

Biological Assessment of

Neptune Beach WWTP

Duval County

NPDES #FL0020427

Sampled May 1999

May 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:	Neptune Beach WWTP
County:	Duval
NPDES Number:	FL0020427
Permit Expiration Date:	9DEC2001

Toxics Sampling Inspection (**XSI**)

Date Sampled: 3 May 1999

Results: Copper (8.1 µg/L) was detected in the effluent at levels that exceeded Class III marine water quality standards, Rule 62-302.530(24)FAC. Iron, lead, silver, and zinc were all detected in the effluent sample at levels that complied with Class III standards. There was presumptive evidence of atrazine (0.23 µg/L) in the effluent.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: 3 May 199

Results: The effluent was not toxic to the invertebrate, *Americamysis bahia,* or to the fish, *Menidia beryllina,* during the 48-hour bioassay.

Impact Bioassessment Inspection (**IBI**)

Date Sampled: 3 May 1999

Results: Quantitative measures of macroinvertebrate community health indicated the control site was degraded compared to the test site. Polychaeta taxa richness was 69% lower, and Shannon-Weaver diversity was 77% lower, at the control site compared to test site 2. Despite this, pollution–sensitive organisms such as the amphipod *Haustoris* sp, and the cumacean *Oxyurostylis* sp dominated the control site. Test site 2 was dominated by pollution–tolerant polychaetes, like Capitellida and *Minuspio longibranchiata,* as well as tubificid worms and sipunculids. It is difficult to determine if the discharger was having an adverse effect on the benthic community due to the differences between sites. The phytoplankton community did not appear to be negatively affected by the discharge.

Water Quality Inspection (**WQI**)

Date Sampled: 3 May 1999

Results: The effluent dissolved oxygen level (3.0 mg/L) was below the permit limit and the Class III water quality standard (4.0 mg/L) (Rule 62-302.530 (31) FAC). Effluent nutrients were elevated. However, nutrients at the study sites were not elevated as a result of the effluent. The Algal Growth Potential (AGP) was below the 10 mg dry wt/L "problem threshold" at all three study sites. Effluent AGP was 127.0 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 and their receiving water bodies to determine appropriate final permit conditions.

Introduction

The Neptune Beach Wastewater Treatment Plant is located in Duval County, Florida (see maps in the Appendix). This domestic waste facility provides treatment for two plants: a 0.9 MGD contact stabilization facility handling domestic waste; and a 0.6 MGD package plant. The combined effluent is disinfected in a chlorine contact tank then dechlorinated before discharge through an outfall line approximately 77 meters in length which flows into the Class III St. Johns River at Sherman Point. The design flow for the combined wastewater is 1.5 MGD. The actual mean flow during this survey was 0.63 MGD.

State permit limits for the plant are listed in Table 1. According to the facility's monthly operating reports, the plant has had no plant upsets within the past year.

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 0.4 miles west of Neptune Beach across the channel) and two test sites bracketing the discharge (located just off Sherman 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 May 3, 1999, during an outgoing tide. The effluent was analyzed for nutrients, metals, and for organic constituents (base neutral and acid extractables, and pesticide extractables).

Acute screening toxicity bioassays, using the invertebrate, *Americamysis bahia,* and the fish, *Menidia beryllina,* as test organisms, were performed on an effluent sample.

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

Sediments from the control site and test site 2 were analyzed for grain size and percent organic matter. Benthic macroinvertebrate communities were evaluated at the control site and test site 2 using three replicate Petite Ponar grabs. It was not possible to take substrate samples at test site 1 because the shell-type bottom caused the sampling gear to malfunction. 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 of Laboratories Standard Operating Procedures (SOP's). The SOP's can be viewed on our web site <www.dep.state.fl.us/labs/sops.htm>.

The following personnel were involved in this investigation: Belinda Bishop, Patrick O'Connor, and James Wright (NE District), and Julie Baughman, Ken Espy, Marshall Faircloth, Michael Heyn, Lisa Homann, Joy Jackson, 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

There was dredging in the study area several weeks prior to this inspection. Shorelines at the study sites were mostly natural with occasional riprap (see Habitat Assessment Field Data Sheets in Appendix). Sand with some areas of mud was the only community type observed at the study sites. Sixty–two percent of the particles at the control site were 0.125–0.25 mm in diameter while 53% of the particles at test site 2 were considerably finer, at less than 0.063 mm in diameter (Table 1). Habitat scores were in the "good" to "fair" category at all three study sites, ranging from 46 points at the control site to 42 points at both test sites. The physical parameters were all very similar among the study sites (Table 1). The remaining results are in Tables 1 and 2.

