

Biological Assessment of

City of Clearwater–Marshall Street Wastewater Treatment Plant

Pinellas County

NPDES #FL0021857

Sampled August 1999

July 2000

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger: City of Clearwater - Marshall Street
County: Pinellas
NPDES Number: FL0021857
Permit Expiration Date:

Toxics Sampling Inspection (**XSI**)	
Date Sampled:	16, 17 August 1999
Results:	Aluminum, cadmium, chromium, nickel, and zinc were detected in the effluent sample at levels that complied with Class III water quality standards. Copper was detected in the effluent sample at a level that exceeded Class III marine water quality standards (Rule 62.302-530(24) FAC). No organic priority pollutants were detected in the effluent sample.

Compliance Biomonitoring Inspection (**CBI**)	
Date Sampled:	16, 17 August 1999
Results:	The effluent was not toxic to the invertebrate, *Ceriodaphnia dubia,* or to the fish, *Cyprinella leedsi,* during the 48-hour bioassay.

Impact Bioassessment Inspection (**IBI**)	
Date Sampled:	27 August 1999
Results:	Stevenson Creek is tidally influenced so, control site was located directly upstream of the facility and it appears to have impacted by the discharge. This is seen in the benthic and algal communities. The communities were similar and severely degraded at the study sites. In the phytoplankton samples, chlorophyll *a* was elevated at the control site (19.1 µg/L) and test site (9.0 µg/L). Algal densities were also elevated, especially at the control site. In the Ponar samples, both sites had extremely low taxa richness and diversity values and were dominated by pollution–tolerant organisms. However, without an adequate control site it is impossible to rule out the effect of other pollution sources in the watershed that may be effecting the receiving waters.

Water Quality Inspection (**WQI**)	
Date Sampled:	17 August 1999
Results:	The nutrient concentrations were similarly elevated at the two study sites. For example, ortho-phosphate, TKN, and total phosphorous levels at both study sites exceeded those levels normally found in 75% of Florida's estuaries. The Algal Growth Potential (AGP) exceeded the 10 mg dry wt/L "problem threshold" at the test site, yet was below the threshold at the control site. Effluent AGP was 30.0 mg dry wt/L.

This biological assessment was prepared by DEP staff to provide information to be used in reviewing an NPDES permit renewal application for the subject facility. This assessment will be used in conjunction with other information concerning the facility effluent and its receiving water body to determine appropriate final permit conditions.

Introduction

The City of Clearwater—Marshall Street Wastewater Treatment Plant is located in Pinellas County, Florida (see map in the Appendix). This domestic waste facility is a Type I advanced wastewater treatment system with Bardenpho process that discharges filtered, chlorinated, and subsequently dechlorinated reclaimed water via a submerged outfall pipe that extends into Stevenson Creek, a Class III marine water body. The design flow of the wastewater system is 10.0 MGD continuous discharge. The mean flow during this survey was 7.5 MGD with 6.0 MGD functionally discharged into the receiving water; the remainder going to the facility's reclaimed water system.

State permit limits for the wastewater treatment plant are listed in Table 1. According to the facility's monthly operating reports, in February 1998, the plant exceeded its monthly TSS permit limit of 6.25 mg/L with a value of 7.2 mg/L (during one week the level was 24.0 mg/L). Also, in March 1998, the facility exceeded a TSS weekly permit limit of 7.5 mg/L with a concentration of 8.8 mg/L (see Facility Summary in Appendix). There were no toxicity violations.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a control site (located upstream of the point of discharge) and a test site (located downstream of the discharge) (see map in the Appendix). Biology samples were collected and a habitat assessment was performed *in situ* to establish comparability between sites on August 27, 1999, during a flood tide. Supplemental chemical data were collected on the effluent and study sites on August 16 and 17, 1999. The effluent was sampled prior to entering the discharge pipe, both grab and composite samples were analyzed for nutrients, metals, volatile organics, semi-volatile organics, organonitrogen and phosphorus pesticides, and organochlorine.

Acute screening toxicity bioassays, using the invertebrate, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi,* as test organisms, were performed on an effluent sample. Sediments from the control and test site were analyzed for grain size and percent organic matter. Bacterial populations were analyzed for total and fecal coliforms.

