

Biological Assessment of

Jacksonville Heights WWTP

Duval County

NPDES #FL0023671

Sampled May 1992

September 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Jacksonville Heights WWTP
County: Duval
NPDES Number: FL0023671
State Permit Expiration Date: June 30, 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 5 May 1992

Results: Effluent metals were undetected except for zinc (27µg/L) and iron (16 µg/L), neither of which violate Class III surface water quality standards. No organics or pesticides were detected.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 5 May 1992

Results: The effluent was not toxic to the bannerfin shiner, *Notropis leedsi,* or to the invertebrate, *Ceriodaphnia dubia.*

Impact Bioassessment Inspection (IBI)

Date Sampled: 5 May 1992

Results: Benthic macroinvertebrate communities were moderately degraded downstream of the WWTP discharge, as shown by reductions in taxa richness and the Florida Index. While Shannon-Weaver diversity was also lower at the test site than at the reference site, it was not low enough to be a violation. Phytoplankton taxa richness and the diatom/blue green algae ratio were both sufficiently reduced downstream of the discharge to indicate a moderate disturbance.

Water Quality Inspection (WQI)

Date Sampled: 5 May 1992

Results: Significant nutrient enrichment was observed in Fishing Creek, which was directly related to the WWTP discharge. Nutrient concentrations were elevated in the effluent and at the test site, particularly ortho-phosphorus, total phosphorus, and nitrate-nitrite. Algal growth potential results were analogous to the nutrient results. While AGP was very low at the reference site, it increased dramatically at the test site due to the very high AGP of the effluent. The test site AGP greatly exceeded the eutrophication "problem threshold". Total coliforms in the effluent and at the test site were in violation of Class III standards (17-302.560(6) FAC).

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

The Jacksonville Heights Wastewater Treatment Plant, located in Duval County, Florida, is a 2.5 MGD activated sludge sewage treatment plant (see maps in Appendix). The treatment system includes a bar screen (for trash removal), hydroscreens (for solids removal), a grit chamber, lime addition (for nitrogen removal), and two aeration basins. Additionally, the plant is equipped with an on-site lift station, a gas feed chlorinator, a gas feed dechlorinator, and diffusion aerators. The effluent is discharged into a short ditch which flows into Fishing Creek, the Ortega River, and then to the St. Johns River.

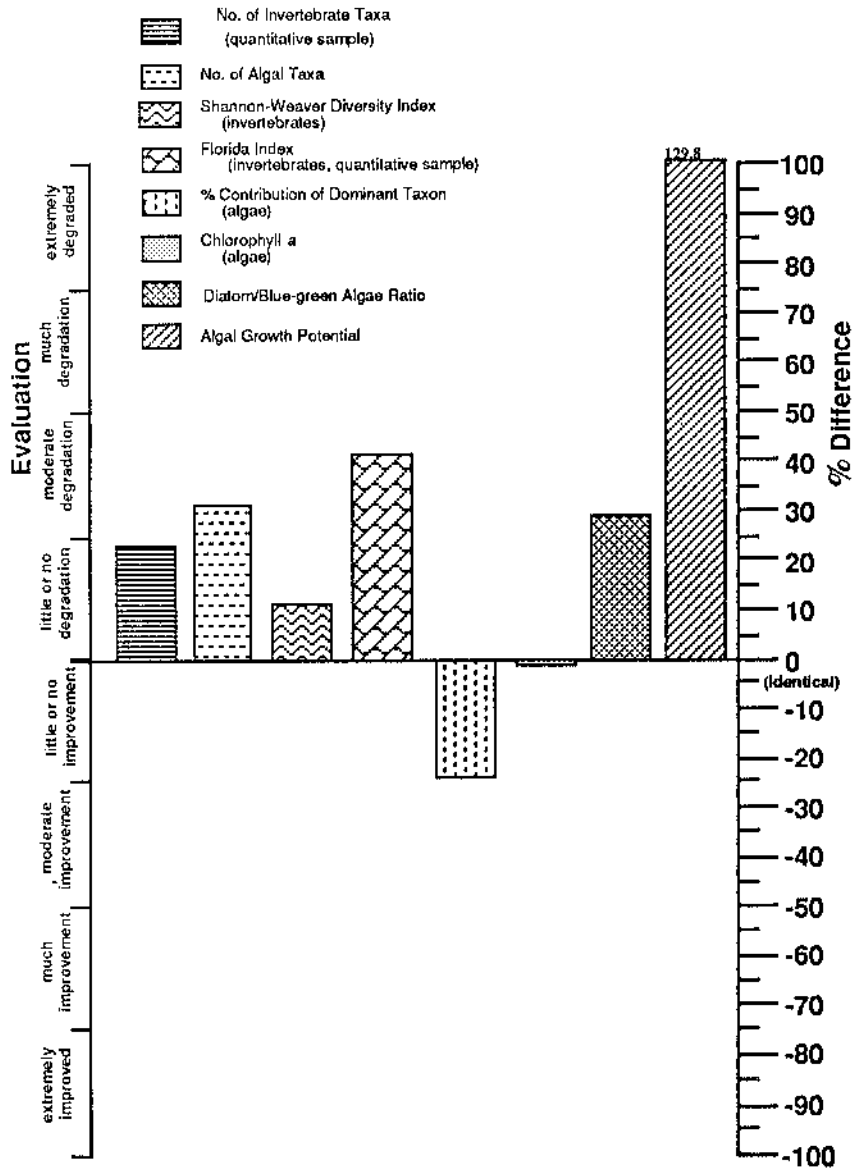
A review of the past two years of MOR data shows no permit violations or deficiencies, with the exception of some minor flow recorder problems. There have been no NPDES permit violations of effluent limits over the past year. However, the Jacksonville Heights WWTP has had problems with chronic toxicity to *Ceriodaphnia dubia*. The facility is currently working on a toxicity reduction evaluation, pursuant to EPA administrative order 90-003. Some toxicity reduction has been accomplished.

