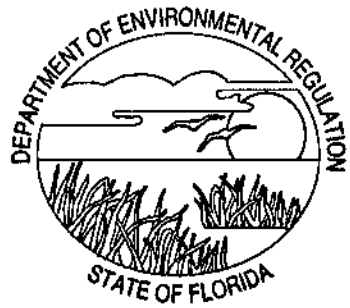


Biological Assessment of

Orange County Public Utilities Division, Eastern Service Area Wastewater Treatment Plant

Orange County

NPDES #FL0038849

Sampled September 1992

January 1993

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Orange Co. Public Utilities Division, Eastern Service Area WWTP
County: Orange Co.
NPDES Number: FL0038849
State Permit Expiration Date: 25 August 1995

Toxics Sampling Inspection (XSI)

Date Sampled: 15 September 1992

Results: No organic priority pollutants or pesticides were present in the effluent at levels above detection limits. Effluent metals were well within Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 15 September 1992

Results: The effluent sample collected before discharge to the treatment wetland was not toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred in either 48 hour static acute bioassay.

Impact Bioassessment Inspection (IBI)

Date Sampled: 15 September 1992

Results: Measures of benthic macroinvertebrate community health generally indicated no degradation resulting from the OCPUD/ESA WWTP discharge. The presence of more pollution sensitive taxa at the test site compared to the control, as well as other factors (low nutrients), suggests that the facility is causing no adverse effects to the macroinvertebrate community. With one exception, phytoplankton community metrics indicated improvement or little change downstream of the OCPUD/ESA discharge. While algal taxa richness was somewhat reduced at the test site, it is thought that water flow was responsible for this effect. The algal QSI for % composition indicated a moderate shift in the phytoplankton populations, from a cyanophyte- and chlorophyte-rich assemblage at the reference site to one primarily composed of diatoms at the test site.

Water Quality Inspection (WQI)

Date Sampled: 15 September 1992

Results: Concentrations of bio-reactive nutrients at the test site were near or below detection limits, indicating excellent nutrient removal treatment by the facility. Algal growth potential was very low in the effluent (2.9 mg dry wt/L), and was unchanged between the reference and test sites (both were 0.3 mg dry wt/L). This low AGP was directly related to the low nutrient concentrations of the samples.

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 Orange County Public Utilities Division, Eastern Service Area Wastewater Treatment Plant (OCPUD/ESA) is located in Orange County, Florida (see maps in Appendix). This 13.5 MGD (design capacity) facility provides treatment beyond standard secondary treatment processes, including chemical additions and tertiary filtration. The disinfected effluent has three potential fates, only one of which involves a surface water discharge. The total permitted discharge is 9.7 MGD. OCPUD/ESA effluent may be piped to the Curtis Stanton Power Plant to be used as recycled cooling water (3.7 MGD permitted capacity), it may be discharged to 14 percolation ponds (2.5 MGD permitted capacity), or the effluent may be discharged to approximately 300 acres of created and natural wetlands (3.5 MGD permitted capacity). Following these wetlands , the effluent flows to a Class III unnamed tributary of the Econlockhatchee River (the river is an Outstanding Florida Waterway).

State permit limits for the effluent are as follows: BOD (monthly average of 8 mg/L, annual average of 5 mg/L), TSS (monthly average of 8 mg/L, annual average of 5 mg/L), total nitrogen as N (monthly average of 5 mg/L, annual average of 3 mg/L), total phosphorus as P (monthly average of 2 mg/L, annual average of 1 mg/L), pH (6 to 8.5), and chlorine residual (minimum of 0.5 mg/L for disinfection). Additional requirements for water exiting the jurisdictional treatment wetlands include: total nitrogen as N (annual average of 2.2 mg/L), total phosphorus as P (annual average of 0.2 mg/L) (see Facility Summary in Appendix). A DER Order issued in 1985 granted an exemption from Class III criteria for dissolved oxygen in the jurisdictional treatment wetland.

The OCPUD/ESA WWTP was named the "best operated publicly owned WWTP" by the DER Central District in 1991. There have been no records of plant upsets or violations of permit limits (see facility summary in Appendix).

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 the "control wetland" south of the facility's created treatment wetland) and a test site (located in the exit wetlands which receive the final treated effluent, which then flows into the unnamed tributary of the Econlockhatchee River) (see

Major characteristics of community structure of control and test sites.