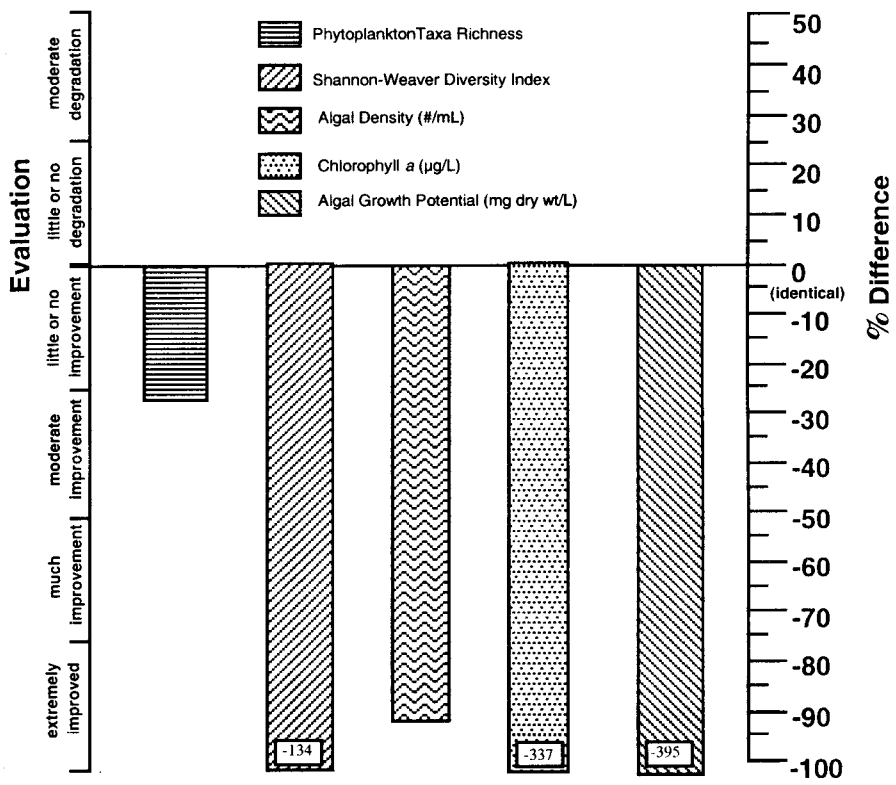


Figure 1. Effect of discharge on the phytoplankton community.

Table 1. Effluent limits and summary of chemistry data.

City of Clearwater - Marshall Street	Effluent Limits	Effluent Sample	Control Site	Test Site
Organic Constituents (µg/L)				
None Detected	-	-	-	-
Metals (µg/L)				
Aluminum 167	1,500 **	58 I b	-	-
Aluminum 308	-	140 I	-	-
Arsenic	50 **	4.0 U	-	-
Cadmium	9.3 **	0.102 I	-	-
Chromium	50 **	0.86 I	-	-
Copper	2.9 **	7.25 A	-	-
Iron 259	300 **	7.0 U	-	-
Lead	3.0 *	0.25 U b	-	-
Mercury	0.025 **	0.1 U	-	-
Nickel	8.3 **	2.4 I	-	-
Selenium	5.0 **	1.2 U	-	-
Silver	2.3 **	0.14 A	-	-
Zinc	86 **	35 A	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	0.74	0.11 A	0.15
Total phosphorus	1.0 *ab	0.015 UQb	0.2	0.28
Ammonia	-	0.04	0.046 A	0.083
Nitrate+Nitrite	-	0.52 J	0.25	0.45
TKN	-	0.060 UQb	0.98 J	1.2 J
Organic Nitrogen	-	0.02	0.934	1.12
Total Nitrogen	3.0 *ab	0.58	1.23	1.65
General Phys-Chem Parameters				
Habitat Assessment	-	66	59	63
DO (mg/L) - top	7.5 *	4.7	4.1	4.4
DO (mg/L) - mid	-	5.3	4.7	5.1
DO (mg/L) - bottom	-	4.2	3.8	4.3
pH (SU) - top	6.0 - 8.5 **	7.5	7.4	7.5
pH (SU) - mid	-	7.7	7.5	7.7
pH (SU) - bottom	-	7.7	7.6	7.7
Conductivity (µmhos/cm) -top	-	1,230	335	1,365
Conductivity (µmhos/cm) - mid	-	2,420	1,891	2,830
Conductivity (µmhos/cm) - bottom	-	3,300	2,830	3,560
Temperature (C) - top	-	32.0	30.8	31.3
Temperature (C) - mid	-	31.2	30.8	30.9
Temperature (C) - bottom	-	31.1	30.7	31.2
TSS (mg/L)	5.0 *b	1.0	4.0	3.0
Turbidity (NTU)	-	0.9	3.2	3.6
CBOD, 5 day (mg/L)	5.0 *b	-	-	-
BOD, 5 day (mg/L)	-	2 U	2 U	2 U
Flow (MGD)	10	7.5	-	-
AGP (mg dry wt/L)	-	30.0	2.1	10.4
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	-	Not Toxic	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	25 *	80 L	120 L	120 L
Total Coliforms	-	160 L	320 L	120 L

A - Value is mean of two or more determinations
I - Value is < the MQL, and ≥ the MDL
J - Estimated value
L - Actual value is known to be > the value given
Q - Sample held beyond normal holding tim
U - Not detected; value is the MDL

* Permit Limit
** Class III water quality standard
b - 24-hr Composite sample
c - Daily maximum

via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities. Algal Growth Potential (AGP) tests were performed using *Selenastrum capricornutum* as the test organism for the freshwater effluent and *Dunaliella tertiolecta* for the marine receiving-water sites.

