	–	–	–
Tanytarsus sp.	–	–	–	–	–	3	–	–
Tanytarsus sp. L Epler	–	–	–	1	–	–	–	–
Tanytarsus sp. S Epler	–	–	–	–	–	–	1	–
Tanytarsus sp. M Epler	–	–	–	–	–	1	1	–
Tanytarsus sp. D Epler	–	–	–	–	–	1	–	–
Tanytarsus sp. T Epler	–	–	–	–	–	2	–	–
Tanytarsus sp. G Epler	–	–	–	–	–	1	–	–
Thienemanniella sp.	–	–	–	–	1	–	–	–
Thienemanniella similis	–	–	1	–	–	–	–	–
Thienemanniella xena	–	–	1	–	–	–	–	–
Thienemannimyia grp.	1	–	–	–	–	–	–	–
Tipula sp.	1	–	–	–	–	–	–	–
Tribelos fuscicornis	–	–	–	3	4	–	–	–
Tribelos jucundus	–	–	–	–	–	–	–	1
Chironomidae	2	2	2	–	8	1	4	1
Empididae	–	–	–	–	1	–	–	–
Tipulidae	–	–	–	–	1	–	–	–
Diptera	–	–	–	–	–	–	–	1

Periphyton taxa list for Cecil Field Bioassessment, collected via standard diatometers on 3 October 1995. Abundance values are numbers/cm^2.

	Station 1	Station 2	Station 3
Cyanophyta			
Anabaena sp.	659	4267	–
Aphanocapsa sp.	659	776	–
Calothrix sp.	–	–	322
Chroococcus sp.	–	776	–
Lyngbya sp.	–	–	322
Lyngbya contorta	–	–	322
Microcystis sp.	659	776	–
Oscillatoria sp.	329	776	–
Rhabdoderma sp.	988	776	–
Synechococcus sp.	–	388	–
Chrysophyta			
Achnanthes sp.	–	1164	–
Achnanthes exigua	–	1552	322
Achnanthes hustedtii	–	1164	–
Achnanthes linearis	–	6595	322
Cocconeis placentula	–	388	–
Cyclotella meneghiniana	659	2716	967
Cymbella sp.	659	–	–
Cymbella minuta	–	1164	–
Eunotia sp.	3293	156726	4188
Eunotia incisa	–	3103	322
Eunotia naegelii	–	–	322
Eunotia pectinalis	2305	19397	644
Eunotia vanheurcki	1976	17069	2255
Frustulia rhomboides	1317	3879	644
Gomphonema sp.	–	388	–
Gomphonema affine	–	–	322
Gomphonema intricatum	329	–	–
Gomphonema parvulum	–	3103	967
Melosira granulata	–	2328	644
Navicula arvensis	–	–	1289
Navicula capitata hungarica	–	–	322
Navicula minima	–	9698	1289
Navicula placentula	329	–	–
Navicula viridula	–	–	322
Nitzschia amphibia	329	–	–
Nitzschia obtusa	329	388	–
Nitzschia palea	329	388	2900
Ophiocytium sp.	–	1552	322
Pinnularia biceps	–	1164	644
Pinnularia sp.	329	–	–
Stauroneis sp.	329	–	–
Synedra rumpens	–	388	–

Synedra ulna	–	1164	322
Pennales	–	3879	–
Chlorophyta			
Characium sp.	329	–	–
Chlamydomonas	–	776	3544
Chlorococcum sp.	329	–	644
Closterium sp.	–	388	–
Crucigenia sp.	–	388	322
Mougeotia sp.	–	1164	–
Oedogonium sp.	–	388	–
Pediastrum sp.	–	388	–
Scenedesmus sp.	–	776	–
Schroederia sp.	–	388	–
Staurastrum sp.	–	388	–
Stigeoclonium sp.	–	2716	–
Chlorophyceae	–	–	322
Euglenophyta			
Euglena sp.	–	–	322
Phacus sp.	–	–	322
Trachelomonas sp.	–	388	–
Cryptophyta			
Cryptomonas sp.	–	388	–

Phytoplankton taxa list for Cecil Field Bioassessment, collected via grab sample on 3 October 1995. Abundance values are numbers/mL.

	Station 1	Station 2	Station 3
Cyanophyta			
Anabaena sp.	–	–	8
Aphanocapsa sp.	–	10	32
Aphanothece sp.	–	10	–
Chroococcus sp.	10	103	63
Microcystis sp.	10	–	–
Oscillatoria sp.	10	10	47
Romeria sp.	10	–	–
Synechococcus sp.	21	103	39
Bacillariophyta			
Asterionella sp.	–	10	–
Cyclotella sp.	–	10	16
Cymbella sp.	10	–	–
Eunotia sp.	10	10	–
Gomphonema sp.	–	–	8
Melosira sp.	–	10	47
Navicula sp.	–	–	8
Nitzschia sp.	–	–	16
Pinnularia sp.	–	10	–
Pennales	21	10	–
Chorophyta			
Chlamydomonas sp.	10	–	16
Chlorococcum sp.	10	–	16
Gloeocystis sp.	–	10	–
Scenedesmus sp.	–	10	8
Staurastrum sp.	–	–	8
Tetraedron sp.	–	10	–
Desmidiaceae	10	–	–
Chlorophyceae	10	–	–
Euplgenophyta			
Lepocinclis sp.	–	31	–
Phacus sp.	21	41	–
Trachelomonas sp.	10	–	24
Euglenophyceae	–	10	–
Dinophytceae			
Peridinium sp.	10	–	8
Cryptophyta			
Cryptomonas sp.	–	–	8

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0020966	11 12 951003	17 18 X	19 5	20 4

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0020966	11 12 951003	17 18 B	19 5	20 4

Remarks

21 66