

Baseline Study for the Relocation of the City of Arcadia WWTP Effluent to the Peace River

DeSoto County

NPDES #FL0027511

Sampled March 1999

January 2000

Biology Section
Division of Administrative and Technical Services
Bureau of Laboratories

Comprehensive Quality Assurance Plan No. 870346G

Introduction

The City of Arcadia Wastewater Treatment Plant is located in DeSoto County, Florida (see maps in the Appendix). Treatment at this 2.0 MGD, domestic wastewater facility consists of a Type I trickling filter with filtration, clarification, chlorination, de-chlorination and re-aeration (see Facility Summary in Appendix). The treated effluent is then discharged into an unnamed tributary of the Class III Peace River. The actual mean flow during this survey was not recorded.

State permit limits for the City of Arcadia Wastewater Treatment Plant are listed in Table 1. According to the facility's monthly operating reports, the plant has been in exceedance of the state surface water quality standards for toxicity, un–ionized ammonia, fecal coliforms, silver and other assorted parameters (see Facility Summary in Appendix). The plant has had three violations of the permit limits within the past three years. These violations resulted from high flows during the months of July and October of 1998. Total Suspended Solids results were elevated during the months of April and May of 1998, and un–ionized ammonia had slight elevations during the month of May, 1998 (see Facility Summary in Appendix).

Methods

The purpose of this investigation was to assess the potential impacts of moving the City of Arcadia WWTP discharge from an unnamed tributary of the Peace River directly into the Peace River (see map in the Appendix). A comparison of biological community health was made between a proposed control site (in the Peace River, 167 meters upstream of the proposed discharge) and the proposed test site (in the Peace River, 333 meters downstream of the proposed discharge). A habitat assessment was performed *in situ* to establish comparability between sites. It should be noted that both of the proposed study sites are downstream of the current discharge.

Supplemental physical/chemical data were also collected on the effluent and study sites. Data for this report were collected on March 8–9, 1999. The effluent was analyzed for nutrients, metals, and organic constituents (base neutral and acid extractables, and pesticide extractables).

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

Benthic macroinvertebrates were evaluated at the proposed control and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip-net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers that were incubated for 28 days.

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

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

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

The following personnel were involved in this investigation: Charles Kovach and Wendy Hershfeld (DEP Southwest District), and Julie Baughman, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Michael Heyn, Elizabeth Miller, Urania Quintana,

Table 1. Effluent limits and summary of chemistry data.

City of Arcadia WWTP	Effluent Limits	Effluent Sample	Control Site	Test Site
Organic Constituents (µg/L)				
Simazine	-	0.59	-	-
Metals (µg/L)				
Aluminum	1500 **	714	-	-
Arsenic	50 **	20 U	-	-
Cadmium	1.93 **a	0.05 U	-	-
Chromium	359.73 **a	10 U	-	-
Copper	21.05 **a	2.6	-	-
Iron	1000 **	210	-	-
Lead	7.51 **a	1.26	-	-
Mercury	0.012 **	0.10 U	-	-
Nickel	279.1 **a	6.0 U	-	-
Selenium	5.0 **	35 U	-	-
Silver	0.07 **	0.04 U	-	-
Zinc	187.8 **a	16 I	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	0.024 Q	0.69 Q	0.70
Total phosphorus	-	0.089	0.75	0.76
Ammonia	-	2.0	0.035	0.023
Unionized Ammonia	≤ 0.02 **	0.16	0.002	0.0004
Nitrate+Nitrite	-	20	0.55	0.45
TKN	6.9 b	6.0 c	0.52	0.48
Organic Nitrogen	-	1.6	0.49	0.46
Total Nitrogen	-	23.6	1.07	0.93
General Phys-Chem Parameters				
Habitat Assessment	-	-	116	90
D.O. (mg/L)	≥ 6.0 *	5.8	10.2	9.4
pH (SU)	6.0 - 8.5 *	8.3	8.0	7.5
Conductivity (µmhos/cm)	**	1040	435	441
Temperature (°C)	-	19.5	20.1	19.1
BOD, 5 day (mg/L)	≥ 5.0 *	2 U	2 U	2 U
CBOD, 5 day (mg/L)	20 *c	3 c	-	-
Flow (MGD)	≤ 2.0 *	0.656 b	-	-
Hardness (mg $CaCO_3$)	-	196.4	-	-
AGP (mg dry wt/L)	-	42.2	28.5	39.6
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	-	Not Toxic	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-
Microbiology (# counts/100 ml)				
Fecal Coliforms	≤ 200 *b	1 K	30 J	22 J
Total Coliforms	≤ 1,000 **b	1 K	192	326 A

A - The mean of two or more determinations
I - Value is < the MQL, and ≥ the MDL
J - Estimated value
K - Actual value is less than value given
Q - Held beyond normal holding time
U - Not detected; value is the MDL

* Permit limit
** Class III standard
a - Based on hardness
b - Based on a monthly average
c - Based on 24-hour composite sample

Johnny Richardson, Lisa Homann, Amy Weaver, Steve Wolfe, David Whiting, and Vicki Whiting (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives.

Results

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

Discussion

This report provides baseline data for the proposed control and test sites in order to determine the potential impacts of relocating the City of Arcadia WWTP discharge from an unnamed tributary of the Peace River directly into the Peace River. This assessment will be used in conjunction with other information concerning the facility and its receiving water to determine appropriate recommendations.