Benthic macroinvertebrate communities were evaluated at the control and test sites using three replicate petite Ponar grabs. Several different measures of macroinvertebrate and algal community health have been employed to determine the effects of the discharge. These measurements include: taxa richness, Shannon-Weaver Diversity Index, community composition, functional feeding groups, and algal biomass. For discussion of each of these measures see the *Explanation of Measurements of Community Health* in the Appendix. All field and laboratory methods followed 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>.

The following personnel were involved in this investigation: Wendy Hershfield and Troy Eastman (DEP SW District), and Julie Baughman, Ken Espy, Marshall Faircloth, Michael Heyn, Lisa Homann, Joy Jackson, Edwin Loschi, Vicki McGee, Elizabeth Miller, Urania Quintana, Johnny Richardson, Landon Ross, David Whiting, and Steve Wolfe (DEP Central Biology Laboratory in Tallahassee).

The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont, and Michael Tanski, as well as District representatives.

Results

Shorelines at both study sites were mostly natural with some riprap (see Habitat Assessment Field Data Sheets in Appendix). Three community types were observed at the control site: mangroves, marshes, and tidal creeks. The test site contained four community types: mangroves, marshes, tidal creeks, and oyster bars. The substrate consisted mainly of anaerobic mud and fine sands at both sites. Seventy-two percent of the sediment particles at the control site and 85% of those at the test site were between 0.125 mm–0.5 mm in diameter.

Habitat scores were in the "good" category at each study site. The control site, with 59 points, was slightly lower than the test site with 63 points. The remaining results are in Tables 1 and 2.

Table 2. Community structure of study sites.

City of Clearwater - Marshall Street WWTP	Control Site	Test Site
Macroinvertebrate Quantitative		
Number of Taxa	3	4
Shannon-Weaver diversity	0.73	0.84
No. Polychaete Taxa	2	2
Community Composition		
% Amphipoda	0.0	0.9
% Gastropoda	0.0	3.5
% Pelecypoda	0.0	0.0
% Polychaeta	92.9	95.7
% Tubificidae	7.1	0.0
Functional Feeding Groups		
% Burrowing Deposit Feeders	14.3	13.0
% Predators/Carnivores	42.9	41.3
% Scrapers	0.0	3.5
% Surface Deposit Feeders	42.9	41.3
% Suspension Feeders	0.0	0.9
Phytoplankton Algae		
Number of Taxa	11	14
Shannon-Weaver diversity	1.2	2.81
Chlorophyll *a* (µg/L)	19.1	9.02
Algal Density (#/mL)	14,887	1,372
% Blue-green	2.3	9.2
% Cryptophytes	5.1	27.9
% Diatoms	83.2	48.6
% Dinoflagellates	0.0	0.4
% Green	9.4	13.9
AGP (mg dry wt/L)	2.1	10.4

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

Discussion

Stevenson Creek is a tidally influenced system and the control site, located only a short distance upstream of the point of discharge, appears to have been impacted by the facility's effluent. The chemical and biological results of the control and test sites were very similar and are indicative of impairment, making comparisons between the study sites tentative at best. The nutrient results, and the phytoplankton, and benthic community data, illustrate this point (Tables 1 and 2).

Aluminum, cadmium, chromium, nickel, silver, and zinc were detected in the effluent sample at levels that complied with Class III marine water quality standards (Table 1). Copper was detected in the effluent grab sample at a level that exceeded Class III marine water quality standards (Rule 62.302-530(24) FAC). (Table 1). No organic priority pollutants were detected in the effluent sample. The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

The effluent fecal coliform counts may have exceeded the facility's permit limit. The permit limit of 25 counts/100 ml is an annual average and the results from this inspection are for a single sample (> 80 counts/100 ml). It is difficult to determine if the remaining results complied with the facility's permit limits and

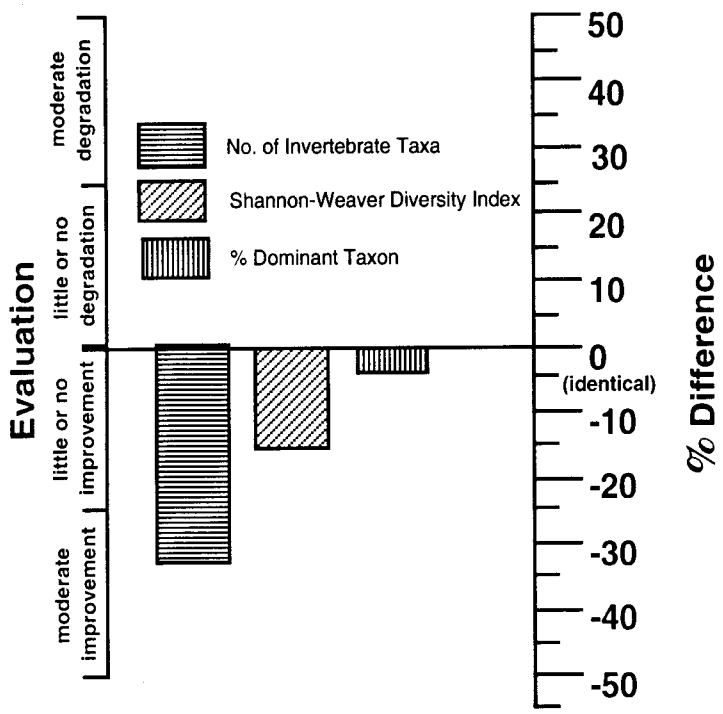


Figure 2. Effect of discharge on the macroinvertebrate community.