Discussion

Copper (8.1 µg/L) was detected in the effluent sample at a level that exceeded Class III marine water quality standards (Rule 62-302.530 (24)FAC). Iron, lead, silver, and zinc were detected in the effluent sample at levels that complied with Class III

Table 1. Effluent limits and summary of chemistry data.

Neptune Beach WWTP	Effluent Limits	Effluent Sample	Control Site	Test Site 1	Test Site 2
Organic Constituents (µg/L)					
Atrazine	-	0.23 N	-	-	-
Metals (µg/L)					
Aluminum	1500 **	50 U	-	-	-
Arsenic	50 **	20 U	-	-	-
Cadmium	9.3 **	0.1 U	-	-	-
Chromium	50 **	10 U	-	-	-
Copper	2.9 **	8.1 A	-	-	-
Iron	8.3 **	70 A	-	-	-
Lead	5.6 **	0.7 A	-	-	-
Mercury	0.025 **	0.1 U	-	-	-
Nickel	8.3 **	6 U	-	-	-
Selenium	71 **	35 U	-	-	-
Silver	2.3 **	0.2 I	-	-	-
Zinc	86 **	52 J	-	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.02 I	0.01 U	0.02 U
Total phosphorus	-	3.8	0.06	0.07	0.08
Ammonia	-	6.8	0.03	0.04	0.05
Unionized Ammonia	-	0.027	-	-	-
Nitrate+Nitrite	-	2.9	0.01	0.01	0.01
TKN	-	8.0	0.26	0.26	0.24
Organic Nitrogen	-	1.2	0.23	0.22	0.19
Total Nitrogen	-	10.9	0.27	0.27	0.25
Sediment Particle Size (% Volume)					
<0.063 mm	-	-	0.0	-	52.9
0.063--0.125 mm	-	-	2.32	-	12.5
0.125--0.25 mm	-	-	61.6	-	24.3
0.25--0.50 mm	-	-	29.1	-	5.59
0.50-- 2.00 mm	-	-	7.01	-	4.73
General Phys-Chem Parameters					
Habitat Assessment	-	-	46	42	42
DO (mg/L)	≥ 5.0 *	3.0	6.6	6.4	6.1
pH (SU)	6.5 - 8.5 *	6.8	7.6	7.6	7.6
Conductivity (µmhos/cm)	-	2,810	51,550	51,330	51,400
Temperature (°C)	-	24.0	19.9	20.1	20.1
Salinity (ppt.)	-	1.5	33.9	33.7	33.8
CBOD, 5 day (mg/L)	20 a *	2	2 K	2 K	2 K
Flow (MGD)	1.5 *	-	-	-	-
AGP (mg dry wt/L)	-	127.0	3.8	2.9	3.1
Toxicity (48-hour static, screening bioassay)					
Bioassay - Fish	-	Not Toxic	-	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-	-
Microbiology (# counts/100 ml)					
Fecal Coliforms	800 **	20 B	3 B	3 B	20 B
Total Coliforms	2,400 **	110 B	3 B	10 B	33 B

A - Value is the mean of two or more determinations
B - Based on colony counts outside acceptable range
I - Value is < the MQL, and ≥ the MDL
J - Estimated value
K - Actual value is known to be less than value given
N- Presumptive evidence of presence of material
U - Not detected; value is the MDL

* Permit Limit
** Class III water quality standard
a - Annual average

standards (Table 1). There was presumptive evidence of atrazine (0.23 µg/L) in the effluent sample.

The effluent dissolved oxygen level (3.0 mg/L) was below the facility's permit limit and Class III water quality standards (Rule 62-302.530 (31) FAC).

The effluent sample was not toxic to the fish, *Menidia beryllina,* or to the invertebrate, *Americamysis bahia,* during the 48-hour bioassay (Appendix).

Effluent levels of total phosphorus (3.8 mg/L), nitrate+nitrite (2.9 mg/L), total nitrogen (10.9 mg/L), TKN (8.0 mg/L), organic nitrogen (1.2 mg/L) and ammonia (6.8 mg/L) were all extremely elevated. Despite the elevated effluent levels, nutrients at all three study sites were comparable and well within the ranges typically found in Florida's estuaries (see *Typical Values for Selected Parameters in Florida Waters* in the Appendix). The effluent AGP was elevated (127 mg dry wt/L). AGP did not exceed the 10 mg dry wt/L "problem threshold" (Ron Raschke, U.S. EPA, pers. comm.) at any of the study sites (Table 1).

As expected, the low nutrient levels at the study sites did not appear to have affected the phytoplankton communities at the test sites (Figure 1). In fact, most of the community health measurements were better at the test sites compared to the control site. Taxa richness was 70% higher at test site 1 and 50% higher at test site 2, compared to the control site (Table 2). Similarly, diversity was 17% and 14% higher at test site 1 and 2, respectively, compared to the control site. Algal densities were typical for a marine system and chlorophyll *a* was undetected at all three study sites.