Aluminum, copper, iron, lead, and zinc were detected in the effluent sample at levels that complied with Class III water quality standards (Table 1). The herbicide simazine was detected at a non-problem level (Table 1). The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

The effluent dissolved oxygen (5.8 mg/L) failed to comply

with the facility's permit limit (6.0 mg/L). All of the physical/chemical measures were comparable at the proposed control and test sites in the Peace River. Coliform bacteria counts were very low in the effluent sample and at the study sites (Table 1).

Most of the effluent nutrients were extremely elevated (e.g., total nitrogen at 23.6 mg/L, nitrate+nitrite at 20 mg/L, and ammonia at 2.0 mg/L). The effluent un–ionized ammonia concentration (0.16 mg/L) violated the Class III water quality standard (0.02 mg/L) (Rule 62-302.530 (3) FAC). At the proposed control and test sites, the concentrations of ortho-phosphate and total phosphorus were greater than 90% and nitrate+nitrite was greater than 80% of other typical Florida streams (see *Typical Values for Selected Parameters in Floriad Waters* in Appendix). During periods of low flow, the discharge if relocated to the Peace River, may increase the already elevated nutrient levels in this system. The remaining nutrients at the study sites were comparable and relatively low compared to other typical Florida streams (Table 1).

BIOLOGICAL BASELINE STUDY FOR PROPOSED CONTROL AND TEST SITES

According to Figure 1, which represents changes in the periphyton community, there was some evidence of nutrient enrichment at the test site compared to the control site. Periphyton chlorophyll *a* increased dramatically from the control site where it was undetected, to the test site (30 mg/m^2). However, both chlorophyll *a* samples were held beyond normal holding times. Algal density increased nearly 2,000% from the already elevated level at the control site (15,047 #/cm^2) to the test site (306,907 #/cm^2). AGP was very high at the control site (28.5 mg dry wt/L) and still higher at test site (39.6 mg dry wt/L). The AGP levels at both sites greatly exceed the 5 mg dry wt/L "problem threshold" where cultural eutrophication is likely to occur (Raschke and Schultz 1987).

Table 2. Algae community structure of study sites.

City of Arcadia WWTP	Control Site	Test Site
Phytoplankton Algae		
Number of Taxa	8	8
Shannon-Weaver diversity	1.08	1.3
Chlorophyll a (µg/L)	1.00 U	1.00 U
Algal Density (#/mL)	1,772	536.51
% Blue-green	1.6	0.8
% Green	0.8	3.9
% Diatoms	19.7	16.3
Periphyton Algae		
Number of Taxa	20	22
Shannon-Weaver diversity	2.41	2.91
Chlorophyll a (mg/m2)	0.11 UQ	30.0 Q
Algal Density (#/cm2)	15,047	306,907
Diatom/Diatom + B-G Ratio	1	0.99
%Blue-green	0	1.1
% Diatoms	95.8	95.9
AGP (mg dry wt/L)	28.5	39.6

U - Not detected; value is the minimum detection limit

These results indicate sources of nutrient enrichment in this portion of the Peace River, with possible elevation due to the influence of the existing wastewater discharge which is upstream of the study sites. There were no significant changes in the phytoplankton community (Table 2).

The habitat assessment score for the control site was in the "optimal" range and in the "suboptimal" range at the test site (see Habitat Assessments in the Appendix). The differences in the scores are due to the decreased width of the riparian buffer zone, the poorer vegetation quality, and artificial channelization at the test site. Despite these differences, the macroinvertebrate community at the test site did not appear to be negatively affected (see Table 3 and Figure 2). In the quantitative samples, taxa richness was 10% higher at the test site, and the Florida and EPT Indices were 19%, and 40% higher respectively, at the test site compared to control site. Shannon-Weaver diversity was extremely high at both sites (Table 3). Similar results were obtained from the dip–net samples (Table 3). The composite SCI scores at the control site (with 29 points) and test site (with 27 points) ranked both sites as "excellent" (see SCI worksheet in Appendix).

Overall, the proposed control and test sites appear similar in terms of the physical and chemical characteristics and in the overall biological communities. The one notable difference between the two

Table 3. Community structure of control and test sites.

City of Arcadia WWTP	Control Site	Test Site
Macroinvertebrate Qualitative		
% Dominant Taxon	27.4	16.8
EPT Index	2	3
Florida Index	8	7
Number of Taxa	31	26
SCI	29	27
Community Composition		
% Acariformes	2.7	0.0
% Coleoptera	8.9	5.6
% Diptera	22.6	39.3
% Ephemeroptera	0.7	0.9
% Gastropoda	27.4	15.9
% Odonata	4.8	4.7
% Oligochaeta	11.0	8.4
% Pelecypoda	17.8	22.4
% Trichoptera	1.4	2.8
% Other	2.7	0.0
Functional Feeding Groups		
% Burrowing Deposit Feeders	6.2	5.6
% Predators	19.9	5.6
% Surface Deposit Feeders	13.0	23.4
% Suspension Feeders/Filterers	21.2	32.7
% Scrapers	31.2	18.2
% Shredders	2.1	1.9
Macroinvertebrate Hester-Dendy		
Number of Taxa	31	34
Florida Index	16	19
Shannon-Weaver Diversity	3.70	3.73
EPT Index	5	7
Community Composition		
% Amphipoda	6.8	0.0
% Coleoptera	2.6	1.1
% Diptera	79.7	84.6
% Ephemeroptera	3.1	3.4
% Gastropoda	1.6	0.3
% Trichoptera	3.1	8.7
% Other	3.1	2.0
Functional Feeding Groups		
% Predators	27.0	32.1
% Surface Deposit Feeders	40.9	27.7
% Suspension Feeders	19.3	28.5
% Scrapers	4.2	2.3
% Shredders	6.0	7.7

study sites was the in–stream habitat. The test site received an overall lower score due to the decreased width of the riparian buffer zone, poorer riparian vegetation quality, and more artificial channelization. Another potential problem is the unnamed tributary above the proposed study sites that may introduce pollutants and ultimately obscure the effect of the discharge on the receiving water.

