

Biological Assessment of

City of Largo WWTP

Pinellas County

NPDES #FL0026603

Sampled November 1998

June 1999

Biology Section
Division of Administrative and Technical Services
Bureau of Laboratories

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	City of Largo WWTP
County:	Pinellas
NPDES Number:	FL0026603
Permit Expiration Date:	January 1, 1997

Toxics Sampling Inspection (XSI)

Date Sampled: 2 November 1998

Results: Aluminum, copper, iron, lead, and zinc were detected in the effluent sample at levels that complied with Class III marine water quality standards. Atrazine was detected in the effluent sample at a level below the practical quantitation limit.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 2 November 1998

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: 2 November 1998

Results: The macroinvertebrate communities appeared healthier at the test sites than at the control site. The discharge did not appear to be having an adverse effect on either the benthic community or the algal community.

Water Quality Inspection (WQI)

Date Sampled: 2 November 1998

Results: Ortho-phosphate and total phosphorus levels at all three study sites were 80% higher than those normally found in Florida's estuaries. TKN levels were similar among the three study areas, exceeding those levels found in 70% of Florida's estuaries. The Algal Growth Potential (AGP) was below the 10 mg dry wt/L "problem threshold" at all three study sites. The effluent AGP was 36.8 mg dry wt/L. Chlorophyll *a* was elevated at the control site (11.9 µg/L). Overall, algal densities were low for a marine system.

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 and its receiving water body to determine appropriate final permit conditions.

Introduction

The City of Largo Wastewater Treatment Plant is located in Pinellas County, Florida (see maps in the Appendix). Treatment at this domestic waste facility consists of primary clarification and aerobic and anoxic zones, followed by an oxic zone, final clarification, re-aeration, and chlorine disinfection. A public access reuse system receives chlorinated effluent while dechlorinated effluent discharges into a freshwater lake via a 36 inch diameter pipe. The lake is located on a golf course and is connected to Feather Sound by a series of lakes that eventually flow into Old Tampa Bay. The design flow of the wastewater system is 15 MGD, the actual mean flow during this survey into the lake was 1.8 MGD. The remaining effluent goes to the reuse system.

State permit limits for the City of Largo Wastewater Treatment Plant are listed in Table 1. According to the facility's monthly operating reports, the plant has exceeded the state surface water quality standards for total residual chlorine and toxicity and in April, 1998 this was cited in a warning letter (WL#980013DW525WD) (see Facility Summary in the Appendix). The facility exceeded its permitted flow limit in 1998 during the months of January, February, and March.

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 in Old Tampa Bay two miles south of Cabbage Patch Point at the Howard Franklin bridge) and two test sites bracketing the discharge (where it enters Old Tampa Bay near Cabbage Patch Point) (see map in the Appendix). A habitat assessment was performed *in situ* to establish comparability between sites, and supplemental physical/chemical data were also collected on the effluent and study sites on November 2, 1998. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables, and pesticide extractables). Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

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 control and test sites were analyzed for grain size and percent organic matter.

Phytoplankton were sampled at both control and test sites 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 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 biological methods followed Biology Section 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: Andrea Grainger and Charles Kovach (DEP Southwest District), and Julie Baughman, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Michael Heyn, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, 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

Shorelines were mostly natural at all three study sites (see Habitat Assessment Field Data Sheets in Appendix). Three community types were observed at the test sites; mangroves, oyster bars, and grass beds. Although mangroves and oyster bars were present at the control site, sea grasses were rare. The control site substrate was 85% organic while test site 1 and 2 consisted of 52% and 79% organic matter, respectively. Habitat scores were in the "good" category at all three study sites, ranging from 64 points at the control site to 70 points at test site 1. The remaining results are in Tables 1 and 2.

Table 1. Effluent limits and summary of chemistry data.