Table 2. Community structure of control and test sites.

Neptune Beach WWTP	Control Site	Test Site 1	Test Site 2
Macroinvertebrate Quantitative - Ponars			
Number of Taxa	8	-	26
Shannon-Weaver diversity	0.82	-	3.5
Number of Polychaete Taxa	1	-	14
Community Composition			
% Amphipoda	93.6	-	6.2
% Cumacea	3.2	-	5.3
% Decapoda	1.1	-	0.4
% Gastropoda	0.0	-	3.5
% Nemertea	0.0	-	15.0
% Pelecypoda	1.0	-	1.3
% Polychaeta	1.1	-	47.8
% Tubificidae	0.0	-	5.3
% Sipuncula	0.0	-	15.0
Functional Feeding Groups			
% Browsers-grazers	2.7	-	1.1
% Burrowing Deposit Feeders	0.0	-	50.9
% Predators/Carnivores	1.1	-	19.9
% Scavengers	2.7	-	2.2
% Scrapers	0.0	-	3.5
% Surface Deposit Feeders	0.0	-	6.0
% Suspension Feeders	92.6	-	12.0
% Unknown	0.8	-	4.4
Phytoplankton Algae			
Number of Taxa	10	17	15
Shannon-Weaver diversity	3.05	3.56	3.48
Chlorophyll *a* (µg/L)	1.0 U	1.0 U	1.0 U
Algal Density (#/mL)	244	447	264
% Blue-green	0.0	1.1	1.2
% Chrysophytes	0.0	1.1	0.0
% Cryptophytes	0.0	3.2	0.0
% Diatoms	100.0	90.3	95.1
% Dinoflagellates	0.0	3.2	3.7
% Euglenophytes	0.0	1.1	0.0
AGP (mg dry wt/L)	3.8	2.9	3.1

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

The control site macroinvertebrate community was depauperate compared to test site 2 (Figure 2). Macroinvertebrate taxa richness was 69% lower at the control site compared to test site 2. Shannon-Weaver diversity was significantly lower at the control site (0.82) compared to test site 2 (3.5). Polychaete taxa richness at the control site was 93% lower than test site 2 (Table 2). Although the control site had low diversity and taxa richness, it was

dominated by the somewhat pollution–sensitive amphipod, *Haustorius* sp., as well as the cumacean, *Oxyurostylis* sp. (see Macroinvertebrate Taxa Lists in the Appendix). Test site 2, while having much higher diversity and taxa richness, was dominated by such pollution–tolerant polychaetes as, Capitellidae, and *Minuspio longibranchiata,* as well as tubificid worms and sipunculids. Further, filter–feeders, generally indicators of good water quality, made up approximately 93% of the control site and only 12% of the test site.

There is no clear indication that the effluent was having an adverse effect on the macroinvertebrate community at the test site. Test site 2 had good diversity and taxa richness, however, many of the organisms were pollution–tolerant. Conversely, the control site had low diversity and taxa richness but more pollution–sensitive organisms.

Literature Cited

EA Engineering, Science, and Technology and Tetra Tech, Inc. 1994. Bioassessment for the non-point 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. U. S. EPA, Cincinnati, Ohio. 216 pp.

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.

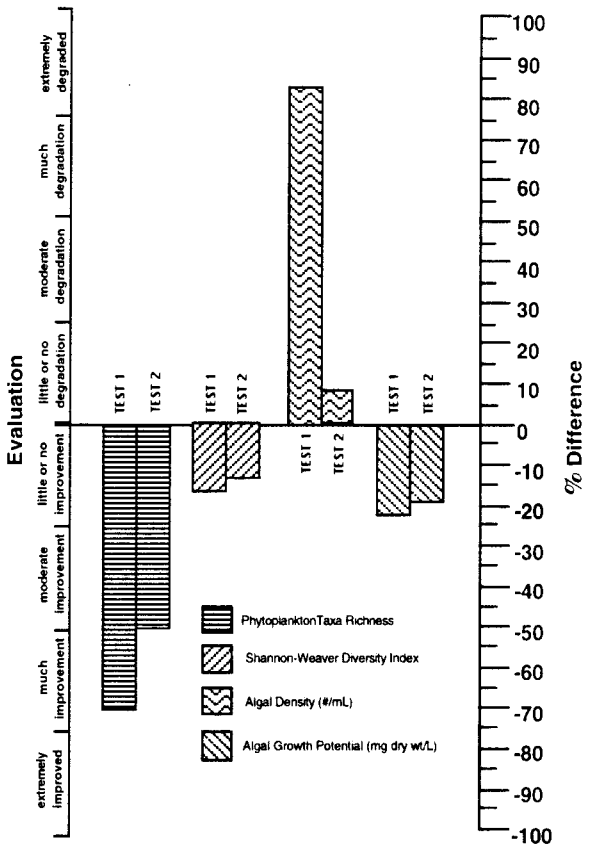


Figure 1. Effect of discharge on the phytoplankton community.