Literature Cited

Barbour, M. T., J. Gerritsen, and J. S. White. 1996. Development of the Stream Condition Index for Florida. Prepared for the Fla. Dept. Environ. Protection. 105 p.

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the nonpoint source program (draft). Prepared for the Fla. Dept. Environ. Protection. Unpaginated.

FDEP. 1994. Lake bioassessments for the determination of nonpoint source impairment in Florida. Fla. Dept. Environ. Prot. Biology Section, Tallahassee, Fla. 73 p.

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

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

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

Weber, C. I. 1993. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA,

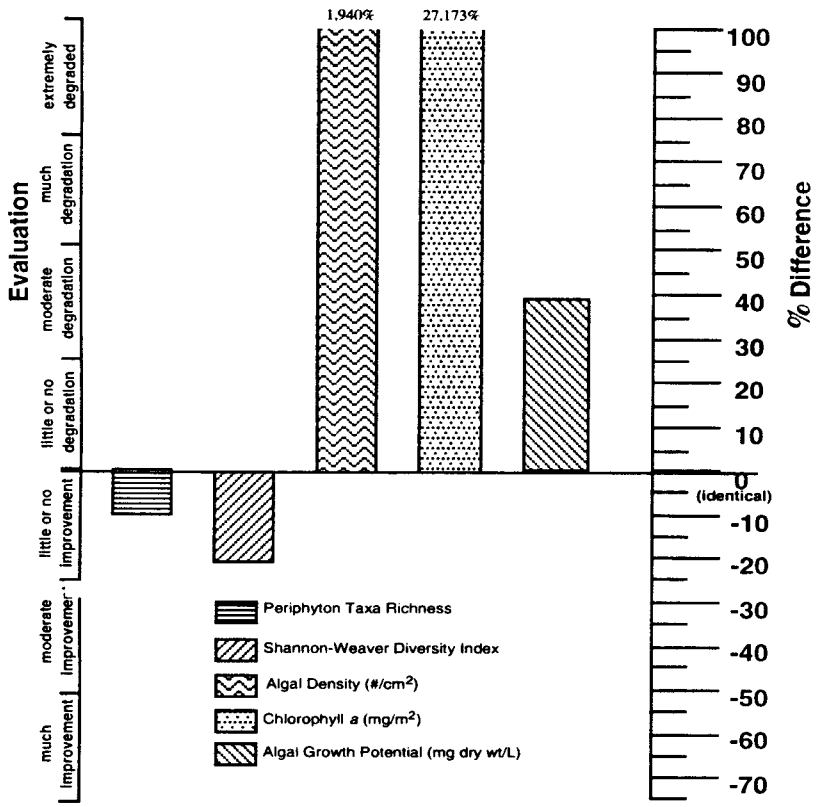


Figure 1. Effect of discharge on the periphyton community.

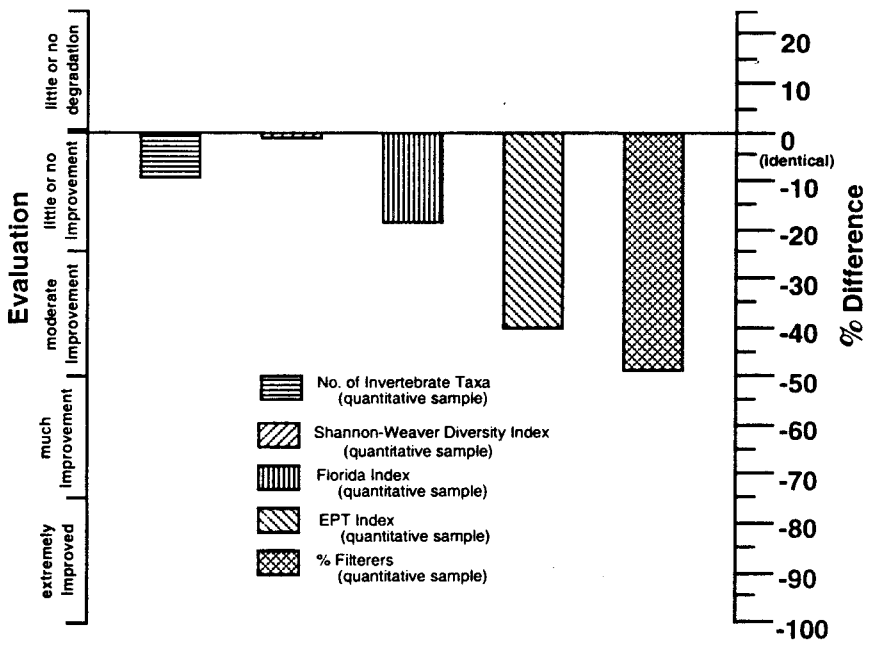


Figure 2. Effect of discharge on the macroinvertebrate community.