Class III water quality standards because the results from the District Laboratory indicated that the actual values were known to be greater than the value given (Table1).

Effluent nutrients complied with the facility's permit limits and did not appear to be elevated. (Table 1). Nutrient levels at the study sites, however, were elevated and very similar which suggests sources of nutrients in addition to the effluent (Table 1). For example, ortho-phosphate, TKN, and total phosphorus concentrations at both study sites exceeded those levels normally found in 75% of Florida's estuaries (see *Typical Values for Selected Parameters in Florida Waters* in Appendix). AGP, which measures bioavailable nutrients via algal response, was below the 10 mg dry wt/L "problem threshold" (Ron Raschke, U.S. EPA, pers. comm.) at the control site and just above the threshold at the test site (10.4 mg dry wt/L). The effluent AGP was 30.0 mg dry wt/L.

Both study sites showed signs of degradation in the phytoplankton communities. The test site measures, however, were significantly better than those of the control site. For example, at the test site, taxa richness was 27% higher, diversity was 134% higher, and chlorophyll *a* and algal density were significantly lower compared to the control site (Figure 1). Chlorophyll *a* was elevated at both study sites, exceeding 65% of those levels normally found in Florida's estuaries at the test site, and 90% at the control site (see *Typical Values for Selected Parameters in Florida Waters* in Appendix).

Both study sites appeared to be severely degraded with respect to the macroinvertebrate communities (Table 2). Macroinvertebrate taxa richness, Shannon-Weaver diversity, and number of polychaete taxa were extremely low at the control and test sites. Roughly 95% percent of other typical estuaries in Florida have greater a number of taxa and diversity compared to the benthic communities in Stevenson Creek (see *Typical Values for Selected Parameters in Florida Waters* in Appendix). Both sites were dominated by the pollution-tolerant capitellid polychaetes≠ as well as *Laeonereis culveri*, with 93% and 96% contribution of the dominant taxon at the control and test site, respectively (Table 2). Pelecypods, normally indicators of "good" water quality, were absent from both study sites.

In summary, both study sites in the tidally influenced Stevenson Creek appear impaired. However, because the control site was located only a short distance above the discharge, it may have been influenced by the effluent. This study can not be adequately determine the extent to which the surrounding watershed or the effluent is responsible for this impairment.

Literature Cited

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.

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.

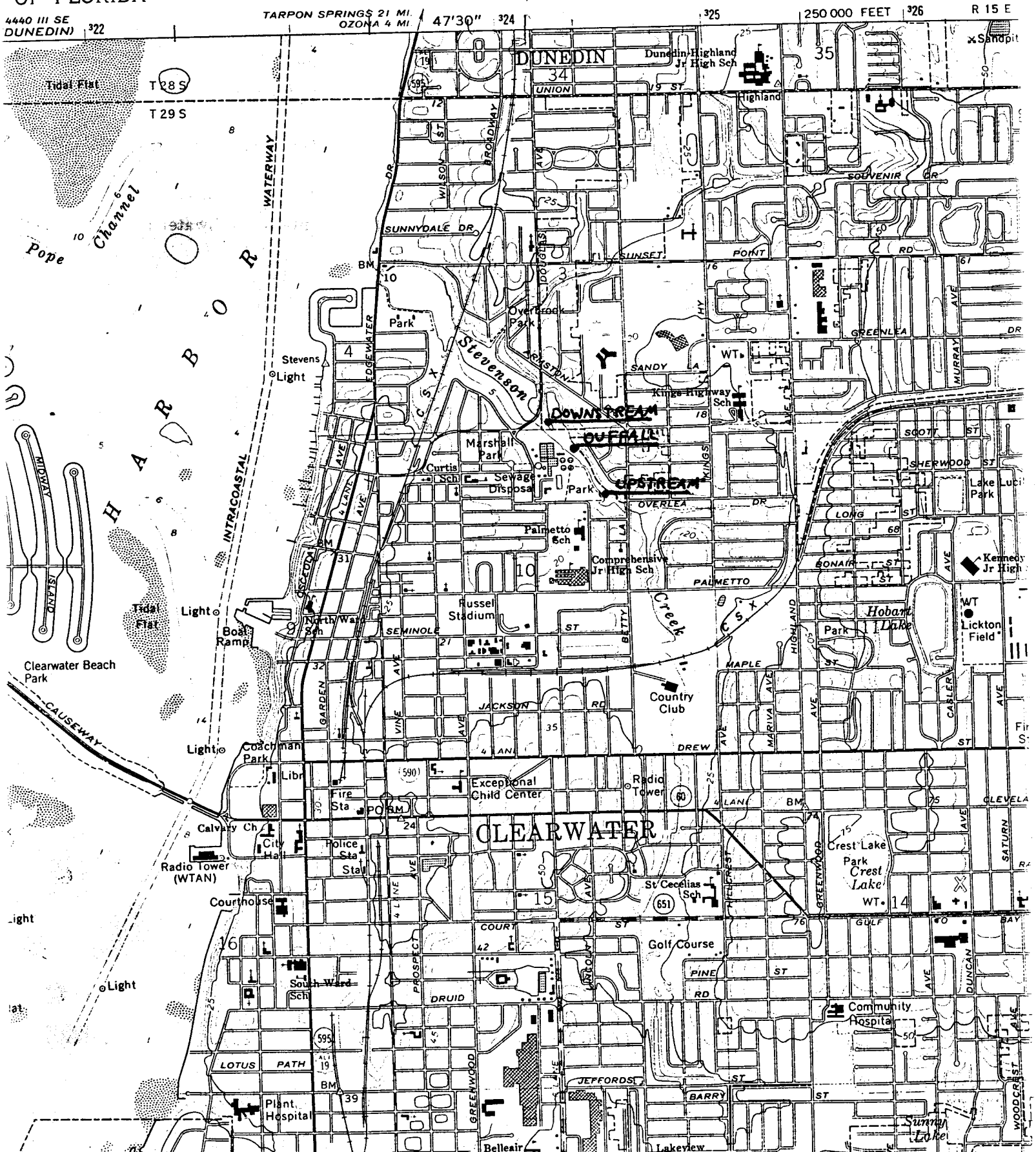
Ross, L. T 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