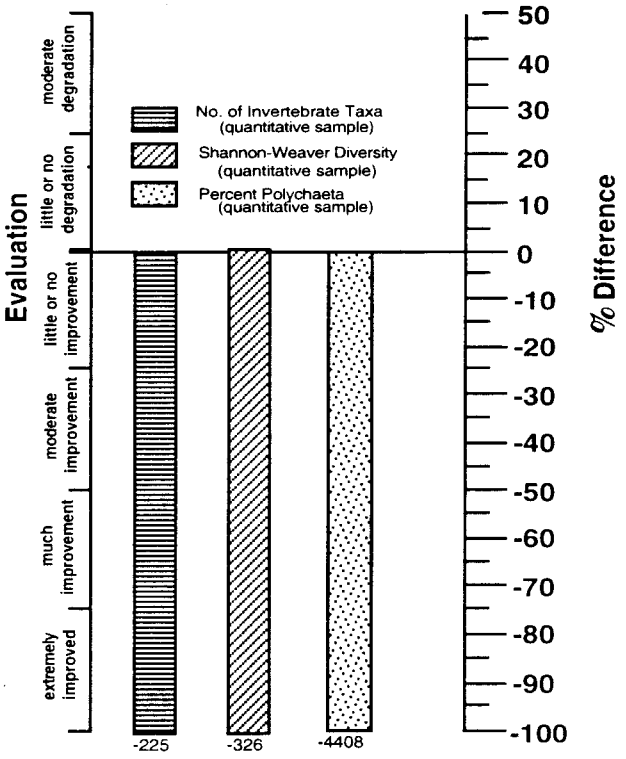
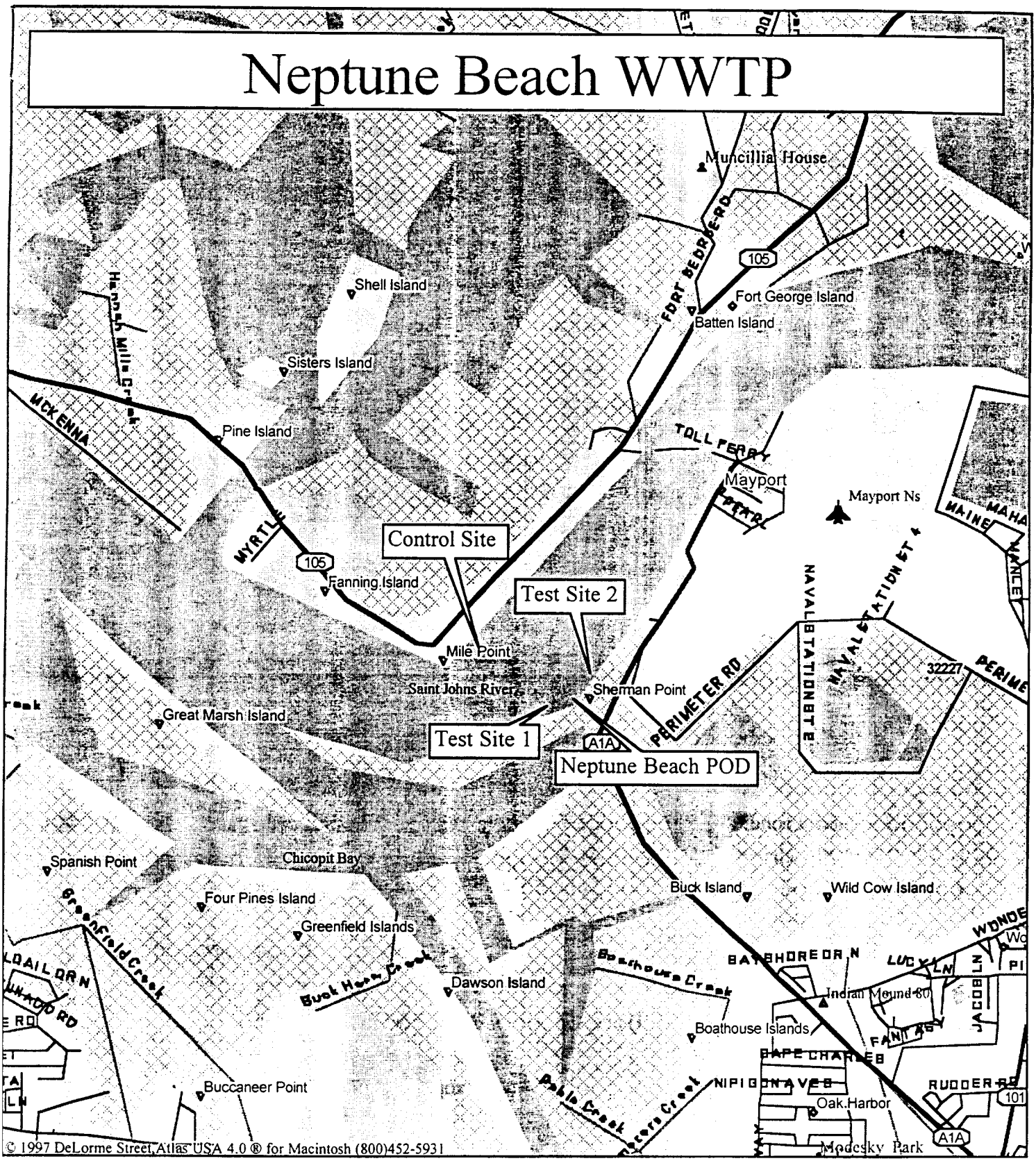