City of Largo WWTP	Effluent Limits	Effluent Samples	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
Atrazine	-	0.11 I	-	-	-
Metals (µg/L)					
Aluminum	1500 **	50 I	-	-	-
Arsenic	50 **	20 U	-	-	-
Cadmium	9.3 **	0.05 U	-	-	-
Chromium	50 **	10 U	-	-	-
Copper	2.9 **	2	-	-	-
Iron	300 **	35 I	-	-	-
Lead	5.6 **	0.21 I	-	-	-
Mercury	0.025 **	0.1 U	-	-	-
Nickel	8.3 **	6 U	-	-	-
Selenium	71 **	40 U	-	-	-
Silver	2.3 **	0.04 U	-	-	-
Zinc	86 **	24 I	-	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	0.98	0.14	0.19	0.15
Total phosphorus	-	0.9	0.25	0.23	0.25
Ammonia	-	0.048	0.012	0.028	0.032
Nitrate+Nitrite	-	0.053	0.023	0.02	0.028
TKN	-	0.98	0.88	0.8	0.8
Organic Nitrogen	-	0.93	0.87	0.77	0.77
Total Nitrogen	3 ac *	1.0	0.035	0.82	0.83
General Phys-Chem Parameters					
Habitat Assessment	-	-	64	70	68
D.O. (mg/L) surface	-	5.9	6.8	5.9	5.3
D.O. (mg/L) bottom	-	5.8	6.7	5.9	5.5
pH (SU) surface	6.0-8.5 *	6.8	7.5	7.3	7.1
pH (SU) bottom	-	6.8	7.4	7.3	7.0
Conductivity (µmhos/cm) surface	-	787	28,835	26,663	26,441
Conductivity (µmhos/cm) bottom	-	787	28,629	26,599	26,371
Salinity (ppt) - surface	-	0	18	16	16
Salinity (ppt) - bottom	-	-	18	16	16
Temperature (°C) surface	-	28.3	24.9	25.2	25.4
Temperature (°C) bottom	-	28.4	24.6	25.2	25.3
Total Residual Chlorine (mg/L)	0.01	-	-	-	-
Turbidity (NTU)	≤ 29 **	0.07	2.4	3.7	3.6
T.S.S. (mg/L)	5 ac *	1 U	5	8	7
C.B.O.D., 5 day (mg/L)	5 ac *	2	5	3	5
Flow (MGD)	2.25	1.8	-	-	-
AGP (mg dry wt/L)	-	36.8	2.0	2.6	2.0
Toxicity (48-hour static, screening bioassay)					
Bioassay - Fish	-	Not Toxic	-	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-	-
Microbiology (# counts/100 ml)					
Fecal Coliforms	25 *	1 K	16 J	78 A	4 J
Total Coliforms	3 ac*	320 L	528 J	524 J	64 J

A - Value is the mean of two or more determinations
I - Value is < the PQL, and ≥ the MDL
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
U - Analyzed for but not detected; value reported is the MDL

* Permit Limit
** Class III water quality standard
a - Annual average
b - Monthly average
c - Flow proportioned composite sample

Discussion

Aluminum, copper, iron, lead, and zinc were detected in the effluent sample at levels that complied with Class III marine water quality standards (Table 1). Atrazine was detected in the effluent sample at a level below the practical quantitation limit.

The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay (Appendix).

All the effluent nutrients complied with the facility's permit limits (Table 1). Ortho-phosphate and total phosphorus levels at all three study sites were 80% higher than those normally found in Florida's estuaries (see *Typical Values for Selected Parameters in Florida Waters* in the Appendix). TKN levels were similar among all three study areas and exceeded levels normally found in 70% of Florida's estuaries.

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 all three study sites (Table 1).

The increased nutrients at the study sites did not appear to have altered the phytoplankton communities (Figure 1). In fact, the test site algal communities appear significantly healthier than that of the control site. Although algal densities were low for a marine system at the study sites, they were slightly higher at the control site (Table 2). Chlorophyll *a* was much higher at the control site (11.9 µg/L) than the two test sites (1 µg/L at both sites).

The test site macroinvertebrate communities showed some improvement compared to the control site (Figure 2). For example, taxa richness was 33% higher at test site 1 compared to the control site and diversity was 24% higher at test site 1 compared to the control site (Figure 2). Test site 2 had the highest number of polychaete taxa (Table 2). The control site and test site

Table 2. Community structure of study sites.