Typical Values for Selected Parameters in Florida Waters

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

Parameter	Percentile Distribution 5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30

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

Explanation of Measurements of Community Health

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

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

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

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

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. The Florida Index, assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy.

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

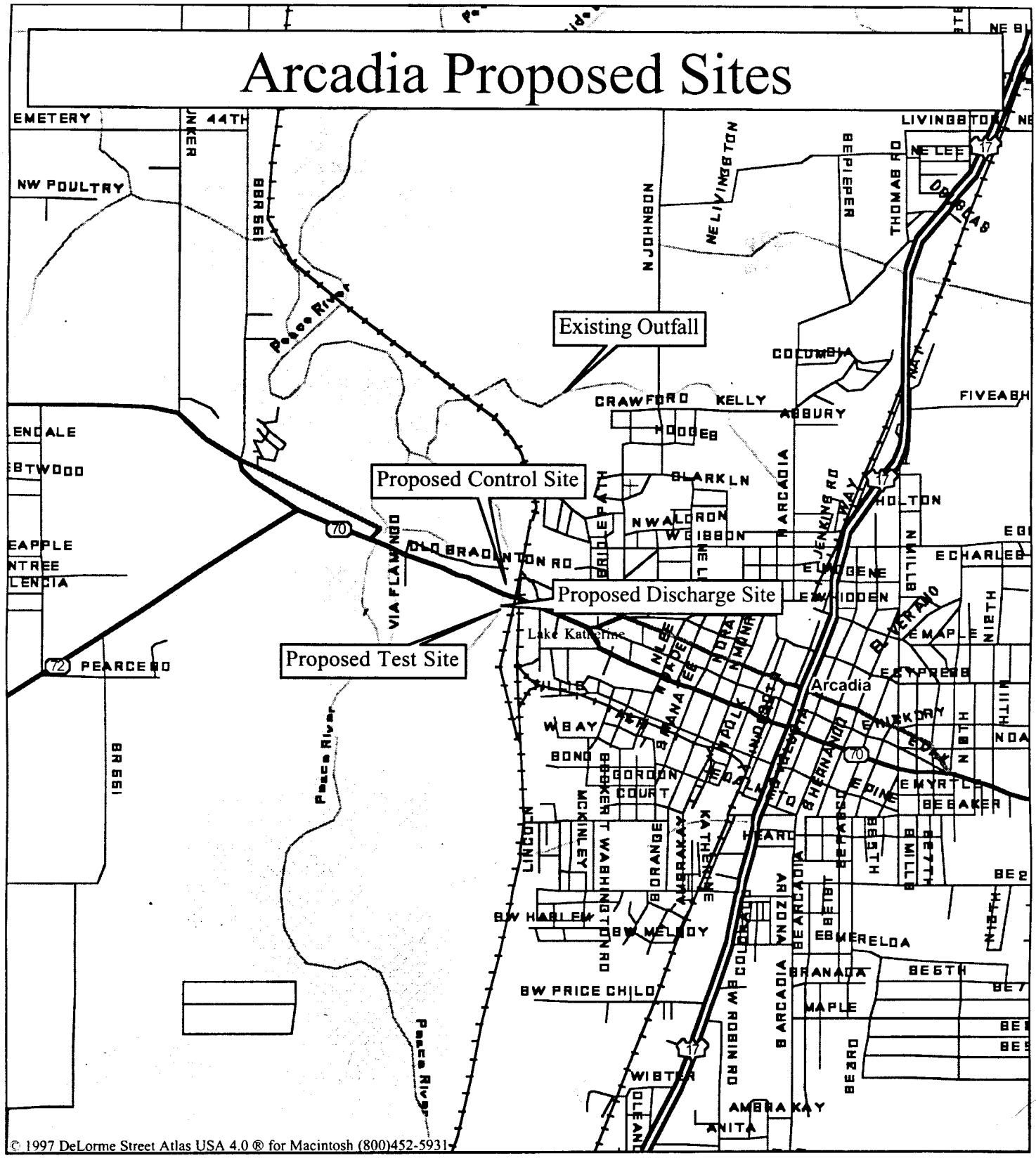
Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation.

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

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

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

Arcadia Proposed Sites



Mag 14.00
Mon Jan 03 14:10 2000

Scale 1:31,250 (at center)

2000 Feet

1000 Meters

- Local Road
- Major Connector
- State Route
- Primary State Route

Facility Summary Sheet for City of Arcadia WWTP's FYI-5 to be Conducted on March 8, 1999 Facility Name: City of Arcadia WWTP Date Summary Prepared: 3/2/99
Location: send map County: Desoto District: SW District
Function of Facility: Domestic wastewater treatment plant

Description of Treatment Process: A Type I trickling filter wastewater treatment plant with filtration, clarification, chlorination, de-chlorination and reaeration.

Receiving Waters: Unnamed tributary of the Peace River
Classification: Class III Fresh Water

Design Flow: 2.0 mgd Mean Flow: Flow during survey:

The Discharge is Continuous

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

Description of permitted outfall: The outfall is located approximately a mile north of the WWTP and is a cascade rearation trough. From the cascade the effluent discharges into a small creek, then to a freshwater herbaceous wetland that flows into the Peace River.