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

City of Clearwater
Basin Study
RQ-1999-08-16-22

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OF FLORIDA



Facility Summary Sheet for the City of Clearwater-Marshall Street WWTP's FYI-5/Basin Study Conducted on August 17-18, 1999

Facility Name: City of Clearwater-Marshall Street WWTP Date Summary Prepared: 8/23/99

Location: send map County: Pinellas District: SW District

Function of Facility: Domestic wastewater treatment plant

Description of Treatment Process:
A Type I advanced wastewater treatment plant with Bardenpho process discharging filtered, chlorinated and dechlorinated reclaimed water to Stevenson Creek.

Receiving Waters: Stevenson Creek

Classification: Class III Marine Water ✓

Design Flow: 10.0 mgd Mean Flow: 7.0 mgd (ann. avg.) Flow during survey: 7.5; approx. 6.0 to SW

The Discharge is Continuous: yes

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

Description of permitted outfall:
The effluent is discharged from the facility via submerged outfall pipe that extends into Stevenson Creek.

List permit violations and plant upsets that occurred within past 3 years:

No toxicity violations
3/98 -TSS monthly limit of 6.25 exceeded with a 7.2 and weekly limit of 7.5 exceeded with a 24.
2/98 -TSS weekly limit of 7.5 exceeded with a 8.8

Describe previous impact bioassessments, WQBELs, and previous and current enforcement actions:

Fifth Year Inspection sampled in February 1996

Discuss comparability of MOR/DMR results to past DEP results and whether there are trends in the data set:

N/A

Additional Information: All flow reported is not discharged to surface waters; approximately 1 to 2 MGD/day goes to the reclaimed water system, and this volume should increase in the future.

Staff contributing to this review:

Wendy Hershfeld (Biologist)
Joe Squitieri (Inspector)

WARNING: UNVERIFIED DATA

FL DEP SW District Chemistry Laboratory
3804 Coconut Palm Drive
Tampa, FL 33619
ph # 813-744-6100 DEP CompQAP # 880078

Project: CITY OF CLEARWATER Type: OTH Requested By:

Site	Date	Time	Depth	Log	Samplers
OUTFALL	990817	1131		25268	HERSHFELD
NOTE: RQ-1999-08-16-22					
FIELD BLANK	990817	1230		25269	HERSHFELD
UPSTREAM	990817	1100	0.75	25270	HERSHFELD
NOTE: STEVENSON CREEK - WATER					
DOWNSTREAM	990817	1030	0.5	25271	HERSHFELD
NOTE: STEVENSON CREEK - WATER					

Code	Parameter	Units	Site ID OUTFALL	Site ID FIELD BLANK	Site ID UPSTREAM	Site ID DOWNSTREAM
29	Log Number	LOG	25268	25269	25270	25271
10	WATER TEMP	deg C	31.81D		30.36D	30.46D
78	SECCHI	meters			0.4	VOB
94	CONDUCTIVITY (FIELD)	umho/cm	1.23		5.89	4.97
299	DISS. OXYGEN (PROBE)	mg/l	7.22D		4.23	4.84D
310	BOD5	mg/l	2U	2U	2U	2U
406	pH (FIELD)	units	7.54		7.20	7.14
530	RESIDUE, NONFILT.	mg/l	1	1U	4	3
			0.1		0.3	0.1
31501	TOTAL COLIFORM	#/100ml	160L	1K	320L	120L
31616	FECAL COLIFORM	#/100ml	80L	1K	120L	120L
82079	TURBIDITY	NTU	0.9	0.1U	3.2	3.6