City of Largo WWTP	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative			
Number of Taxa	18	19	27
Shannon-Weaver Diversity	2.9	3.6	3.5
Number of Polychaete Taxa	6	5	10
Community Composition			
% Amphipoda	3.0	20.0	5.0
% Cumacea	6.0	9.0	0.2
% Isopoda	5.0	11.0	5.0
% Pelecypoda	8.0	33.0	12.0
% Polychaeta	62.0	18.0	67.0
% Tanaidaceae	0.0	4.0	1.0
% Tubificidae	14.0	0.0	4.0
% Other	2.0	5.0	5.8
Functional Feeding Groups			
% Browsers-grazers	4.0	15.0	5.0
% Burrowing Deposit Feeders	30.0	6.0	26.0
% Predators/Carnivores	25.0	8.0	17.0
% Scavengers	5.0	15.0	5.0
% Surface Deposit Feeders	22.0	4.0	22.0
% Suspension Feeders	14.0	52.0	25.0
Phytoplankton Algae			
Number of Taxa	11	9	13
Shannon-Weaver Diversity	1.9	1.7	2.4
Chlorophyll *a* (µg/L)	11.9	1	1
Algal Density (#/mL)	1,106	405	461
% Blue-green	0	0	1
% Cryptophytes	17	69	52
% Diatoms	71	13	38
% Dinoflagellates	11	10	5
% Green	0	5	3
AGP (mg dry wt/L)	2	2.6	2

U - Analyzed for but not detected; value is the minimum detection limit

2 were dominated by pollution-tolerant polychaetes, while test site 1 was dominated by pelecypods, normally considered "good water quality indicators" (see Macroinvertebrate Taxa Lists in the Appendix). All three sites contained the pollution-sensitive cumacean, *Oxyurostylis*. The differences in sediment types among the study sites may explain the shifts in community composition. Test site 2, which had the healthiest macroinvertebrate community, had the least organic material (52%) in the substrate. Test site 1, intermediate in most parameters of community health, was also intermediate in the percentage of organic material in the sediment sample (79%). Eighty five percent of the sediment at the control site was fine, organic matter which may have limited the productivity of this site. These results suggest that the discharger was not having an adverse effect on the benthic macroinvertebrate community at the test sites.

Literature Cited

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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, Cincinnati, Ohio. 216 pp.

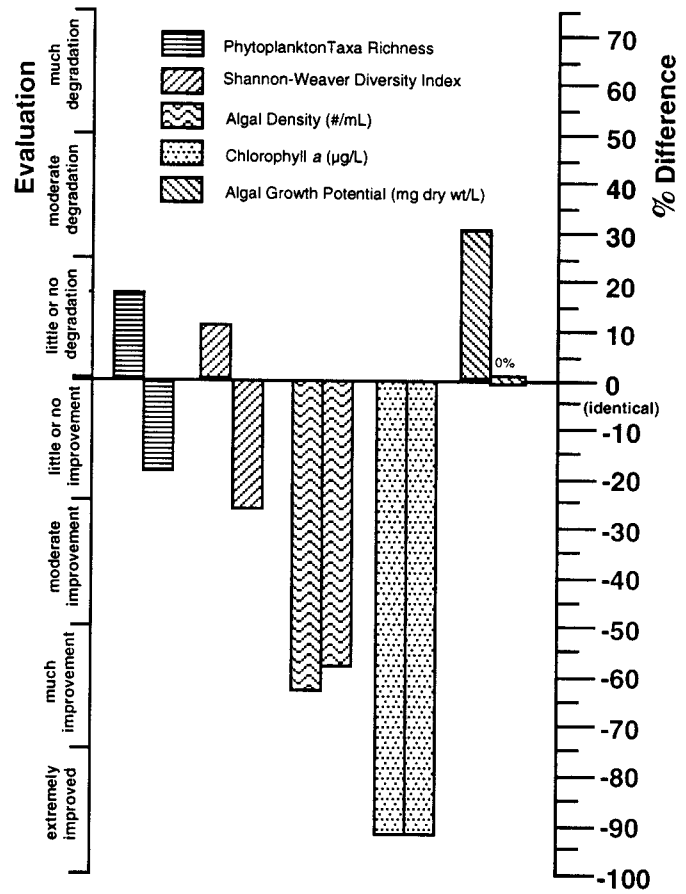


Figure 1. Effect of discharge on the algae community.