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 reference site (located in Fishing Creek approx-

Major characteristics of community structure of control and test sites.

Jacksonville Heights WWTP	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	35	26
Florida Index	12	9
% Contribution of Dominant Taxon	17.4	21.8
% Diptera	89.4	38.2
% Odonata	6.1	28.2
% Oligochaeta	.10	13.6
% Gastropoda	3.2	8.2
% Trichoptera	0.0	3.6
% Coleoptera	.39	2.7
% Other	.80	5.5
% Predators	35.1	42.1
% Collector-Gatherers	28.9	28.3
% Collector-Filterers	18.4	9.7
% Scrapers	11.0	9.7
% Shredders	6.6	9.6
% Piercers	0.0	.5
Macroinvertebrate Hester-Dendy		
Number of Taxa	30	23
Florida Index	12	7
Shannon-Weaver Diversity	4.4	3.9
% Odonata	10.1	24.2
% Diptera	63.9	60.8
% Gastropoda	11.8	3.9
% Oligochaeta	10.9	.7
% Coleoptera	0.0	5.9
% Trichoptera	0.0	4.6
% Other	3.3	0.0
% Predators	30.1	53.6
% Collector-Gatherers	34.2	21.9
% Collector-Filterers	15.2	5.8
% Scrapers	16.9	8.7
% Shredders	3.7	10.0
% Parasites	.4	0.0
Phytoplankton Algae		
Number of Taxa	13	9
% Contribution of Dominant Taxon	31.0	23.3
Chlorophyll a (µg/L)	0.86A	0.00
Diatom/Diatom + B-G Abundance Ratio	.88	.62
% Blue-green	9.5	26.7
% Green	21.4	26.7
% Diatoms	66.7	43.3
% Other	2.4	3.3
Algal Growth Potential (mg dry wt/l)	0.4	52.3



Effect of discharge on receiving stream
(measured as difference between control and test sites).

imately 30 yards upstream of the discharge) and a test site (the area down gradient of the discharge in Fishing Creek) (see maps in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller et al. (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major tax-

onomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

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

The following personnel were involved in this investigation: Scott Bulgrin (DER, Northeast District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

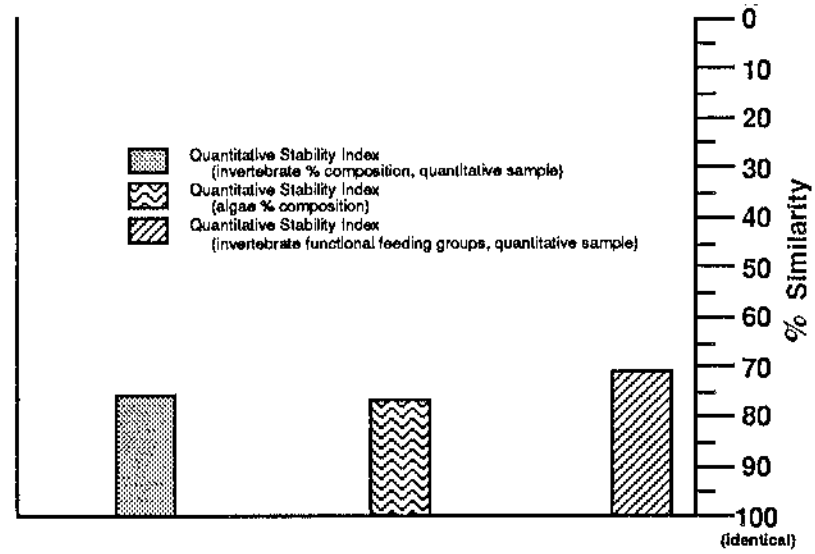
Results and Discussion

Habitat quality ratings at the reference site (with 74 points) and at the test site (with 63 points), were comparable. The reference station had more available substrate types and better bank stability. The dominant land use surrounding both sites was characterized as residential. The stream is fairly small (1 to 2 m wide) with adequate water velocity (above 0.12 m/sec). A major difference between the sampling locations was the amount of sunlight reaching the stream. The reference site was open, with abundant macrophyte growth (including *Hydrilla*), while the test site was moderately shaded, with 30 % less macrophyte coverage. Field dissolved oxygen was fairly high in the stream (12.9 mg/L at the reference site and 9.6 mg/L at the test site). Fishing Creek had alkaline water (pH was 9.6 at the reference and 7.5 at the test site. The conductivity was 252 µmhos/cm at the reference site and 480 µmhos/cm at the test site.

The sample of effluent was not acutely toxic to the bannerfin shiner, *Notropis leedsi*, or to the invertebrate, *Ceriodaphnia dubia* (Appendix). With the exception of zinc (27 µg/L) and iron (16 µg/L), effluent metals were below detection limits. These concentrations of zinc and iron do not violate Class III surface water quality standards. No organic priority pollutants or pesticides were found.

Significant nutrient enrichment was observed in Fishing Creek, which appeared to be directly related to the WWTP discharge. Test site concentrations of ortho-phosphorus (2.2 mg/L), total phosphorus (2.2 mg/L), and nitrate-nitrite (9.6 mg/L), were higher than 95 % of all other Florida streams (see Table of Typical Water Quality Values in Appendix). This can be attributed to the elevated effluent concentrations of total phosphorus (2.6 mg/L), orthophosphorus (2.8 mg/L), and nitrate-nitrite (12 mg/L). In contrast, these nutrient species were undetected at the upstream reference site. Ammonia and TKN measured at the reference and test sites were not unusually high.

Algal growth potential results were analogous to the nutrient results. While AGP was very low at the reference site (0.4 mg dry wt/L) it increased dramatically at the test site (52.3 mg dry weight/L). The AGP of the effluent was 66.6 mg dry weight/L. An AGP above 5 mg dry weight/L is considered troublesome, since it has been correlated with algae blooms, low dissolved oxygen, and fish kills (Raschke and Schultz 1987).