However, the purpose of this survey is to begin to assess the potential of moving the discharge directly into the Peace River. The City will conduct a WQBEL study this year, as required by the Consent Order. This survey will assess the discharge and points upstream and downstream of the potential discharge location, which is downstream of where the existing discharge enters the Peace River.

List permit violations and plant upsets that occurred within past 3 years: High flows in October and July 1998. TSS of 91 mg/l on 5/28/98 and 51 on 4/16/98. Unionized ammonia of 0.021 mg/l on 5/28/98.

Describe previous impact bioassessments, WQBELs, and previous and current enforcement actions: This facility been in exceedance of the state surface water quality standards and is under Consent Order. The violations occurred mostly in 1994-95. Self monitoring data reflected violations for toxicity, unionized ammonia, TKN, fecal coliform, Silver and other assorted parameters.

FYIs were conducted in April 1994 and April 1995, both of which added to the enforcement case. They documented water quality violations, and concluded that an imbalance in both flora and fauna was occurring in the receiving stream. Refer to these reports for details.

Discuss comparability of MOR/DMR results to past DEP results and whether there are trends in the data set: none

Additional Information:

Staff contributing to this review:
Wendy Hershfled (Biologist)
Joe Squitieri (Inspector)

PERMITTEE: City of Arcadia GMS ID No. 4014M00340
Permit No. DO14-203494

SPECIFIC CONDITIONS:

1. Drawings, plans, documents or specifications submitted by the permittee, not attached hereto, but retained on file at the Southwest District Office, are made a part hereof.

2. In accordance with Chapter 17-602, F.A.C., the required certified operator on site time is: Staffing by a class C or higher operator, 6 hrs/day for 5 days/week and one visit on each weekend day.

3. The discharge from the chlorine contact chamber shall be sampled in accordance with Chapter 17-601, F.A.C. and shall meet the following limitations:

Parameter	Unit	Min-imum	Maximum	Type Sample	Frequency
Permitted Capacity (flow)	mgd	.000	2.0 3-MA	flowmeter	continuous
pH**	std un	6.00	8.50	recorder	continuous
$CBOD_5$ & Total Suspended Solids	mg/L	0	20 annual avg.* 30 monthly avg. 45 weekly avg. 60 any one sample	24 hour FPC	weekly
	* or 90% removal, whichever is more stringent				
Temperature**	°C	--	--	grab	daily 7/wk
Cl_2 (Before De-Chlor)	mg/L	0.5	--	recorder	continuous
Fecal coliform	#/100	0	200 Annual Average 200 Monthly Avg.	grab	weekly
Diss. Oxygen	mg/L	6.0	-	grab	daily, 7/wk
Un-ionized Amm. (NH_3) **	mg/L	--	0.02(in the stream)	graph	weekly
TKN**	mg/L		9.7 @30°C, pH 6.5 3.0 @30°C, pH 7.0 1.0 @30°C, pH 7.5 0.5 @30°C, pH 8.0	24 hr FPC	weekly
Cl_2 (After De-Chlor)	mg/L	0	0.01	grab	daily, 7/wk

** Un-ionized ammonia compliance determined from graph attached (Item I-A) utilizing a given temperature, TKN, and pH as graph entry parameters. Graph entry parameters shall be recorded and reported on Monthly Operating Report to support each weekly un-ionized ammonia test.

3-MA = Three-Month Average
FPC = Flow proportioned composite
The results shall be reported monthly on DER Form 17-601.900(1).

4. Influent samples of $CBOD_5$ and TSS shall be taken weekly to determine per cent removal during the treatment process. Results shall be recorded and reported on the Monthly Operating Report in accordance with Rule 17-601.300(1).

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		3/9/99	1300	Peace River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
For proposed outfall	DeSoto	City of Arcadia WWTP	UPSTREAM

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20		7	60	10	2	1	

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

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

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

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

m wide		m wide	
≈ 125 ft	0.1 m/s	m/s	m/s
0.5 m deep	1.0 m deep	0.5 m deep	m deep

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

Artificially Impounded ☐ yes more sinuous

High Water Mark: 5 m (m above [reach] water level) + 1 m (present depth at m) = 6 m (m above bank)

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags) ✓	3			Sand	5		
Leaf Packs or Mats				Mud/Muck/Silt	3		
Aquatic Vegetation ✓	1			Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots ✓	5			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	0.5	20.07	7.98	10.22	0.435			
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:
W. Hershfeld / C. Kovach Wendy Hershfeld	W. Hershfeld	3/9/99

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		3/9/99	Peace River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Upstream	DeSoto	Proposed Upstream / City of Arcadia	

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components **Substrate Diversity** [18]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 (18) 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [16]	Greater than 30% productive habitat present at site. 20 19 1 8 17 (16)	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [7]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 1 8 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 (7) 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [17]	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
Primary Score [58]				
Secondary Habitat Components **Artificial Channelization** [14]	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
Bank Stability Right Bank [6] Left Bank [8]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. (8) 7 (6)	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [6] Left Bank [7]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 (7) (6)	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [7] Left Bank [8]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 (7) 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1
Secondary Sco. [58]				

[116] **TOTAL SCORE**

ANALYSIS DATE:	ANALYST:	SIGNATURE:
		Wendy Hendrickson

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-00)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		3/9/99	1040	Peace River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
For proposed outfall	DeSoto	Downstream / City of Arcadia WWTP	Downstream