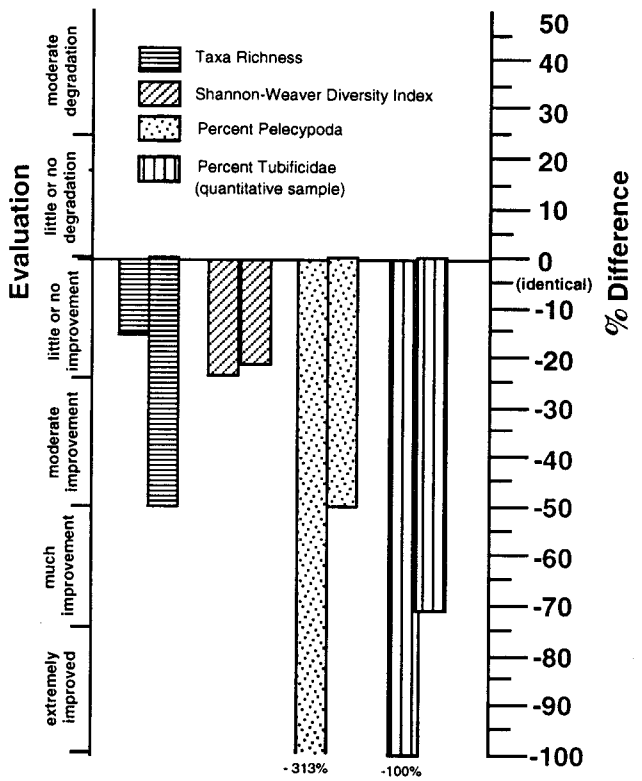


Figure 2. Effect of discharge on the benthic community.

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
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphate	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphate	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

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

Explanation of Measurements of Community Health

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

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

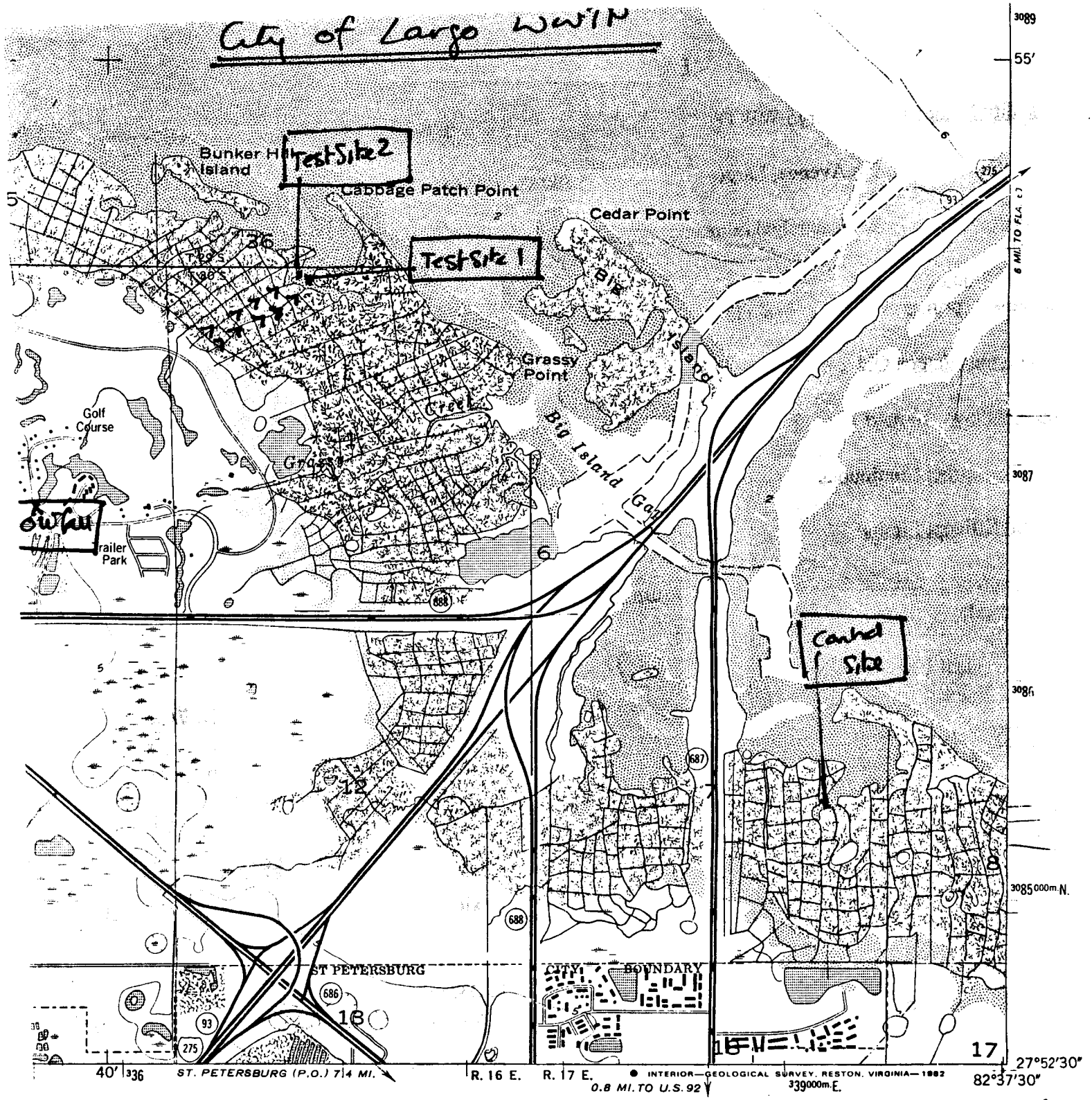
Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single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

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

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

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

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



SAFETY HARBOR, FLA.