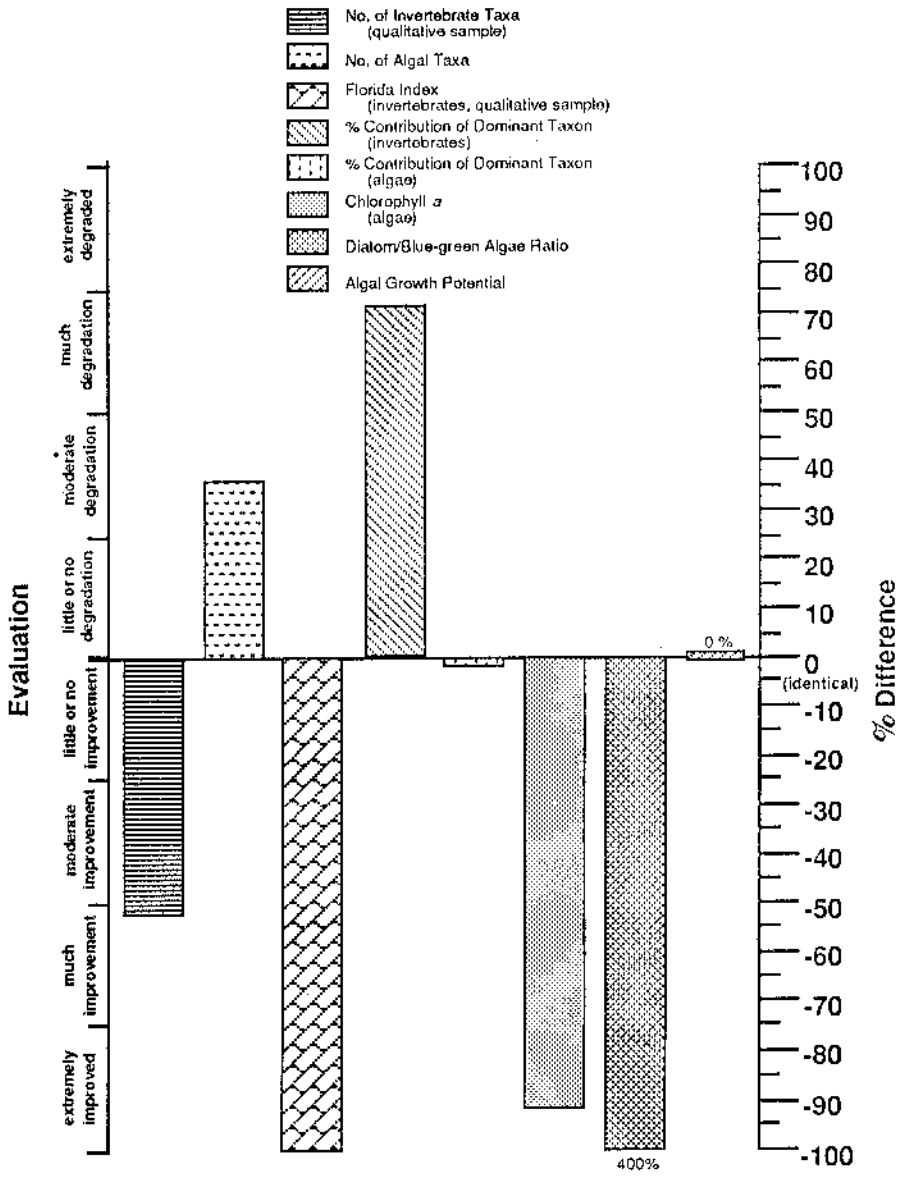
	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	23	35
Florida Index	4	8
% Contribution of Dominant Taxon	16.2	27.8
% Megaloptera	0	4.1
% Diptera	44.2	40.2
% Ephemeroptera	8.1	27.9
% Malacostraca	3.5	7.4
% Odonata	19.8	10.7
% Coleoptera	17.4	1.6
% Other	7.0	8.1
% Predators	48.7	40.3
% Collector-Gatherers	35.4	34.4
% Collector-Filterers	0	0
% Scrapers	5.5	20.0
% Piercers	0.6	0
% Shredders	8.7	4.2
% Parasites	1.2	1.1
Phytoplankton Algae		
Number of Taxa	22	14
% Contribution of Dominant Taxon	23.8	23.3
Chlorophyll a (µg/L)	12.8	1.1
Diatom/Diatom + B-G Abundance Ratio	0.1	0.5
% Blue-green	74.6	33.3
% Green	14.3	33.4
% Diatoms	8.7	33.3
% Other	2.4	0
Algal Growth Potential (mg dry wt/l)	0.3	0.3

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. Phytoplankton was sampled at both reference and test sites through subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). 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, 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 taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (for % composition) of 100% means that the two sites being compared are identical.