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

Total coliform populations measured in the effluent (8000 organisms/100ml) and at the test site (8000 organisms/100ml) were in violation of Class III standards (17-302.560(6) FAC). Fecal coliform levels were within standards in all samples.

Some measures of benthic macroinvertebrate community health indicated moderate degradation at the test site. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness was reduced at the test site, both in the dip net and Hester-Dendy samples, by 26% and 23%, respectively. Similarly, the Florida Index declined by 42% in Hester-Dendy samples and by 25% in the dip net samples, when comparing the reference site to the test site. Shannon-Weaver diversity was also somewhat lower at the test site. Quantitative stability indices for community structure and functional feeding groups, however, indicated a fair similarity between the reference and test sites. These results suggest a moderate adverse influence from the discharge.

While phytoplankton is generally not the target population for determining pollution effects in flowing waters, periphyton racks were lost during the study. This is why we used the phytoplankton community for the assessment. Phytoplankton taxa richness and the diatom/blue green algae ratio were both reduced downstream of the discharge, by 31% and 25%, respectively. This indicates a moderate disturbance due to the discharge. In contrast to the significant nutrient enrichment found at the test site, chlorophyll *a* measured there was zero (0.0 µg/L) This low chlorophyll a value may be due to the water current flushing free floating algae from the area. Despite this anomalous chlorophyll a result, the elevated nutrients and AGP observed at the test site suggest that algae blooms or excessive macrophyte growth are probable further downstream, where flow conditions are more favorable to their development.

Conclusions

The sample of effluent collected from Jacksonville Heights WWTP was not toxic to the fish, *Notropis leedsi*, or to the cladoceran, *Ceriodaphnia dubia*. No organic chemicals or metals were detected in the effluent at levels which would produce toxicity or violate Class III standards.

Significant nutrient enrichment was observed in Fishing Creek, which was directly related to the WWTP discharge. Nutrient concentrations were elevated in the effluent and at the test site, particularly ortho-phosphorus, total phosphorus, and nitrate-nitrite. Algal growth potential results were analogous to the nutrient results. While AGP was very low at the reference site, it increased dramatically at the test site due to the very high AGP of the effluent. The test site AGP greatly exceeded the eutrophication "problem threshold". Because the facility was operating at approximately 40% of its capacity during this study, these enrichment problems are expected to be worse when the plant discharges its full 2.5 MGD.

Total coliforms in the effluent and at the test site were in violation of Class III standards (17-302.560(6) FAC).

Benthic macroinvertebrate communities were moderately degraded downstream of the WWTP discharge, as shown by reductions in taxa richness and the Florida Index. While Shannon-Weaver diversity was also lower at the test site than at the reference site, it was not low enough to be a violation.

Phytoplankton taxa richness and the diatom/blue green algae ratio were both sufficiently reduced downstream of the discharge to indicate a moderate disturbance.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

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

Weber, C. I. 1991. 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.

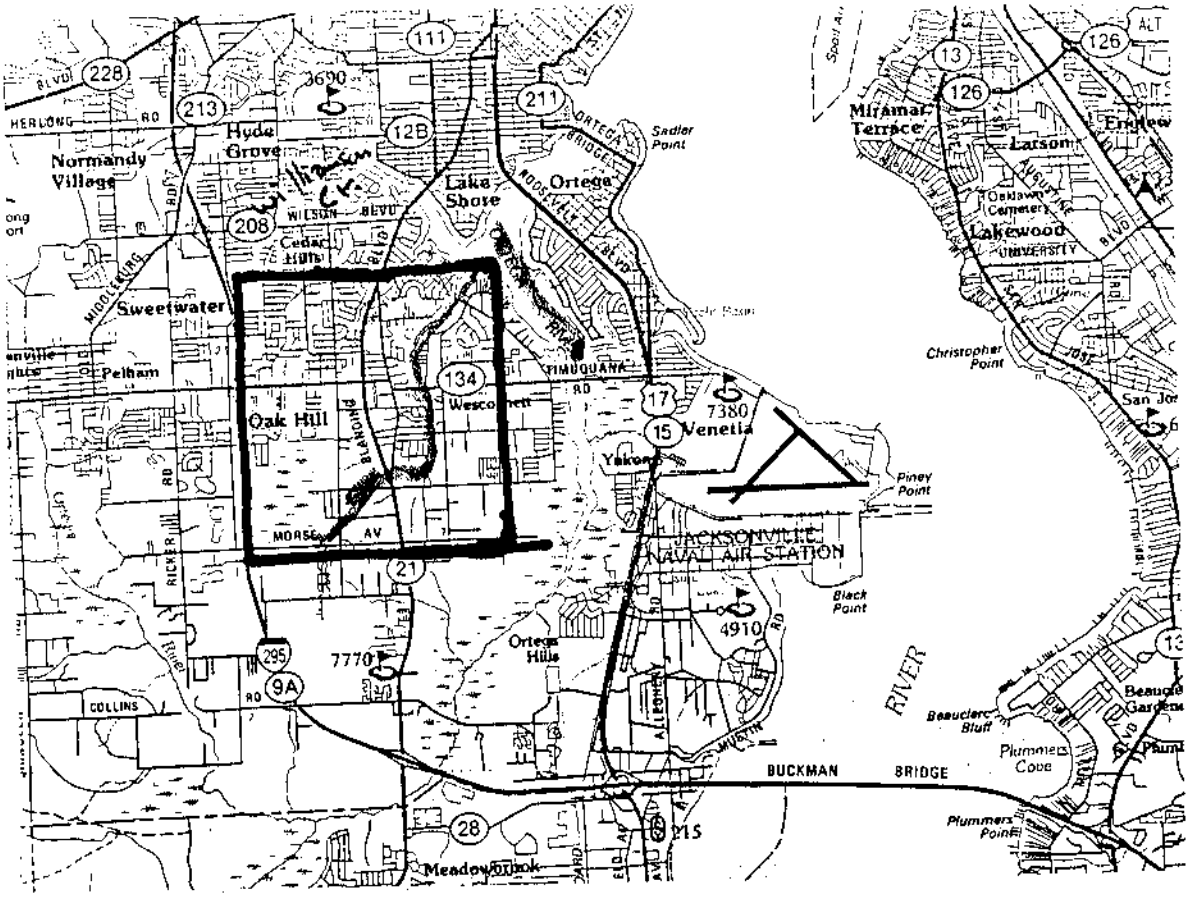
Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