N2752.5—W8237.5/7.5

1956
PHOTOREVISED 1981
DMA 4439 I NW—SERIES V847

FACILITY SHEET FOR FYI-5

Facility Name: City of Largo WWTP

Date Summary Prepared: June 1, 1999

Location: 5100, 150th Avenue, Largo

County: Pinellas

District: SW District

Function of Facility: Municipal domestic WWTP

Description of Treatment Process: The influent that is discharged to surface waters undergoes the following treatment: primary clarifiers, final clarifiers, denitrification, aeration, chlorination and dechlorinations.

Receiving Waters: Old Tampa Bay

Water Classification: Class III Marine

Design Flow: 18 mgd

Average Flow from 12/97 to 12/98: 13.43 mgd

The Discharge: Continuous

Does facility have a mixing zone: No mixing zone

Permit Effluent Limits:

Parameter	Minimum	Maximum	Measurement Frequency
Flow (mgd)	-	15	Continuous 24-hr daily/week
pH (SU)	6.0	8.5	Daily, 7/week
Total Residual Chlorine (mg/L)	-	0.01	Daily, 7/week
CBOD5 (mg/L)	-	5 annual ave	24 hr/composite daily, 7/week
TSS (mg/L)	-	5 annual ave	24 hr/composite daily, 7/week
Total nitrogen (mg/L)	-	3 annual ave	24 hr/composite daily, 7/week
Dissolved oxygen (mg/L)	5	-	Grab daily, 7/week
Fecal coliforms (#/100/ml)	Non-detectable*	25/100	Grab daily, 7/week

* Non-detectable in at least 75% of monthly samples

Description of permitted outfall(s): The outfall discharges, approximately 2 miles southwest of the WWTP, into a series of freshwater ponds that flow into Feather Sound, Old Tampa Bay.

List permit violations and plant upsets that occurred within past 3 years: The monthly operating reports (MORs) from the months of December 1997 to December 1998 demonstrate the following permit exceedances:

1. There was a minimum value of 5.75 SU reported in the July 1998 MOR.
2. Flow was greater than the permit limit of 15 mgd during the months of December 1997, and January, February, and March 1998. These exceedances may have been due to El Nino.
3. Total residual chlorine violations have been cited by the Department in a warning letter issued April 30, 1998.

Staff contributing to this review:

Andrea Grainger (Biologist)
Neal Schobert (Inspector)

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:
	24040118	11/2/98	1410	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Sampled in Inlet of Old Tampa Bay	Hills	City of Largo WWTP	Control Site / 24844 24845.

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				60	20		

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: <200m

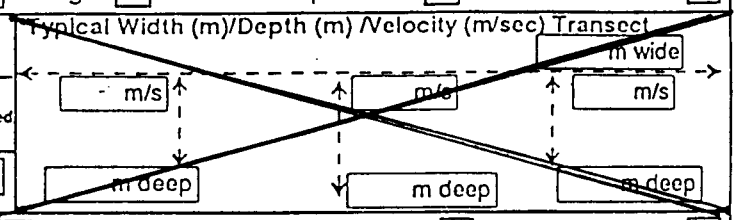
List & map dominant vegetation on back

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

Artificially Impounded ☒ yes ☐ more sinuous

High Water Mark: 1 (m above present water level) + 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			
Leaf Packs or Mats				Mud/Muck/Silt			
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	24.87	7.47	6.75	28,835			VOB
Mid-depth								
Bottom	1.0	24.64	7.41	6.65	28,629			

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, few clouds, slight breeze
This area was more turbid than the test sites.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovacek / Granger	Candace Granger	11/3/98

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		11/2/98	Old Tampa Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
	City of Largo WWTP	Control Site / 24844 24845

Habitat Parameter Score	Excellent	Good	Fair	Poor
Littoral Alterations 10	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 26	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 mangroves, oyster beds	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 8	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 8	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 64