Figure 3. Effect of the discharge on the benthic community.



Mag 14.00
Thu Dec 09 14:45 1999

Scale 1:31,250 (at center)
2000 Feet
1000 Meters

Local Road
Major Connector
State Route
Ferry

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.

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Neptune Beach WWTF	Prepared by: Belinda Bishop Date: 5/25/99	
Location (attach detailed map):	County: Duval	District: Northeast NED
Federal Permit # and expiration date:	State GMS # and State expiration date: FL0022047	Facility Type: Industrial (Municipal) Federal, Agricultural Other (list):

Function of facility: Wastewater treatment facility

Description of treatment process:
Plant #1 .90 mgd contact stabilization consisting of influent bar screens, grit removal, contact tank, stabilization tank, 2 clarifiers, digestor, belt press
Plant #2 .60 mgd contact tank, stabilization tank, 2nd ary clarifier
Combined effluent disinected in: Chlorine contact tank then dechlorinated & pumped to Beaches outfall

Receiving waters: St Johns River @ Sherman Point	Classification: II. B.
Design Flow: total = 1.5 mgd	Actual Mean Flow:

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

therefore, the best time to sample is:

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

List effluent limits:

Parameter	Limit (units)		
	Annual	monthly	max
CBOD(effluent)	20 mg/L	25	60
TSS	20 mg/L	30	60
(DO) Dissolved O_2	4 = min 5 = daily min.		
Total Residual Cl_2	.01 max (mg/L)		
pH	6.5 → 8.5		

Describe special permit conditions and permit modifications:

Permit Revision was issued 1/13/97 to clarify ambient monitoring.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

3116X10567

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s): 1.5 mgd discharge to St Johns River (Class III waters) @ Sherman Point.
- outfall line ≃ 230 ft in length, depth ≃ 8 ft at pt. of discharge ≃ Latitude 30° 31' 09" N Long 81° 26' 22" W

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

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
No enforcement activities.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
According to records, this facility generally operates within permit limits

Additional information:

Staff contributing to this review (signature):

Pat O'Connor (Biologist)

Belinda S. Bishop (Inspector)

(Engineer)

Jim Wright (LAB)

( )

( )

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

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE:	TIME:	RECEIVING BODY OF WATER:
	20030722	5/3/99	1515	St Johns River

REMARKS:	COUNTY:	LOCATION:	FIELD NAME:
Shipping Channel Ongoing Dredging Falling Tide	Duval	St Johns River 0.4 miles W of Neptune Bch WWTP POD	Control Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify
15%				10%	60%	15%	

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

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

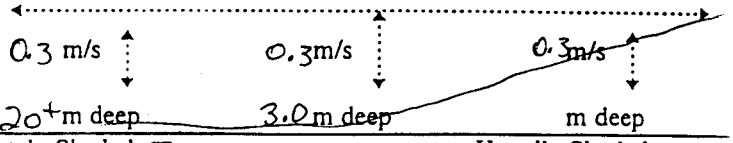
Width of riparian vegetation (m) on least buffered side: 3m

List & map dominant vegetation on back

Artificially Channelized ☐ NO Artificially Impounded ☐ YES — none

High Water Mark: 1.0 + 3.0 = 4.0 (m above present water level) (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 Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	100%	3	P Ponar
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):	Time		Secchi (m):
Top								
Mid-depth	1.6	19.99	7.61	6.57	51550 33.9ppt	1515		1.8
Bottom								

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

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

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

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

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

Weather Conditions/Notes: Cool Clear

Falling tide

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

Sampling Team: Weight Bisop O'Connor

Signature: [signature]

Date: 5/3/99

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:
	20030722	5/3/99	

REMARKS:	LOCATION: St Johns River 0.4 Miles West of Neptune Beach WWTP POD	FIELD ID/NAME:
		Control Site