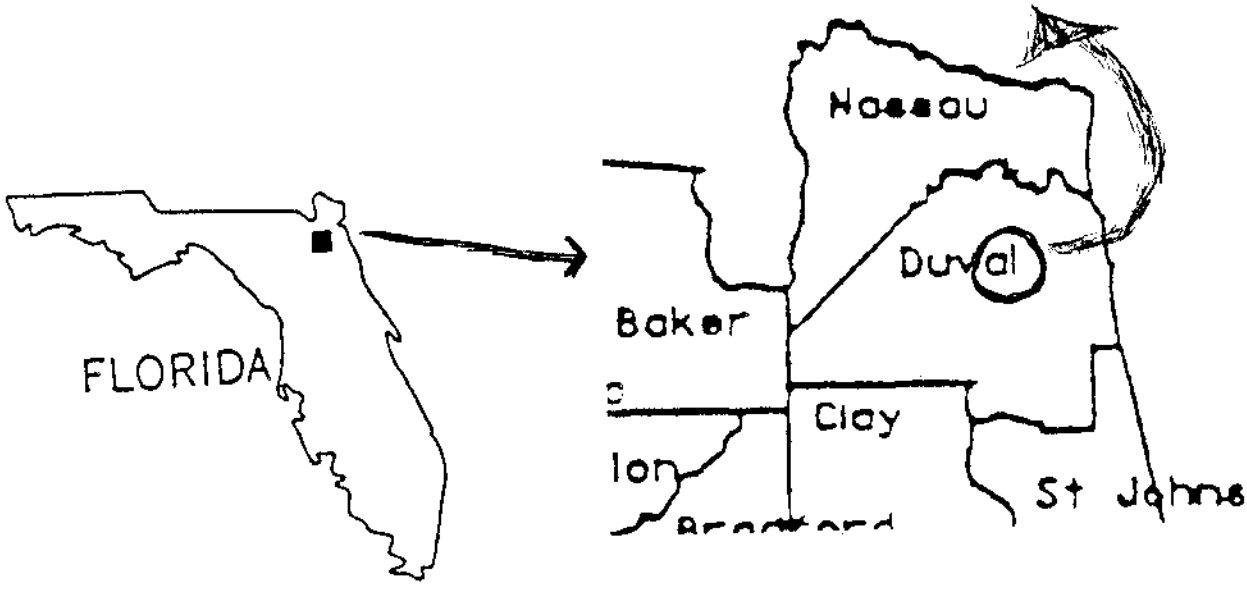
Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

Chemistry summary table for Jacksonville Heights WWTP.

	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
Organics and pesticides	Undetected		
Metals (ug/L)			
Aluminum	50U		
Arsenic	20U		
Cadmium	.05U		
Copper	6T		
Chromium	10U		
Iron	16		
Lead	15U		
Nickel	5U		
Mercury	.1U		
Selenium	1U		
Silver	.07U		
Zinc	27		
Nutrients (mg/L)			
Ortho-phosphorus	2.8A	0.02U	2.2A
Total phosphorus	2.6	0.05U	2.2
Ammonia	0.04A	0.012T	0.11A
Nitrate+Nitrite	12A	0.04U	9.6A
TKN	0.84	0.28	0.85
Other Parameters			
Habitat Assessment		74	63
D.O. (mg/L)		12.9	9.6
pH (SU's)		9.6	7.5
Conductivity/Salinity (µmhos/cm or ppt)		252	480
Temperature (°C)		19.8	23.7
AGP	66.6	.4	52.3
Bioassay Fish-Dechlorinated	not toxic		
Bioassay Invertebrate-Dechlorinated	not toxic		
Fecal coliform (org/100 ml)	110	70	110
Total coliform (org/100 ml)	8000	1700	8000

A - Value reported is the mean of two or more determinations
E - Scientific notation
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
N - Not analyzed for this compound
T - Value reported is less than the practical quantitation limit
U - Material analyzed for but not detected; value reported is the minimum detection limit
Q - Evidence that analyte is present in sample is equivocal
NA - Not applicable
NR - Not requested