COMMENTS: This site was more turbid than the test sites. This may account for seagrasses being rare.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/3/98	Granger	Andrea Granger

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:
	24040119	11/2/98	1300	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Sampled in inlet of Old Tampa Bay	Hills	City of Largo WWTP	Test Site 1 / 24840 24841

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				60	20		

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: < 250m

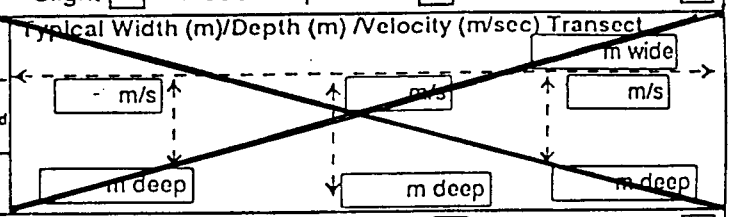
List & map dominant vegetation on back

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

Artificially Impounded ☒ yes

High Water Mark: 1 (m above present water level) + 1 (present depth in m) = 2 (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			
Leaf Packs or Mats				Mud/Muck/Silt			
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	.1	25.19	7.26	5.88	26,599663			VOB
Mid-depth								
Bottom	1.0	25.19	7.26	5.86	26,599			

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, few clouds, slight breeze

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach / Grainger	Andrea Grainger	11/3/98

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY):	RECEIVING BODY OF WATER:
		11/2/98	Old Tampa Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
Sampled in inlet of Tampa Bay	City of Largo WWTP	Test Site 1 / * 24840 24841

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations (10)	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 (32)	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 mangroves oysters seagrasses.	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 (5)	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 (11)	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 70

COMMENTS: of the 2 test sites, this site was the furthest from the mangroves. This inlet is very sheltered.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/3/98	Grange	Andrea Grange

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:
	24040120	11/2/98	1330	Old Tampa Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
sampled in inlet of old Tampa Bay	Hills	City of Largo WWTP	Test Site 2 / 24842 24843

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			60	20			

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: < 250m

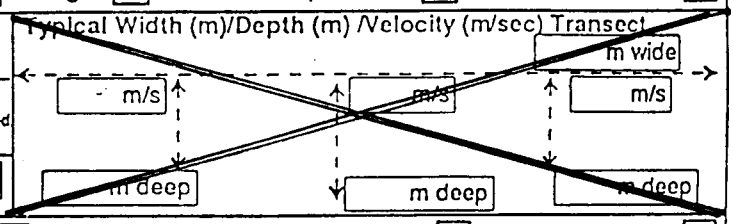
List & map dominant vegetation on back

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

Artificially Impounded ☒ yes ☐ more sinuous

High Water Mark: 1 (m above present water level) + 1 (present depth in m) = 2 (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: due to mangroves

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
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	25.37	7.12	5.27	26,441			VOB
Mid-depth								
Bottom	1.0	25.28	7.00	5.47	26,371			

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, few clouds, slight breeze

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish (lots of mullet)	☐	☐	☐	☒
Aquatic Macrophytes	☐	☐	☒	☐
Iron/sulfur Bacteria	☒	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach / Granger	Edward Granger	11/3/98

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY):	RECEIVING BODY OF WATER:
		11/2/98	Old Tampa Bay

REMARKS:	LOCATION:	FIELD ID/NAME:
Sampled in inlet of Old Tampa Bay	City of Largo WWTP	Test Site 2 / 24842 24843

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations: 10	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: 32	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 mangroves oyster bars grass beds	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: 5	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	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: 68

COMMENTS: This site was approximately 10 feet from a mangrove island. The sediments were more mucky than at Test Site 1

ANALYSIS DATE:	ANALYST:	SIGNATURE:
11/3/98	Granger	Andrea Granger

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Largo
County: Pinellas
Contact / District: Andrea Grainger / Southwest
NPDES Permit #: FL0026603
LIMS Sample #: 354376 LIMS Job #: TLH-1998-11-03-33
sample log 11/9/98 DW
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2

Sample Collection: Date 11/2/98 Time 15:25
Test Beginning: Date 11/3/98 Time 14:45
Test Ending: Date 11/5/98 Time 13:45
Organism Batch #: 84 Diluent Batch #: well H_2O
Organism Age: 12 days SRT toxicant batch #:
Test organism: Cyprinella leedsi