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20		2	60	10	2	1	

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

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

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

Artificially Channelized ☐ no ☐ ☐ ☐ ☐
Artificially Impounded ☐ yes — recent, severe | some recovery | mostly recovered, more sinuous

High Water Mark: 1 m (m above present water level) + 0.7 (present depth in m) = 1.7 (m above bed)

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

m/s	0.1 m/s	m/s
m deep	m deep	m deep

JAS - after talking to WH 7/15/99

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

SEDIMENT/SUBSTRATE

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

Sediment Oils: Absent ☑ Slight ☐ Moderate ☐ Profuse ☐

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	3			Sand ☑	85		
Leaf Packs or Mats				Mud/Muck/Silt ☑	5		
Aquatic Vegetation ☑	4			Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	3			Draw aerial view sketch of habitats found in 100 m section			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.4	19.13	7.54	9.39	0.441			VOB
Mid-depth								
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:
W. Hershfield / C. Kovach	Wendy Hershfield	3/9/99

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		3/9/99	Peace River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
For Proposed Outfall	DeSoto	Downstream / City of Arcadia	

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity [16]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 (16)	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [12]	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 (12) 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [7]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 (7) 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [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
Primary Score [51] [12]				
Secondary Habitat Components 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
Bank Stability Right Bank [5] Left Bank [7]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 (7) 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. (5) 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [2] Left Bank [5]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system (5) 4	Less than 6 m of native buffer zone due to intensive human activities 3 (2) 1
Riparian Zone Vegetation Quality Right Bank [2] Left Bank [7]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 (7) 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 (2) 1
Secondary Score [39]				

[90] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
		Wendy Kirkfield

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Arcadia (William Tyson WWTP)
County: DeSoto mf 9/7/99
Contact / District: W. Hershfeld / Southwest
NPDES Permit #: FL0027511
LIMS Sample #: 373203 LIMS Job #: TLH-1999-03-10-34
sample log 3/15/99 ow
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2
Incubator #2 Temperature Range 25.0-26.0°C
Room Temperature Range 24.0-25.0°C

Sample Collection: Date 3/9/99 Time 14:10
Test Beginning: Date 3/10/99 Time 14:30
Test Ending: Date 3/12/99 Time ~~14:00~~ 16:00 DW
Organism Batch #: 15 Diluent Batch #: 9
Organism Age: <24 hrs SRT toxicant batch #: ____
Test organism: Ceriodaphnia dubia

Remarks:

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	Cond. 24 h	Cond. 48 h
Ctl A	A	5	5	5	7.8		8.3	25.5		23.1	6.8		8.1	235		170
B	B	5	5	5			8.3			22.8			8.1			185
C	C	5	5	5			8.3			22.5			8.3			180
D	D	5	5	5			8.3			22.8			8.3			180
100% A	A	5	5	5	6.3		7.8	25.7		22.8	7.1		8.0	900		1005
B	B	5	5	5			7.8			22.7			8.0			1035
C	C	5	5	5			7.8			22.9			8.2			1070
D	D	5	5	5			7.8			23.1			8.1			1070
measured by:		FW	FW	DW	CH		DW	CH		DW	CH		DW	CH		DW
recorded by:		MF	FW	DW	AS		DW	AS		DW	AS		DW	AS		DW

Investigators' Signatures

Andrea S. Shumate
Tom Hershfeld
[illegible]
[illegible]
Marshall Faircloth
[illegible]

reviewer

form updated 5/22/98

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			not measured		AS	AS
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR100	CH	AS
Alkalinity (mg/L as $CaCO_3$):	—	75	30	Hach	CH	AS
Hardness (mg/L as $CaCO_3$):	—	85	200	Hach	CH	AS
Total ammonia (mg/L as N):	—	0.0175	2.57	Denver	CH	AS
Salinity:	—	—	0 ppt	YSI	CH	AS

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Arcadia (William Tyson WWTP)
County: DeSoto mf 9/17/99
Contact / District: W. Hershfeld / Southwest
NPDES Permit #: FL0027511
LIMS Sample #: 373203 LIMS Job #: TLH-1999-03-10-34
sample log 3/17/99 DW

Sample Collection: Date 3/9/99 Time 14:10
Test Beginning: Date 3/10/99 Time 13:00
Test Ending: Date 3/12/99 Time ~~17:00~~ 16:00 DW
Organism Batch #: 16 Diluent Batch #: Weil
Organism Age: 12 days SRT toxicant batch #: _____
Test organism: Cyprinella leedsi

Test Type: (Screening) / Definitive
Static / (Static Renewal) / Flow-through
Test Number: 2 of 2
Incubator #3 Temperature Range 24.5-25.0°C
Room Temperature Range 24.0-25.0°C

Remarks:

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) / (µmhos/cm)		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Ctl A	A1	5	5	5	7.8	8.1	8.3	25.3	24.2	24.7	7.1	7.8	7.8	230	255	270
Ctl B	A2	5	5	5	7.8	8.1	8.3	25.2	24.3	24.5	7.2	7.8	7.7	245	260	275
Ctl C	A3	5	5	5	7.9	8.2	8.4	24.8	24.3	25.0	7.2	7.8	7.9	240	255	270
Ctl D	A4	5	5	5	7.9	8.2	8.3	24.0	24.3	25.4	7.2	7.8	7.9	240	265	280
100% A	A5	5	5	5	6.5	7.5	7.6	24.6	24.3	25.1	7.1	7.5	7.6	900	1010	1100
100% B	A6	5	5	5	6.2	7.2	7.6	24.7	24.7	24.8	7.0	7.6	7.6	1005	1075	1125
100% C	A7	5	5	5	6.2	7.1	7.6	24.4	24.7	25.4	7.0	7.6	7.6	1006	1075	1125
100% D	A8	5	5	5	6.3	7.1	7.6	23.9	24.6	25.0	7.0	7.6	7.6	985	1070	1115
measured by:		FW	AS	DW	CH	AS	DW	CH	AS	DW	CH	AS	DW	CH	AS	DW
recorded by:		MF	AS	DW	AS	FW	DW	AS	FW	DW	AS	FW	DW	AS	FW	DW