A denotes mean, B counts unacceptable, J estimate, K less than
L greater than, OO data lost, P too numerous to count, Q out of
holding time, T value below detection limit, U not detected

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Continued - Final

1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge from outfall 001, sanitary wastewater.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Dissolved Oxygen shall not be less than 7.5 mg/l					7/Week	Grab	Effluent
Total Recoverable Lead, mg/l	--	--	--	0.003*	1/Month	24-hr Comp	Effluent
Chronic Whole Effluent Toxicity	(See Item 10, page I-4.)				See Part IV	24-hr Comp	Effluent
Acute Whole Effluent Toxicity	(See Item 9, page I-4.)				See Part IV	24-hr Comp	Effluent
Total Hardness** (as mg/l $CaCO_3$)	--	--	--	Report	1/Month	24-hr Comp	Effluent

* It was determined that a reasonable potential appears to exist for this metal to exceed FAC Section 17-302.560(24) (January 5, 1993) and a conditional limit has been placed in the permit. This metal shall be monitored 1/month as a 24-hour composite for one (1) year. At the end of the year of monitoring, EPA will review the data and determine if reasonable potential exists for a WQS's excursion to occur. If reasonable potential is proven to exist, the effluent limitation for this parameter shall become effective 18 months after the effective date of the permit. If reasonable potential is proven not to exist, the conditional limit will be deleted from the permit upon written notification from EPA.

** Total Hardness shall be collected at the same frequency and concurrently with any metals monitoring.

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Final

1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge from outfall 001, sanitary wastewater.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	Report	Report	Report	Report	Continuous	Recording flowmeter & totalizer	Effluent
Carbonaceous Biochemical Oxygen Demand, mg/l	5.0	6.25	7.5	--	Daily	24-hr Comp	Effluent
Total Suspended Solids, mg/l	5.0	6.25	7.5	--	Daily	24-hr Comp	Effluent
Total Nitrogen as N, mg/l	3.0	3.75	4.5	--	Daily	24-hr Comp	Effluent
Total Phosphorus (as P), mg/l	1.0	1.25	1.5	--	Daily	24-hr Comp	Effluent
Fecal Coliform Bacteria, N/100 ml	(See Item 3, Page I-3.)				Daily	Grab	Effluent
pH, Standard Units	(See Item 4, Page I-3.)				Continuous	Recorder	Effluent
Total Residual Chlorine, mg/l	(See Item 8, Page I-4.)				7/Week	Grab	Effluent

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:
	24040820	8/27/99	1130	Stevenson Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Stevenson	Pinellas	UPSTREAM	2532C

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)
				95	5		

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

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

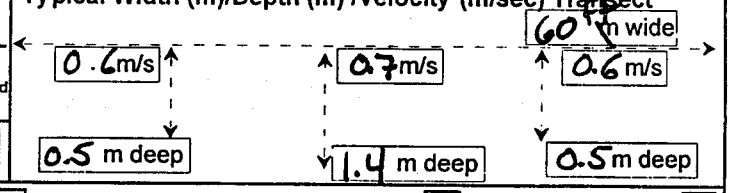
Width of riparian vegetation (m) on least buffered side: 0.5

List & map dominant vegetation on back

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

High Water Mark: 1.40 (wash) (m above present water level) + 1.4 (present depth in m) = 1.4 (m above bed)

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



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)				Sand	95		
Leaf Packs or Mats				Mud/Muck/Silt	5		
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	30.75	7.38	4.06	3.35	335		0.85
Mid-depth	0.7	30.81	7.46	4.65	14.91	1,891		
Bottom	1.4	30.74	7.60	3.76	28.3	2,830		

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:

Sunny, hot, slack high tide; clear skies

UPSTREAM OF STORMWATER DITCH (Residential)

27° 50' 47" 82° 47' 05"

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

SAMPLING TEAM:	SIGNATURE:	DATE:
W. Hershfeld / Troy Eastman	Wendy E. Hershfeld	8/27/99

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		8/27/99	Stevenson Creek

REMARKS:	LOCATION:	FIELD ID/NAME:
Stevenson Creek	UPSTREAM	25326

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 6	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 37	At least four communities observed from the following list: mangrove swamp✓, marsh✓, oyster bar✗, grass bed, reef, saltern, natural beach, or tidal creek.✓ **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 3	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type ~~9~~ 1	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 58

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
8/27/99	W. Hershfeld	Wendy E. Hershfeld

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:
	24040821	8/27/99	1100	Stevenson Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
City of Clearwater	Pinellas	Downstream - Stevenson	25328

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)
				95	5		

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

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

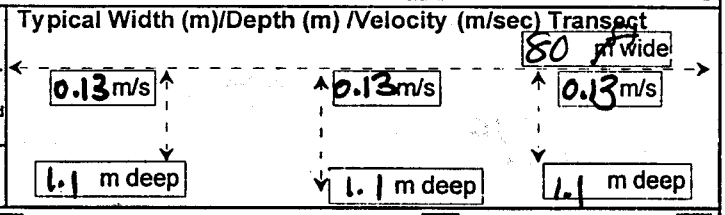
Width of riparian vegetation (m) on least buffered side: 10 — *List & map dominant vegetation on back*