Remarks:
Room temperature Range 23.5°C-25.0°C
Incubator #3 Temperature Range 23.8°C-25.5°C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (µmhos/cm) 0 hr	Cond. 24 h	Cond. 48 h
CTL A	G17	5	5	5	7.8	8.3	8.3	24.3	24.2	24.4	7.5	7.6	7.9	245	240	260
CTL B	G18	5	5	5	7.8	8.3	8.3	24.3	24.0	23.9	7.6	7.7	7.7	250	245	255
CTL C	G19	5	5	5	7.8	8.3	8.3	24.1	23.8	24.1	7.7	7.5	7.9	245	250	260
CTL D	G20	5	5	5	7.8	8.3	8.2	24.1	23.8	24.1	7.6	7.8	7.7	245	245	260
100% A	G21	5	5	5	7.2	8.1	8.3	24.3	24.2	24.2	6.9	7.4	8.1	760	740	830
100% B	G22	5	5	5	7.2	8.1	8.3	24.2	24.1	24.2	7.0	7.3	7.9	790	770	815
100% C	G23	5	5	5	7.2	8.1	8.3	24.2	23.9	24.2	7.1	7.2	7.9	790	795	1810 (A)
100% D	G24	5	5	5	7.2	8.1	8.3	24.1	23.9	24.3	7.1	7.3	7.9	795	800	820
measured by:		DW	CH	FW	DAW	CH	MF	DAW	CH	MF	DAW	CH	MF	DAW	CH	FW
recorded by:		DAW	CH	FW	CH	CH	FW	CH	CH	FW	CH	CH	FW	CH	CH	FW

(A) started to write wrong number FW 11/5/98

Investigators' Signatures

Water Quality Parameters	Salt Water: Well Water	Salt Water: 20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			not measured			FW
Lab Total Residual Cl2 (mg/L):	<0.03	–	<0.03	DR-100	CH	FW
Alkalinity (mg/L as $CaCO_3$):	130	–	192	Hach	CH	FW
Hardness (mg/L as $CaCO_3$):	175	–	220	Hach	CH	FW
Total ammonia (mg/L as N):	<0.017	–	<0.017	ORION	FW	FW
Salinity:	0	–	0	YSI	FW	FW

reviewer form updated 5/22/98

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Largo
County: Pinellas
Contact / District: Andrea Grainger / Southwest
NPDES Permit #: FL0026603
LIMS Sample #: 354376 LIMS Job #: TLH-1998-11-03-33
sample log 11/5/98 DW
Test Type: ~~Screening~~ I Definitive
(Static) I Static Renewal I Flow-through
Test Number: 2 of 2

Sample Collection: Date 11/2/98 Time 15:25
Test Beginning: Date 11/3/98 Time 1455
Test Ending: Date 11/5/98 Time 13:45
Organism Batch #: 48 Diluent Batch #: 53
Organism Age: <24 hours SRT toxicant batch #: ____

Test organism: Ceriodaphnia dubia

Remarks:
Room Temperature Range 23.5°C-25.0°C
Incubator #2 Temperature Range 23.5-24.5°C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 24 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 48 h
CTL A		5	5	5	8.3		8.2	24.6		23.9	7.6		8.1	195		185
CTL B		5	5	5			8.2			24.0			8.0			185
CTL C		5	5	5			8.2			24.0			8.1			185
CTL D		5	5	5			8.2			24.1			8.0			190
100% A		5	5	5	7.2		8.6	24.6		23.9	7.1		8.2	775		875
100% B		5	5	5			8.6			23.9			8.2			905
100% C		5	5	5			8.6			24.0			8.2			925
100% D		5	5	5			8.6			24.0			8.2			935
measured by:		MF	DAW	FW	DAW		MF	DAW		MF	DAW		MF	DAW		FW
recorded by:		DAW	FW	FW	CH		MF	CH		MF	CH		MF	CH		FW

Investigators' Signatures

Cindy Heyes
Marshall Faircloth
Ryan Wershaw
David A. Worthington
Dan Moore (DW)
Dan Moore

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			FW
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-700	CH	FW
Alkalinity (mg/L as $CaCO_3$):	—	84	192	Hach	CH	FW
Hardness (mg/L as $CaCO_3$):	—	90	230	Hach	CH	FW
~~Total~~ ammonia (mg/L as N):	—	<0.017	<0.017	ORion	FW	FW
Salinity:	—	0	0	YSI	FW	FW

Phytoplankton taxa list and densities (#/mL) for the City of Largo WWTP, collected via subsurface grabs in OldTampa Bay on 2 November, 1998.