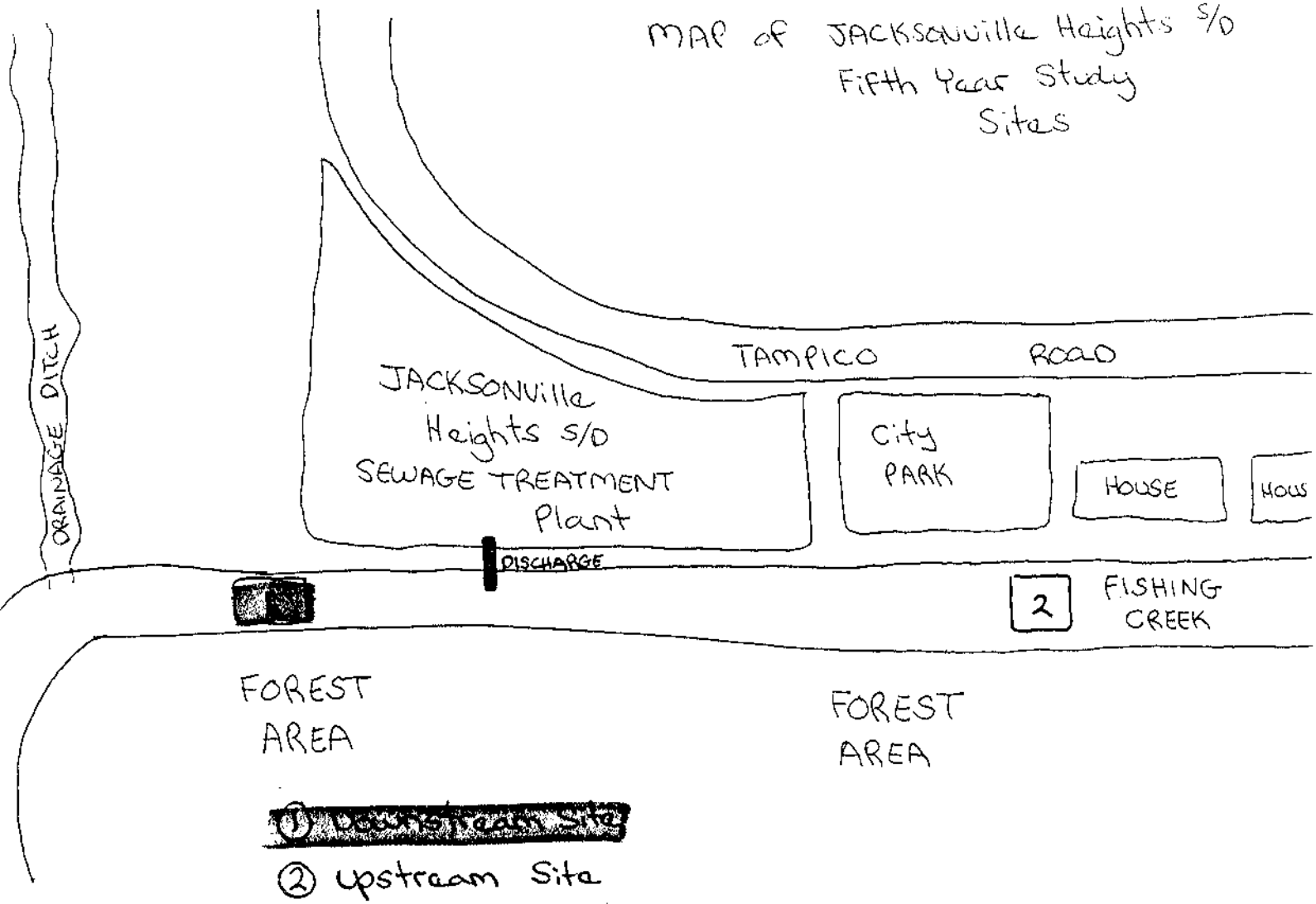




QUADRANGLE LOCATION

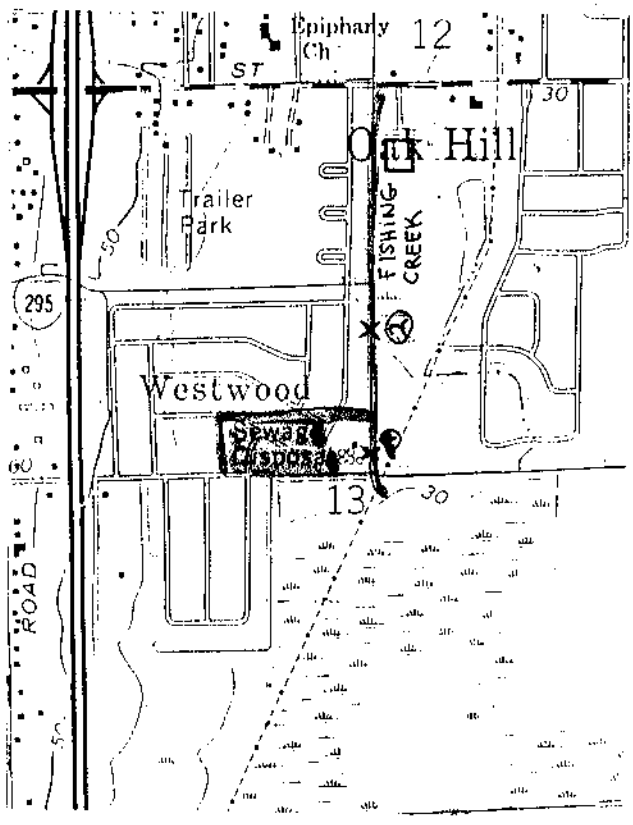
MAP of General location of Jacksonville Florida
Fifth year study

MAP of JACKSONVILLE Heights S/D
Fifth Year Study
Sites



① Discharge Site

② Upstream Site



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name:	Prepared by: Date:	
Location (attach detailed map):	County	District
Federal Permit # and expiration date:	State GMS # and State expiration date:	Facility Type: Industrial Municipal Federal Agricultural Other (list):

Function of facility:

Description of treatment process:

Receiving waters:	Classification:
Design Flow: 2.50 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.):

No Mixing zone for this

List effluent limits:		Describe special permit conditions and permit modifications:
Parameter	Limit (units)	
1. FIGURE 1	NPDES effluent Limitations	
2. FIGURE 2	STATE effluent Limitations	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

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

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

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

Additional information:

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL LIMITS

1. These effluent limitations are to be achieved on the effective date of the permit, and shall remain in effect until permit expiration for outfall Serial Number 001 - Treated Sanitary Wastewater. Such discharges shall be limited and monitored by the permittee as specified below.