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 7	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 13	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 5	>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 2	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 46

COMMENTS: Ongoing dredging of area for several weeks prior to inspection

ANALYSIS DATE:	ANALYST:	SIGNATURE:
5/3/99	O'Connor	Patrick O'Connor

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

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER: 20030464	DATE: 5/3/99	TIME: 1430	RECEIVING BODY OF WATER: St Johns River

REMARKS: Falling Tide	COUNTY: Duval	LOCATION: St Johns River 100yds SE of Neptune Bch WWTP POD	FIELD NAME: - Test Site 2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (spec
15%				10%	60%	15%	

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

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

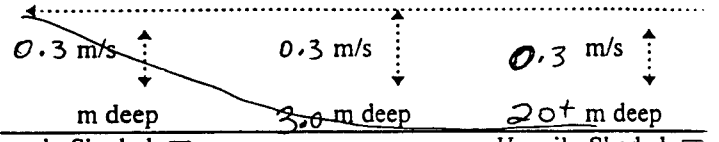
Width of riparian vegetation (m) on least buffered side: 3m

List & map dominant vegetation on back

Artificially Channelized YES ☐ NO none
Artificially Impounded ☐ YES

High Water Mark: 1.0 + 3.0 = 4.0
(m above present water level) (present depth in m) (m above bed)

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



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

SEDIMENT SUBSTRATE

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

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

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

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

Water Quality	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Time		Secchi
Top								
Mid-depth	1.6	20.06	7.62	6.05	51,400 33.8ppt	1430		0.9
Bottom								

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

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

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

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

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

Weather Conditions/Notes: Clear Cool
Ongoing Dredging and large 500' Ship traffic

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

Sampling Team: Wright Bishop O'Connor

Signature: [signature]

Date: 5/

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:
	20030464	5/3/99	

REMARKS:	LOCATION:	FIELD ID/NAME:
	St. Johns River 100 yds SE of Neptune Beach Pod	Test Site 2

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 7	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 13	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 5	>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 4	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 2	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 42

COMMENTS: ONGOING DREDGING FOR SEVERAL WEEKS PRIOR TO INSPECTION

ANALYSIS DATE:	ANALYST:	SIGNATURE:
5/3/99	O'Connor	Patrick W Connor

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Neptune Beach WWTP
County: Duval
Contact / District: Pat O'Connor / Northeast
NPDES Permit #: FL0020427
LIMS Sample #: 383368 LIMS Job #: TLH-1999-05-04-03

Sample Collection: Date 5/3/99 Time 11:05
Test Beginning: Date 5/4/99 Time 1600
Test Ending: Date 5/6/99 Time 1600
Organism Batch #: 109 Diluent Batch #:
Organism Age: 3days SRT toxicant batch #:

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

Test organism: Americamysis bahia

Remarks: ASW Control was 20‰ ASW diluted with well water to 7.4‰ salinity
NSW was 30‰ NSW diluted to 1.4‰ salinity then reconstituted with 40 fathoms artificial seasalts to 7.4‰ salinity.
original
1.4‰ Sample salinity adjusted to 7.4‰ with 40 fathoms artificial seasalts

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) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
4%. ASWCTLA	E1	5	5	5	8.4	8.2	8.0	24.0	25.0	25.2	7.4	6.8	7.0	10.69	12.21	13.35
ASWCTLB	E2	5	4 ID	4	8.4	8.2	8.1	24.0	25.2	25.3	7.6	7.0	7.0	11.78	12.66	13.27
ASWCTLC	E3	5	5	5	8.4	8.2	8.1	24.1	25.1	25.2	7.7	6.9	7.0	12.04	12.73	13.30
ASWCTLD	E4	5	5	5	8.4	8.2	8.1	24.6	25.4	25.3	7.7	7.0	7.3	12.17	12.93	13.64
NSWCTLA	E5	5	5	4 ID	8.2	8.3	8.3	24.4	25.0	25.4	7.7	6.9	7.1	12.12	12.39	13.52
NSWCTLB	E6	5	5	4 ID	8.2	8.3	8.3	24.2	25.2	25.7	7.6	7.0	7.2	11.99	12.65	13.39
NSWCTLC	E7	5	5	5 ~~4~~	8.2	8.3	8.3	24.3	24.6	25.4	7.6	6.9	7.0	12.07	12.62	13.33
NSWCTLD	E8	5	5	5	8.2	8.3	8.4	24.4	24.6	25.6	7.6	7.0	7.1	12.16	12.65	13.75
100% A	E9	5	5	5	7.9	8.2	8.3	24.3	24.6	25.5	7.6	7.0	7.0	12.19	12.56	13.23
100% B	E10	5	4 IM	4	7.9	8.2	8.3	24.6	25.2	25.1	7.5	6.9	7.0	12.21	12.65	13.34
100% C	E11	5	5	5	7.9	8.2	8.3	24.5	24.9	25.1	7.4	6.7	7.1	12.16	12.65	13.30
100% D	E12	5	4 ID	4	7.9	8.2	8.3	24.4	25.7	25.3	7.3	6.8	7.1	12.13	12.55	13.40
measured by:		CH	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF	MF
recorded by:		MF	MF	MF	FW	CH	CH	FW	CH	CH	FW	CH	CH	FW	CH	CH