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

Artificially Impounded ☐ yes — more sinuous

High Water Mark: ____ (m above present water level) + 1.1 (present depth in m) = ____ (m above bed)

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



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)				Sand	95		
Leaf Packs or Mats				Mud/Muck/Silt	5		
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	31.27	7.45	4.39	13.65	1,365		0.8
Mid-depth	0.5	30.93	7.66	5.14	28.3	2,830		
Bottom	1.1	31.16	7.66	4.30	35.6	3,560		

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: SCUM ON SURFACE CONSISTS OF OIL + FOAM

incoming tide

25°58'59" 82°47'17"

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

SAMPLING TEAM:	SIGNATURE:	DATE:
W. Hershfeld / T. Eastman	Wendy E. Hershfeld	

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:
	24040821	8/27/99	1100	Stevenson Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
City of Clearwater	Pinellas	Downstream - Stevenson	25328

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)
				95	5		

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

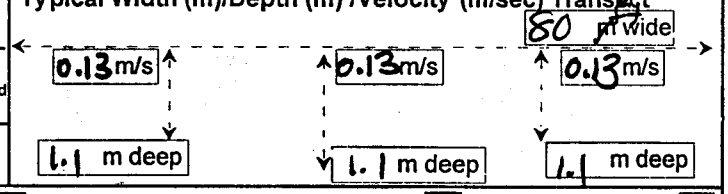
Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☑

Width of riparian vegetation (m) on least buffered side: 10 — *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 present water level) + 1.1 (present depth in m) = ____ (m above bed)

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



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)				Sand	95		
Leaf Packs or Mats				Mud/Muck/Silt	5		
Aquatic Vegetation				Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				***Draw aerial view sketch of habitats found in 100 m section***			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	31.27	7.45	4.39	13.65	1,365		0.8
Mid-depth	0.5	30.93	7.66	5.14	28.3	2,830		
Bottom	1.1	31.16	7.66	4.30	35.6	3,560		

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: SCUM ON SURFACE CONSISTS OF OIL + FOAM
incoming tide
25°58'59" 82°47'17"

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

SAMPLING TEAM:	SIGNATURE:	DATE:
W. Hershfeld / T. Eastman	Wendy E. Hershfeld	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		8/27/99	Stevenson Creek

REMARKS:	LOCATION:	FIELD ID/NAME:
	DOWNSTREAM	25328

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 6	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 38	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 4	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 3	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 3	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 63

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
8/27/99	W. Hershfeld	Wendy E. Hershfeld

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: ~~Herschfeld~~ (Incorrect name from label) City of Clearwater Marshall ST. WWTP
County: PINELLAS
Contact / District: Wendy Herstfeld / SE TAMPA
NPDES Permit #: FL00 21857
LIMS Sample #: 402891 LIMS Job #: TLH-1999-08-18-11
sample log
Test Type: (Screening) I Definitive
(Static) I Static Renewal I Flow-through
Test Number: 2 of 2

Remarks:

Sample Collection: Date 8-17-99 Time 1130
Test Beginning: Date 8/18/99 Time 14:00
Test Ending: Date 8/20/99 Time 1350
Organism Batch #: 62 Diluent Batch #: well H2O
Organism Age: 11 Days SRT toxicant batch #: NA
Test organism: Cyprinella leedsi

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	24 h	48 h
Control A	A17	5	5	5	7.7	8.1	8.2	24.0	24.9	24.5	7.8	6.7.2	8.1	245	260	260
Control B	A18	5	5	5	7.7	8.1	8.2	24.0	24.9	24.8	7.8	7.3	8.2	245	260	260
Control C	A19	5	5	5	7.7	8.2	8.2	23.9	24.9	24.8	7.8	7.2	8.1	245	260	260
Control D	A20	5	5	5	7.7	8.2	8.2	24.0	25.0	24.9	7.8	7.4	8.1	245	260	260
100% A	A21	5	5	5	7.9	8.2	8.2	24.0	24.9	25.3	7.8	7.3	7.9	1310	1245	1405
100% B	A22	5	5	5	7.9	8.2	8.2	24.0	24.8	25.3	7.8	7.3	7.9	1315	1340	1420
100% C	A23	5	5	5	7.9	8.2	8.2	24.0	25.1	24.8	7.8	7.1	8.1	1320	1365	1400
100% D	A24	5	5	5	7.9	8.2	8.2	24.0	25.3	24.7	7.8	7.1	8.0	1315	1345	1405
measured by:		DW	MF	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF
recorded by:		DW	MF	DW	MF	SG	CH	MF	SG	CH	MF	SG	CH	MF	SG	CH