PARAMETERS	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS		
	Annual Average	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type	Sampling Point
Flow (MGD)	2.5	Report	Report	Continuous	Recording Flow Meter	Effluent
Biochemical Oxygen Demand (5 day)	8 mg/l	8 mg/l	16 mg/l	1/Week	16 hour Composite	Effluent
Total Suspended Solids	20 mg/l	20 mg/l	60 mg/l	1/Week	16 hour Composite	Effluent
Ammonia, as N	1.6 mg/l	2.0 mg/l	3.2 mg/l	1/Week	16 hour Composite	Effluent
Total Residual Chlorine (TRC)	(SEE PAGE I-2, ITEM 2, FOR INTERIM & FINAL LIMITS. SEE PART I.C.1 FOR COMPLIANCE SUCEDULE)			1/Week	Grab	Effluent
pH	(SEE ITEM 3 ON PAGE I-2)			Continuous	Recorder 1/	Effluent
Fecal Coliform Bacteria, N/100 ml	(SEE ITEM 9 ON PAGE I-3)			1/Week	Grab	Effluent
Dissolved Oxygen	(SEE ITEM 7 ON PAGE I-2)			Continuous	Meter	Effluent

1/ Hourly grab samples during the period of operator attendance may be substituted for meter readings.

Permittee:

Phillip Heil, Vice-President
Jacksonville Heights STP

I.D. Number: 10 PO 1970
Permit/Certification
Number: DO16-143957
Date of Issue: April 1, 1988
Expiration Date: January 30, 1993

SPECIFIC CONDITIONS:

14. The monitoring requirements and effluent limitations for this plant are as follows:

PARAMETER	EFFLUENT LIMIT	MINIMUN FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow	2.50 MGD (b)	continuous	recording meter	Influent
Dissolved Oxygen	Min. 6.0 mg/l	continuous (e)	recording meter	Effluent
BOD_5	(a) mg/l	weekly	16 hr. composite	Influent/ Effluent
TSS	(a) mg/l	weekly	16 hr. composite	Effluent/ Influent
NH_3-N	(a) mg/l	weekly	16 hr. composite	Effluent
pH units	6.0 to 8.5	continuous (e)	recording meter	Effluent
Chlorine Residual	Min. 0.5 mg/l Max. (d)	continuous (e)	recording meter	Effluent
Fecal Coliform	Avg. 200/100 ml Max. 800/100 ml	weekly	grab (c)	Effluent

(a) Limits, Maximum (mg/l)

	annual	monthly	weekly	one time grab max
BOD_5	8	10	12	16
TSS	20	30	45	60
NH_3-N	1.60	2.0	2.25	3.20

(b) Annual average daily flow shall not exceed valve shown.

(c) Grab samples will be collected during periods of minimal treatment plant pollutant removal efficiencies, or maximum organic loading in the effluent.

(d) For the period from the date of issue until two years from the date of issue, the maxima for chlorine residual area: Annual - 1.0 mg/l; monthly 1.3 mg/l; weekly - 1.5 mg/l; one time grab sample - 2.0 mg/l. Beginning two years from the date of issue of this permit, the permittee shall either:

(1) Complete and have in operation dechlorination facilities which reduce the total residual chlorine (TRC) content of the effluent to below 0.01 mg/l, or

(2) Apply for a mixing zone for TRC in the receiving stream pursuant to the Department's applicable mixing zone regulations. The Department's mixing zone regulations are contained in Florida Administrative Code Rule Section 17-4.244.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL D.E.R. Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 05/05/92	TIME: 1400	RECEIVING BODY OF WATER: Fishing Creek to Cottage River to St. Johns River

REMARKS: Fishing Creek is a major drainage canal for the neighborhood areas. Trash in creek.	LOCATION: Fishing Creek 50 yds downstream from Jacksonville Heights discharge	FIELD ID/NAME: (Lab water sample Site)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20			80			

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

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

Point-Source Pollution (list location and describe): Jacksonville Heights S/O wastewater Treatment Plant

Estimated System Width (range, m): 1-2	Estimated System Depth (range, m): 0.3 0.5	Impounded ☐ yes ☐ no
High Water Mark (m above bed): 1-2	Velocity (range, m/s): 0.16	Channelized ☐ yes ☐ no

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 Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☑ Sand: ☑ Shell: ☐ Other: ☑ Debris

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	25	6	DIPNET	Rock or Shell Rubble			
Leaf Packs	5	2	DIPNET	Sand	5	1	DIPNET
Aquatic Vegetation	10	2	DIPNET	Mud/Muck	20	1	DIPNET
Submerged Roots				Other: TRASH SNAGS	10	4	DIPNET
Undercut Banks	15	4	DIPNET	Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	23.7	9.57	7.50	480				0.5L
Mid-depth	23.7	9.57	7.50	480				
Bottom	23.7	9.57	7.50	480				

System Type : Stream: ☒ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ Drainage Canal

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

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

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

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

Weather Conditions: Sunny, warm low 80's.

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☑	☐	☐
Fish	☐	☐	☑ (Sunfish, Largemouth)	☐
Aquatic Macrophytes	☐	☑	☐	☐
Iron/sulfur Bacteria	☑	☐	☐	☐

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/05/92	SCOTT BULGRIN	Scott Bulgrin

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL D.E.R. Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 05/05/92	RECEIVING BODY OF WATER: FISHING CREEK into Cortega River into St. Johns River

REMARKS: Creek used for Recreation. Trash in creek and on the Creek banks	LOCATION: FISHING CREEK (about 30yds downstream of STP discharge)	FIELD ID/NAME: (DOWNSTREAM SITE)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover **16**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity **18**	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration **12**	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability **8**	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality **9**	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	TOTAL SCORE **63**

COMMENTS: DOWNSTREAM SITE for Jacksonville Heights WWTP 5 Fifth Year Study. FISHING CREEK is a major drainage canal for the area. Several other drainage ditches from an old established neighborhood empty into the Creek along with RUNOFF from Highway.