Investigators' Signatures

Amber E. Shumate
Tina Lee Carter
Christina Hood
Dana Riley
Marshall Fairchild
Dana Riley
reviewer

form updated 5/22/98

Water Quality Parameters	Salt Water / (Well Water)	80% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			NOT	Measured	AS	
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR100	CH	AS
Alkalinity (mg/L as $CaCO_3$):	126	—	30	Hach	CH	AS
Hardness (mg/L as $CaCO_3$):	120	—	200	Hach	CH	AS
Total ammonia (mg/L as N):	0.0188	—	2.51	~~Denver~~ (A)	CH	AS
Salinity:	~~0.0188~~	—	0 ppt	YSI	CH	AS

(A) should read Denver AS 3/12/99

City of Arcadia WWTP – Control Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	31	≥27	26-14	<14	5
EPT Index	2	≥4	3-2	<2	3
# Chironomid Taxa	10	≥9	8-5	<5	5
% Contribution of Dominant Taxon	27.4	≤30	31-65	>65	5
% Diptera	22.6	-	≤52	>52	3
Florida Index	8	≥10	9-5	<5	3
% Suspension feeders/Filterers	21.2	≥15	14-8	<8	5
Total Score			**Peninsula**		**29**
Interpretation of Scores			**Excellent**		27-33
			Good		21-26
			Poor		14-20
			Severely Degraded		7-13

Winter Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

City of Arcadia WWTP – Test Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	26	≥27	26-14	<14	3
EPT Index	3	≥4	3-2	<2	3
# Chironomid Taxa	11	≥9	8-5	<5	5
% Contribution of Dominant Taxon	16.8	≤30	31-65	>65	5
% Diptera	39.3	-	≤52	>52	3
Florida Index	7	≥10	9-5	<5	3
% Suspension feeders/Filterers	32.7	≥15	14-8	<8	5
Total Score			**Peninsula**		**27**
Interpretation of Scores			**Excellent**		27-33
			Good		21-26
			Poor		14-20
			Severely Degraded		7-13

Winter Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

Periphyton taxa list and densities (#/cm^2) for City of Arcadia WWTP, collected via glass microscope slides in Peace River, on 08 March, 1999.

	Control Site	Test Site
Bacillariophyceae		
Achnanthes curvirostrum	250	–
Achnanthes exigua	417	37511
Achnanthes hauckiana	1584	11935
Achnanthes lanceolata	750	30691
Achnanthes sp.	125	–
Amphora sp.	42	–
Bacillaria paradoxa	125	3410
Capartogramma crucicula	125	–
Cocconeis fluviatilis	7502	93777
Cocconeis placentula	709	65928
Cyclotella sp.	42	–
Cymbella minuta	42	–
Diploneis ovalis	42	–
Eunotia sp.	–	1137
Gomphonema angustatum	–	2273
Melosira sp.	333	24439
Navicula capitata	167	1137
Navicula confervacea	42	–
Navicula pupula	–	2273
Navicula sp.	458	4547
Navicula viridula	–	1137
Nitzschia palea	–	1137
Nitzschia sp.	42	–
Pennales sp.	1584	11935
Surirella turgida	–	1137
Synedra ulna	42	–
Chlorophyceae		
Characium sp.	42	568
Oedogonium sp.	–	568
Scenedesmus sp.	–	2842
Spermatozoopsis sp.	42	–
Stigeoclonium sp.	542	2273
Tetraedron sp.	–	568
Undetermined Chlorophyceae	–	1705
Cryptophyceae		
Undetermined Cryptophyceae	–	568
Cyanophyceae		
Lyngbya sp.	–	1137
Synechococcus sp.	–	2273

Phytoplankton taxa list and densities (#/mL) for City of Arcadia WWTP, collected via subsurface grabs in Peace River, on 08 and 09 March, 1999.

	Control Site	Test Site
Bacillariophyceae		
Achnanthes sp.	–	8
Centrales sp.	–	12
Eunotia sp.	14	–
Melosira sp.	293	21
Navicula sp.	14	12
Nitzschia sp.	28	17
Pennales sp.	–	17
Chlorophyceae		
Chlamydomonas sp.	14	–
Scenedesmus sp.	–	8
Spermatozoopsis sp.	1382	420
Undetermined Chlorophyceae	–	12
Cyanophyceae		
Aphanocapsa sp.	–	4
Chroococcus sp.	14	–
Oscillatoria sp.	14	–
Euglenophyceae		
Undetermined Euglenophyceae	–	4