Investigators' Signatures
Marshall Faircloth
Shannon Gerardi
Courtney Hunt
A H Wolfe
reviewer

form updated 3/3/99

Temperature Range °C
Incubator # 3 25.0-25.5°C
Room 24.0-25.0°C

Water Quality Parameters	Salt Water (Well Water)	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			not measured.			
Lab Total Residual Cl2 (mg/L):	<0.03		0.06	DR100	MF	MF
Alkalinity (mg/L as $CaCO_3$):	130		169	Hach	SG	MF
Hardness (mg/L as $CaCO_3$):	130		333	Hach	SG	MF
Total ammonia (mg/L as N):	<0.017		<0.017	Dorsett	MC	MF
Salinity:	0		<1	YCT	MF	MF

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Hershfeld City of Clearwater Marshall ST WWTP (treatment name from label)
County: PINELLAS
Contact / District: Wendy Hershfeld / SE TAMPA
NPDES Permit #: FL0021857
LIMS Sample #: 402891 LIMS Job #: TLH-1999-08-18-11
sample log
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2

Remarks:

Sample Collection: Date 8-17-99 Time 1130
Test Beginning: Date 8-18-99 Time 1400
Test Ending: Date 8-20-99 Time 1350
Organism Batch #: 41 Diluent Batch #: 34
Organism Age: <24hr SRT toxicant batch #: NA
Test organism: Ceriodaphnia dubia

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) (µmhos/cm) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Control A	A	5	5	~~5~~	7.8		8.2	23.8		24.2	7.8		8.1	170		210
Control B	B	5	5	~~5~~			8.2			24.1			8.1			190
Control C	C	5	5	5			8.2			24.1			8.2			225
Control D	D	5	5	5			8.2			24.2			8.2			220
100% A	A	5	5	5	7.9		8.4	24.0		24.3	7.8		8.2	1290		1630
100% B	B	5	5	5			8.4			24.4			8.2			1530
100% C	C	5	5	5			8.4			24.6			8.2			1460
100% D	D	5	5	5			8.4			24.8			8.2			1490
measured by:		MF	MF	MF			MF			MF			MF			MF
recorded by:		MF	SG	DW			CH			CH			CH			CH

Investigators' Signatures
Marshall Faircloth
Courtney Head

Temperature Range °C
Incubator # 2 25.0-26.0°C
Room 24.0-25.0°C

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			not measured			
Lab Total Residual Cl2 (mg/L):		20.03	0.06	DR100	MF	MF
Alkalinity (mg/L as $CaCO_3$):		75	169	Hach	SG	MF
Hardness (mg/L as $CaCO_3$):		85	333	Hach	SG	MF
Total ammonia (mg/L as N):		20.017	20.017	Denver	MF	MF
Salinity:		0	<1	YCT	MF	MF

reviewer

form updated 3/3/99

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

Units:

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

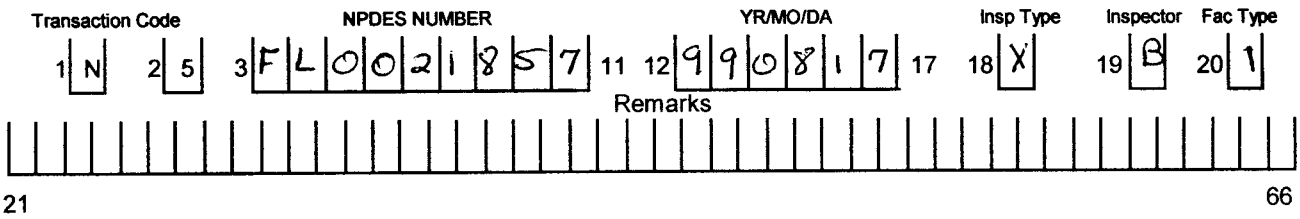
Phytoplankton taxa list and densities (#/mL) for the City of Clearwater WWTP, collected via subsurface grabs in Stevenson Creek on 17 August, 1999.

	Control Site	Test Site 1
Bacillariophyceae		
Cyclotella sp.	139	47
Entomoneis sp.	-	3
Navicula sp.	70	-
Nitzschia sp.	-	3
Undetermined Pennales	5983	282
Chlorophyceae		
Chlamydomonas sp.	35	11
Coelastrum sp.	139	14
Crucigenia sp.	-	6
Dictyosphaerium sp.	-	3
Oocystis sp.	35	3
Scenedesmus incrassatulus	35	-
Scenedesmus quadricauda	-	19
Scenedesmus sp.	348	39
Selenastrum sp.	35	-
Tetraedron sp.	35	-
Undetermined Chlorophyceae	35	3
Cyanophyceae		
Aphanocapsa sp.	-	11
Merismopedia sp.	35	8
Dactylococcopsis sp.	139	44
Cryptophyeae		
Cryptomonas sp.	-	192
Undetermined Cryptophyceae	383	-
Dinophyceae		
Undetermined Dinophyceae	-	3

Benthic macroinvertebrate taxa list for the City of Clearwater WWTP, collected via Ponar grab samples in Stevenson Creek, on 27 August, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	**Test Site 1**
Amphipoda		
Capitella capitata	–	313
Capitella sp.	21	–
Corophium sp.	–	21
Polychaeta		
Laeonereis culveri	250	1979
Gastropoda		
Undetermined Planorbidae	–	84
Oligochaeta		
Undetermined Tubificidae	21	–

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



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