Total ammonia at Sample at 24‰ salinity was 6.67 mg/L

Investigators' Signatures

Test Acceptance Temp Range 20.5-26.5°C
Incubator #3 Temp Range 25.0-27.0°C

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			0.01 ~~1.9~~ Smt	—	Hach Kit	MF
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	DR-100	CH	MF
Alkalinity (mg/L as $CaCO_3$):	NOT measured		168	Hach	CH	MF
Hardness (mg/L as $CaCO_3$):	NOT measured		400	Hach	CH	MF
Total ammonia (mg/L as N):	<0.017		6.67	Hach TNT	MF	
Salinity:	7.4‰		1.4‰	YSI	FW	MF

reviewer

form updated 5/22/98

Tested at 7.4‰ MF 5/4/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Neptune Beach WWTP
County: Duval
ontact / District: Pat O'Connor / NORTHEAST
IPDES Permit #: FL0020427
_IMS Sample #: 383368 LIMS Job #: TLH-1999-05-04-03
sample log
est Type: (Screening) I Definitive
(Static) I Static Renewal I Flow-through
est Number: 2 of 2

Sample Collection: Date 5/3/99 Time 11:05
Test Beginning: Date 5/4/99 Time 1600
Test Ending: Date 5/6/99 Time 1600
Organism Batch #: 16 Diluent Batch #: ____
Organism Age: 12 days SRT toxicant batch #: ____
Test organism: Menidia beryllina

Remarks: ASW Control was 20‰ ASW diluted with well water to 2.4‰ Salinity
NSW control was 30‰ (salinity) NSW diluted to 1.4‰ salinity with well water then reconstituted to 2.4‰ with Artificial Sea salts (40 fathoms).
1.4‰ salinity of original sample adjusted to 2.4‰ salinity with 40 fathoms artificial salts.

UNCORRECTED
(Cond. (mmhos/cm)) Cond. (µmhos/cm)

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	Cond. 0 hr	24 h	48 h
ASW CTL A	E13	5	5	5	8.2	7.8	7.9	24.3	24.0	26.3	7.8	7.5	7.2	4.87	4.43	4.75
ASW CTL B	E14	5	5	5	8.2	7.8	7.8	24.3	24.0	26.3	7.8	7.6	7.2	4.39	4.38	4.55
ASW CTL C	E15	5	5	5	8.2	7.8	7.7	24.1	24.2	25.6	7.9	7.6	7.3	4.19	4.38	4.65
ASW CTL D	E16	5	5	5	8.2	7.8	7.7	24.2	24.1	25.4	7.9	7.5	7.3	4.38	4.34	4.71
NSW CTL A	E17	5	5	5	8.0	8.2	8.3	24.4	24.0	26.4	7.9	7.6	7.4	4.27	4.30	4.91
NSW CTL B	E18	5	5	5	8.0	8.2	8.3	24.4	24.0	26.2	7.6	7.6	7.2	4.19	4.31	4.84
NSW CTL C	E19	5	5	5	8.0	8.2	8.3	24.4	24.0	26.3	7.6	7.6	7.3	4.18	4.37	4.75
NSW CTL D	E20	5	5	5	8.0	8.2	8.3	24.3	23.9	25.5	7.6	7.6	7.2	4.17	4.32	4.62
100% A	E21	5	5	5	7.6	8.0	8.2	24.5	24.0	25.5	7.3	7.5	7.3	4.23	4.33	4.65
100% B	E22	5	5	5	7.6	8.0	8.2	24.6	24.0	25.4	7.3	7.3	7.1	4.20	4.29	4.65
100% C	E23	5	5	5	7.6	8.0	8.2	24.6	24.0	25.6	7.3	7.3	7.2	4.16	4.36	4.91
100% D	E24	5	5	5	7.6	8.0	8.2	24.6	24.0	26.5	7.3	7.1	7.1	4.22	4.33	4.77
measured by:		FW	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF	MF	CH	MF	MF
recorded by:		MF	MF	MF	FW	CH	CH	FW	CH	CH	FW	CH	CH	FW	CH	CH