ANALYSIS DATE: 05/05/92	ANALYST: SCOTT BULGRIN	SIGNATURE: Scott Bulgrin

Aquatic vegetation lacking downstream of Jacksonville Heights STP effluent discharge, could be due Canopy Cover.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL D.E.R. Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 05/05/92	TIME: 1500	RECEIVING BODY OF WATER: FISHING Creek to Ortega River to St. Johns River

REMARKS: FISHING Creek is a major drainage canal for the neighborhood. Trash in creek. Excessive Hydrilla in	LOCATION: FISHING Creek 50 yds upstream from Jacksonville Heights discharge	FIELD ID/NAME: (Upstream Site)

RIPARIAN ZONE/INSTREAM FEATURES Upstream canal

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20			80			

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

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

Point-Source Pollution (list location and describe): NO Point-Source Pollution but NPS pollution Residential and Highway Runoff

Estimated System Width (range, m): 1-2	Estimated System Depth (range, m): 0.3-0.6	Impounded ☐ NO
High Water Mark (m above bed): 1-2	Velocity (range, m/s): 0.12	Channelized ☐ NO

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 Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☑ Sand: ☑ Shell: ☐ Other: ☑ Detritus

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	25	4	DR NET	Rock or Shell Rubble			
Leaf Packs	5	2	DR NET	Sand	5	1	DR NET
Aquatic Vegetation	40	4	DR NET	Mud/Muck	10	1	DR NET
Submerged Roots				Other: TRASH SNAGS	10	4	DR NET
Undercut Banks	5	4	DR NET	Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (umho/cm):				Secchi (m):
Top	19.8	12.85	9.57	252				0.5L
Mid-depth	19.8	12.85	9.57	252				
Bottom	19.8	12.85	9.57	252				

System Type : Stream: ☒ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ Drainage Canal

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

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

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

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

Weather Conditions: Sunny warm, low 80's

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

ANALYSIS DATE: 05/05/92	ANALYST: SCOTT BULGRIN	SIGNATURE: Scott Bulgrin

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

SUBMITTING AGENCY CODE: 2031	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER: FISHING CREEK into
SUBMITTING AGENCY NAME: FL D.E.R. Northeast District		05/05/92	Cotega River into ST. Johns River

REMARKS: Creek used for recreation. Trash in creek and on the banks.	LOCATION: FISHING CREEK (about 30yds upstream from STP discharge)	FIELD ID/NAME: (UPSTREAM SITE)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover **27**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity **16**	Max. observed: >0.3 m/sec. but < 1 m/sec **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec **0-7 points**
Artificial Channel/ Flow Alteration **13**	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability **9**	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality **9**	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	TOTAL SCORE
—		**74**

COMMENTS: UPSTREAM SITE FOR JACKSONVILLE Heights WWTP S/O Fifth Year Study. FISHING Creek is a major drainage canal for the area. Several other drainage ditches from an old established neighborhood empty into the Creek.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
05/05/92	SCOTT BULGRIN	Scott Bulgrin

Excessive Hydrilla in upper creek area could be due to openess of upstream site

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Jacksonville Heights
Address/City:
County: Duval
Contact/District: Scott Bulgin / NEAS T
NPDES Permit #: FL0023671 Outfall #:

Sample Collection: Date 5/5/92 Time 1115
Test Beginning: Date 5/6/92 Time 1500
Test Ending: Date 5-8-92 Time 1300
Test Organism: Ceriodaphnia Dubia
Life Stage/Age: <24hour

Test Number: 1 of 2 Test Type: (Screening) | Definitive LIMS 33584 92-MAY-06-30
(Static) | Static Renewal | Flow-through Lims 5/11/92

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.5@24.6	23.9@23.9	1378@24.2 @1387
24 hr	7@7, 10@10	8.5@24.0	23.2@23.2	1372@24.1
48 hr	7@7, 10@10	8.7@23.0	22.8@23.8	1357@23.6

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.0		8.0	23.8		23.2	8.4		9.2	156		169
Control	B	5	5	5			8.0						9.2			
Control	C	5	5	5			8.0						9.2			
Control	D	5	5	5			8.0						9.2			
100%	A	5	5	5	7.4		8.2	23.8		23.2	8.5		9.2	553		566
100%	B	5	5	5			8.2						9.2			
100%	C	5	5	5			8.2						9.2			
100%	D	5	5	5			8.2						9.2			
Measured/Loaded by:		MF	MF	MF	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		KP	KP	KP	KP		KP	KP		KP	KP		KP	KP		KP

33584 92-MAY-06-30-01
BIOLOGY Matrix: W-EFFLUENT
Date Collected: 5-MAY-1992 11:15:00.
Field ID:EFFLUENT
BSY-SN-CLD BSY-SN-FSH

Investigators' Signatures
Marshall Faircloth
Kim Pearce

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not measured		
Lab Tot. Resid. Cl2:	Blank = 0.0		0.0	Hach	MF
Alkalinity:	115	61	88	Hach	KP
Hardness:	123	73	155	Hach	KP
Total Ammonia:			1.2	Hach	KP

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Jacksonville Heights
Address/City:
County: DUVAL
Contact/District: Scott Bulgin / NE
NPDES Permit #: FL00 23671 Outfall #:

Sample Collection: Date 5/5/92 Time 1115
Test Beginning: Date 5/6/92 Time 1500
Test Ending: Date 5-8-92 Time 1300
Test Organism: M. beckii
Life Stage/Age: 11 days

Cims 5/11/92

Test Number: 2 of 2 Test Type: (Screening) | Definitive
(Static) Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.5@24.0	23.9@ 23.9	1378@ 24.2
24 hr	7@7, 10@10	8.5@24.0	23.2@ 23.2	1372@ 24.1
48 hr	7@7, 10@10	8.7@23.0	22.8@ 22.8	1357@ 23.6

		Number Live			pH			Temp. (°C)			DO (mg/L)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	70	5	5	5	7.4	8.1	8.2	23.2	22.9	22.3	8.4	9.3	9.4			
Control	26	5	5	5	7.4	8.1	8.2				8.4	9.3	9.4	238	240	240
100%	326	5	5	5	7.2	8.0	8.1	22.8	22.8	22.3	8.7	9.2	9.4			
100%	53	5	5	5	7.2	8.1	8.1				8.7	9.2	9.4	561	566	568
Measured/Loaded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP

Investigators' Signatures
Marshall Faircloth
Kim Pearce
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not measured		
Lab Tot. Resid. Cl2:	blank = 0.0		0.0	Hach	MF
Alkalinity:	115	61	88	Hach	KP
Hardness:	123	73	155	Hach	KP
Total Ammonia:			1.2	Hach	KP

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: _____ ppt

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

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

Phytoplankton taxa and abundances for Jacksonville Heights Subdivision, collected in Fishing Creek, Duval County, on 5 May 1992.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	287	46
Cocconeis sp.	221	46
Cyclotella sp.	22	–
Gomphonema sp.	22	–
Nitzschia sp.	44	139
Synedra sp.	22	69
Chlorophyta		
Ankistrodesmus sp.	22	–
Elakatothrix sp.	22	–
Scenedesmus sp.	88	23
Westella sp.	22	–
Unknown chlorophyte flagellate	44	162
Cyanophyta		
Chroococcus sp.	88	–
Dactylococcopsis sp.	–	93
Oscillatoria sp.	–	93
Euglenophyta		
Trachelomonas sp.	22	23

Macroinvertebrate taxa list for Jacksonville Heights WWTP, Duval County, collected via Hester-Dendy multiplate samplers on 2 June, 1992.

	Reference Site	Test Site
Coleoptera		
Dubiraphia vittata	–	9
Diptera		
Ablabesmyia mallochi	4	–
Chironomus decorus grp.	3	15
Chironomus sp.	1	1
Conchapelopia sp.	7	14
Corynoneura sp.	2	–
Cryptochironomus sp.	–	1
Dicrotendipes modestus	7	–
Dicrotendipes neomodestus	14	1
Dicrotendipes nervosus	1	–
Dicrotendipes simpsoni	5	–
Helopelopia sp.	5	9
Hemerodromia sp.	1	18
Kiefferulus sp.	1	–
Labrundinia pilosella	2	–
Labrundinia sp.4 Epler	1	–
Larsia berneri	1	–
Polypedilum scalaenum	2	10
Polypedilum tritum	5	8
Pseudochironomus sp.	–	1
Undetermined dipteran pupae	1	10
Tanytarsus sp. E Epler	5	3
Tanytarsus sp. G Epler	2	–
Tanytarsus sp. L Epler	2	–
Tanytarsus sp. T Epler	4	1
Tanytarsus sp. U Epler	–	1
Ephemeroptera		
Caenis sp.	3	–
Gastropoda		
Physella sp.	14	6
Hirudinea		
Mooreobdella tetragon	1	–
Odonata		
Argia fumipennis	8	1
Argia sedula	–	7
Argia sp.	–	1
Undetermined Coenagrionidae	–	6
Enallagma cardenium	2	22
Ischnura sp.	2	–

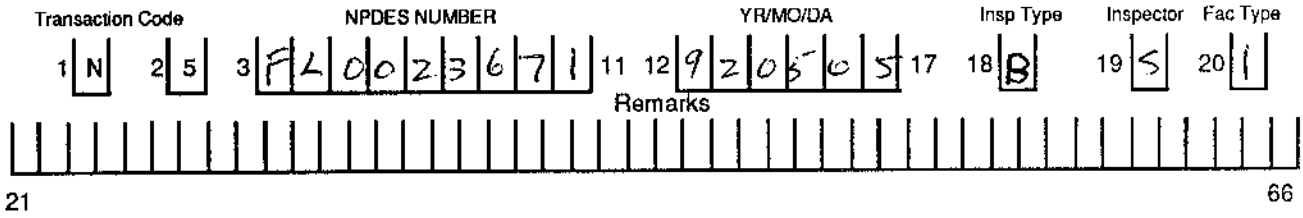
Oligochaeta		
Lumbriculus variegatus	–	1
Pristinella osborni	1	–
Slavina appendiculata	12	–
Trichoptera		
Cheumatopsyche sp.	–	6
Undetermined Trichoptera pupa	–	1

Macroinvertebrate taxa list for Jacksonville Heights WWTP, Duval County, collected via discrete dip net sweeps from all available habitats on 5 May 1992.

	Reference site	Test site
Coleoptera		
Agasicles sp.	1	–
Helochares sp.	1	–
Peltodytes muticus	–	6
Stenelmis sp.	2	12
Diptera		
Ablabesmyia mallochi	9	6
Chironomus decorus grp.	–	30
Chironomus sp.	–	6
Conchapelopia sp.	111	12
Cricotopus bicinctus	34	–
Cryptochironomus sp.	17	–
Dicrotendipes modestus	17	6
Dicrotendipes neomodestus	179	18
Dicrotendipes prob. *tritomus*	9	–
Helopelopia sp.	77	–
Hemerodromia sp.	1	18
Labrundinia pilosella	9	–
Palpomyia grp.	2	6
Polypedilum scalaenum	17	66
Polypedilum tritum	111	48
Pseudochironomus sp.	17	–
Paratanytarsus sp.	9	–
Undetermined dipteran pupae	82	24
Simulium sp.	3	–
Tanytarsus sp. E Epler	77	6
Tanytarsus sp. T Epler	128	–
Tipula sp.	–	6
Tribelos sp.	9	–
Ephemeroptera		
Caenis sp.	3	–
Callibaetis pretiosus	2	–
Gastropoda		
Hebetancyclus excentricus	1	–
Physella sp.	32	54
Hemiptera		
Abedus sp.	–	6
Mesovelia sp.	–	6
Lepidoptera		
Undetermined lepidopteran	2	–
Malacostraca		
Procambarus fallax	1	–

Odonata		
Anax sp.	1	–
Argia sedula	16	18
Enallagma cardenium	35	144
Ischnura sp.	5	18
Progomphus obscurus	6	6
Oligochaeta		
Lumbriculus inconstans	1	90
Pelecypoda		
Sphaerium or *Musculium* sp.	–	24
Trichoptera		
Cheumatopsyche sp.	–	18
Hydropsyche sp.	–	6

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)