Benthic macroinvertebrate taxa list for City of Arcadia WWTP, collected via Hester-Dendy artificial substrates in Peace River, on 09 March, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site
Amphipoda		
Hyalella azteca	17	–
Coleoptera		
Dineutus sp.	–	3
Hydrocanthus oblongus	2	–
Stenelmis sp.	6	3
Diptera		
Ablabesmyia mallochi	6	3
Ablabesmyia rhamphe grp.	4	–
Ceratopogonidae	4	–
Chironomidae	21	44
Corynoneura sp. B Epler	2	2
Corynoneura sp.	–	2
Dicrotendipes neomodestus	–	3
Hemerodromia sp.	3	12
Labrundinia pilosella	4	8
Labrundinia sp.	–	6
Nanocladius sp.	–	3
Nilothauma sp.	3	2
Palpomyia / Bezzia grp.	48	24
Pentaneura inconspicua	11	61
Polypedilum convictum grp.	2	66
Polypedilum fallax	2	2
Polypedilum illinoense grp.	2	–
Polypedilum scalaenum grp.	10	4
Rheocricotopus robacki	–	2
Rheotanytarsus distinctissimus grp.	–	7
Rheotanytarsus exiguus grp.	–	41
Tanytarsus sp. A Epler	68	88
Tanytarsus sp. C Epler	13	20
Tanytarsus sp. L Epler	2	–
Tanytarsus sp. S Epler	2	2
Tanytarsus sp. T Epler	2	–
Tanytarsus sp.	2	4
Ephemeroptera		
Caenis sp.	6	10
Heptageniidae	2	–
Stenonema exiguum	2	7
Gastropoda		
Ferrissia sp.	3	–
Micromenetus sp.	–	2
Physella sp.	2	–

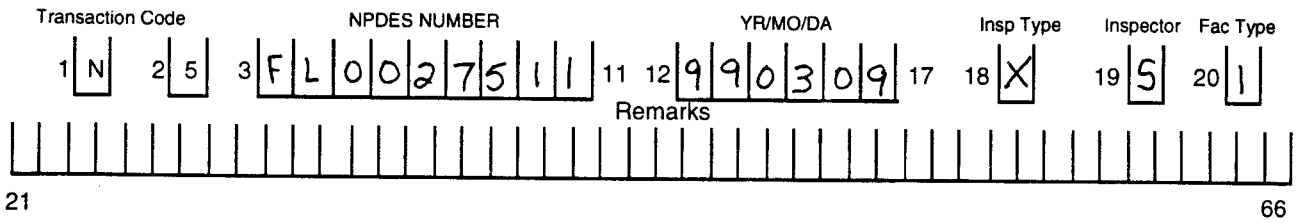
Megaloptera		
Corydalus sp.	–	2
Odonata		
Argia sedula	3	–
Enallagma cardenium	–	3
Hetaerina sp.	–	2
Oligochaeta		
Limnodrilus hoffmeisteri	–	2
Nais communis complex	2	2
Slavina appendiculata	3	2
Pelecypoda		
Undetermined Pelecypoda	2	–
Trichoptera		
Cheumatopsyche sp.	–	23
Cyrnellus fraternus	3	2
Hydroptilidae	2	6
Neureclipsis crepuscularis	–	10
Neureclipsis melco	4	2
Oxyethira sp.	–	2

Benthic macroinvertebrate taxa list for City of Arcadia WWTP, collected via 20 discrete dip net sweeps in Peace River, on 08 March, 1999.

	Control Site	Test Site
Acarina		
Hygrobates sp.	1	–
Limnesia sp.	2	–
Coleoptera		
Dineutus sp.	–	1
Dubiraphia vittata	2	–
Gyrinus sp.	2	–
Stenelmis sp.	4	3
Decapoda		
Palaemonetes sp.	1	–
Diptera		
Chironomidae	4	4
Cladotanytarsus sp.	1	2
Cryptochironomus sp.	1	–
Cryptotendipes sp.	–	1
Dicrotendipes modestus	–	1
Dicrotendipes neomodestus	–	1
Dicrotendipes sp.	–	1
Palpomyia / Bezzia grp.	3	1
Parakiefferiella sp.	1	–
Pentaneura inconspicua	1	–
Polypedilum convictum grp.	1	1
Polypedilum halterale grp.	1	–
Polypedilum scalaenum grp.	1	2
Rheotanytarsus exiguus grp.	–	1
Stempellina sp.	1	5
Tanytarsus sp. A Epler	4	3
Tanytarsus sp. C Epler	1	1
Ephemeroptera		
Caenis sp.	1	–
Tricorythodes albilineatus	–	1
Gastropoda		
Hydrobiidae	7	2
Pyrogophorus platyrachis	3	7
Undetermined Gastropoda	11	–
Nemertea		
Undetermined Nemertea	1	–
Odonata		
Argia sp.	2	2
Coenagrionidae	1	–
Enallagma sp.	1	–
Hetaerina sp.	–	1
Macromia illinoiensis	1	–

Oligochaeta		
Dero digitata complex	3	2
Eclipidrilus sp.	1	–
Limnodrilus hoffmeisteri	4	2
Nais communis complex	1	–
Nais communis	–	1
Slavina appendiculata	1	1
Pelecypoda		
Corbicula fluminea	–	8
Corbicula sp.	3	–
Sphaeriidae	–	3
Undetermined Pelecypoda	11	2
Trichoptera		
Hydropsyche sp.	–	1
Nectopsyche sp.	1	–
Oecetis sp. A	–	1
Oecetis sp.	–	1
Turbellaria		
Undetermined Turbellaria	1	–

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



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