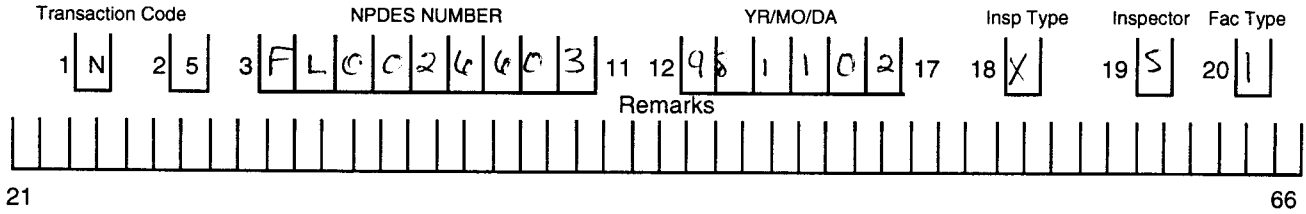
	Control Site	Test Site 1	Test Site 2
Bacillariophycea			
Amphora sp.	7	3	-
Asterionella sp.	-	-	6
Cylindrotheca sp.	14	31	51
Cymbella sp.	-	-	3
Diploneis sp.	7	-	-
Entomoneis sp.	-	-	3
Leptocylindrus sp.	14	-	-
Melosira sp.	14	-	-
Navicula sp.	-	3	-
Nitzschia sp.	34	3	24
Rhizosolenia sp.	694	-	-
Undetermined Bacillariophyceae	-	-	3
Undetermined Centrales	-	-	51
Undetermined Pennales	-	12	33
Chlorophyceae			
Dunaliella sp.	-	-	3
Tetraselmis sp.	-	16	3
Undetermined Chlorophyceae	-	19	12
Cryptophyceae			
Chroomonas sp.	172	249	207
Cryptomonas sp.	-	-	15
Undetrmined Cryptophyceae	21	28	18
Cyanophycea			
Lyngbya sp.	-	-	3
Oscillatoria sp.	-	-	3
Dinophyceae			
Ceratium sp.	27	19	-
Peridinium sp.	55	19	21
Undetermined Dinophyceae	41	3	3
Euglenophyceae			
Euglena sp.	7	-	-

Benthic macroinvertebrate taxa list for the City of Largo WWTP, collected via Ponar grab samples in Old Tampa Bay, on 2 November, 1998. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site 1	Test Site 2
Amphipoda			
Ampelisca sp.	69	14	56
Aoridae	-	-	14
Batea catharinensis	-	14	-
Corophium sp.	-	-	97
Gammarus mucronatus	-	14	97
Grandidierella bonnieroides	28	194	69
Oedicerotidae	-	28	-
Cumacea			
Oxyurostylis sp.	167	111	14
Gastropoda			
Bullata ovuliformis	28	-	-
Cerithium sp.	14	-	-
Marginellidae	28	-	-
Undetermined Gastropoda	-	-	28
Isopoda			
Cyathura polita	-	69	250
Edotea montosa	-	69	83
Xenanthura brevitelson	125	-	-
Xenanthura sp.	14	-	-
Mysidacea			
Bowmaniella sp.	-	14	-
Undetermined Mysidacea	-	42	14
Nemertea			
Undetermined Nemertea	14	14	14
Oligochaeta			
Undetermined Tubificidae	389	-	236
Pelecypoda			
Amygdalum papyrium	28	56	69
Corbula contracta	14	-	-
Parastarte triquetra	14	28	97
Tellina sp.	139	347	472
Tellinidae	28	-	83
Undetermined Pelecypoda	-	-	56
Polychaeta			
Capitellidae	264	-	1250
Diopatra sp.	14	-	-
Eteone heteropoda	97	56	83
Hobsonia florida	-	-	14
Laeonereis culveri	1194	56	1750
Leitoscoloplos fragilis	-	-	69
Leitoscoloplos sp.	125	69	-

Nereidae	-	-	28
Nereis succinea	-	-	181
Orbiniidae	56	-	42
Paraonidae	-	-	28
Pectinaria gouldi	-	14	14
Polydora ligni	-	-	42
Polydora sp.	-	-	56
Prionospio heterobranchia	14	-	-
Streblospio benedicti	-	42	653
Tanaidacea			
Hargeria rapax	-	56	83
Thoracica			
Balanus sp.	-	-	208

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



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