Total ammonia of sample at 2.4‰ was 6.34 mg/L

Investigators' Signatures
Tracy Woodard
Marshall Faircloth
Courtney Hess

Test Room Temperature Range 20.5-26.5°C
Incubator #3 Temp Range 25.0-27.0°C

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			0.01	—	Belinda Bishop	MF
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	DR-400	CH	MF
Alkalinity (mg/L as $CaCO_3$):	not measured		168	Hach	CH	MF
Hardness (mg/L as $CaCO_3$):	not measured		400	Hach	CH	MF
Total ammonia (mg/L as N):	<0.017		6.67	Denver ISE	MF	MF
Salinity:	2.4‰		1.4‰	YSI	FW	MF

reviewer
form updated 5/22/98

tested @ 2.4‰ MF 5/10/99

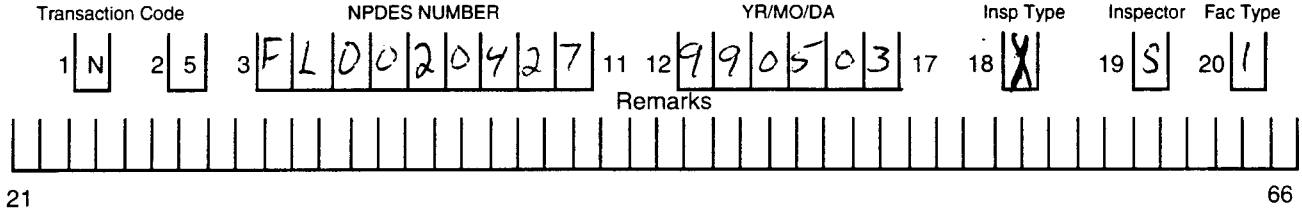
Phytoplankton taxa list and densities (#/mL) for Neptune Beach WWTP, collected via subsurface grabs in St. Johns River at Sherman Point on 3 May, 1999.

	Control Site	Test Site 1	Test Site 2
Cyanophyceae			
Chroococcus sp.	–	–	3
Undetermined Cyanophyceae	–	5	–
Chrysophyceae			
Dictyocha sp.	–	5	–
Bacillariophyceae			
Asterionella sp.	–	–	16
Biddulphia sp.	4	5	–
Chaetoceros sp.	–	10	13
Coscinodiscus sp.	42	24	35
Cyclotella sp.	29	58	58
Cylindrotheca sp.	13	14	13
Diploneis sp.	4	–	3
Entomoneis sp.	8	10	–
Gyrosigma sp.	–	–	10
Leptocylindrus sp.	–	14	10
Navicula sp.	–	–	3
Nitzschia sp.	21	14	16
Pennales	38	53	26
Plagiogramma sp.	–	29	–
Rhizosolenia sp.	25	43	29
Skeletonema sp.	50	101	6
Thalassionema sp.	8	29	13
Euglenophyceae			
Undetermined Euglenophyceae	–	5	–
Dinophyceae			
Undetermined Dinophyceae	–	14	10
Cryptophyceae			
Chroomonas sp.	–	5	–
Undetermined Cryptophyceae	–	10	–

Benthic macroinvertebrate taxa list for Neptune Beach WWTP, collected via Ponar grab samples in St. Johns River at Sherman Point, on 3 May, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site
Amphipoda		
Ampelisca abdita	–	56
Cerapus cudjoe	–	14
Cerapus sp.	14	97
Grandidierella bonnieroides	–	14
Haustorius sp.	1153	–
Undetermined Aoridae	14	–
Undetermined Corophiidae	–	14
Undetermined Phoxocephalidae	42	–
Cumacea		
Cyclaspis varians	–	14
Oxyurostylis sp.	42	153
Decapoda		
Callinectes sapidus	–	14
Undetermined Decapoda	14	–
Gastropoda		
Undetermined Gastropoda	–	14
Nemertea		
Undetermined Nemertea	-	472
Oligochaeta		
Undetermined Tubificidae	–	167
Pelecypoda		
Tellina versicolor	14	28
Undetermined Cyrenoididae	–	14
Undetermined Vitrinellidae	–	97
Polychaeta		
Ceratonereis irritabilis	–	14
Diopatra cuprea	–	28
Lepidonotus sp.	–	14
Melinna maculata	–	14
Minuspio longibranchiata	–	167
Nephtys picta	14	–
Phyllodoce mucosa	–	28
Prionospio pinnata	–	83
Sigambra tentaculata	–	56
Spiophanes bombyx	–	14
Spiophanes sp.	–	28
Streblospio benedicti	–	14
Undetermined Capitellidae	–	917
Undetermined Chaetopteridae	–	28
Undetermined Lumbrineridae	–	28
Undetermined Maldanidae	–	42
Undetermined Nereidae	–	28
Sipuncula		
Undetermined Sipuncula	–	472

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



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