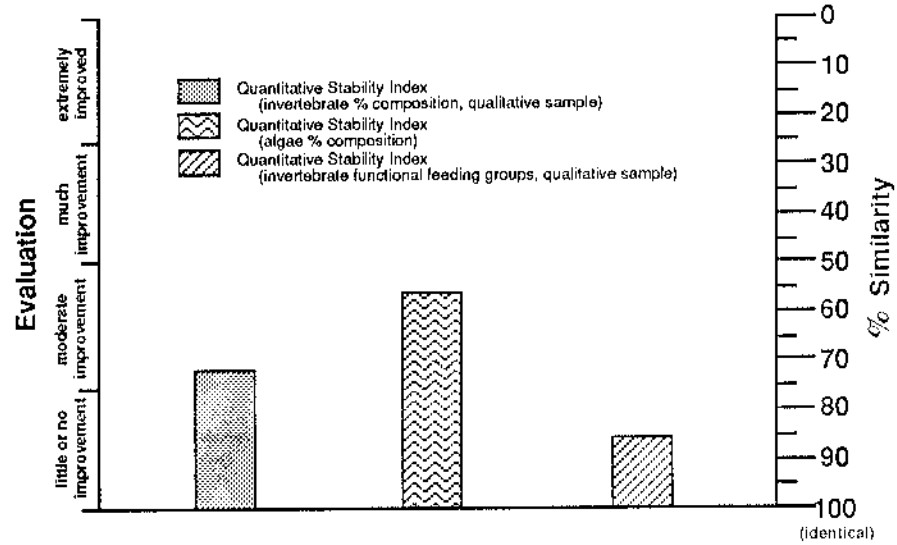


Effect of discharge on receiving stream
(measured as difference between control and test sites).

This same type of procedure is used for calculating the QSI for functional feeding groups.

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, 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: Philip Kane (DER Central District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Kim Pearce, and Landon Ross (Tallahassee Biology Laboratory).



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

Results and Discussion

Habitat scores for the reference and test sites were essentially identical, at 63 and 62 points, respectively (Appendix). Primary substrates available at both moderately shaded wetland systems were woody debris and aquatic vegetation. Bank stability and vegetation quality were excellent. While observable water velocity was zero at both wetlands, a flow of 3.9 MGD (the effluent) was present at the test site, which probably influenced the biological communities there. The drainage basin was forested (pine flatwoods, swamp, and scrub habitat), and no evidence of non-point source pollution or erosion was apparent. Physical/chemical measurements were fairly similar at both study areas, with the exception of pH (Appendix). Waters were acidic at the reference site (pH = 4.8), while the mid-depth pH was 7.5 at the test site. This was primarily due to the input of effluent, which was originally derived from the well-buffered Floridan Aquifer. Dissolved oxygen and temperature readings were not possible due to a meter malfunction.

No organic priority pollutants or pesticides were present in the effluent at levels above detection limits. The following metals were present in concentrations above the practical quantitation limit: aluminum (107 µg/L), iron (16 µg/L), and zinc (19 µg/L). None of these values represents a violation of Class III standards.

The effluent sample collected before discharge to the treatment wetland was not toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred in either 48 hour static acute bioassay (Appendix).

Concentrations of bio-reactive nutrients at the test site were near or below detection limits, indicating excellent nutrient removal treatment by the facility (see Chemistry Summary Table in Appendix). The effluent collected prior to the treatment wetland was very low in nutrients as well, with some nitrate-nitrite (1.3 mg/L) and ammonia (0.13 mg/L) present, but very little total phosphorus (0.06 mg/L). The reference wetland was relatively oligotrophic as well, with only 0.05 mg/L of total phosphorus found, and virtually no bio-reactive forms of nitrogen.

Algal growth potential (AGP) was very low in the effluent (2.9 mg dry wt/L), and was unchanged between the reference and test sites (both were 0.3 mg dry wt/L). This low AGP was directly related to the low nutrient concentrations of the samples.

Measures of benthic macroinvertebrate community health generally indicated no degradation resulting from the OCPUD/ESA WWTP discharge. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentag-

es) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference site. The relative abundance of each individual taxon appears in the Appendix. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. In this particular case, though, the greater similarities between communities at the two sites are indicative of moderate improvement or very little change.

Macroinvertebrate taxa richness and Florida Index were increased by 52.2% and 100%, respectively, between the reference and test sites. These "improvements" in the test site benthic community may possibly be explained by hydrological factors, as a (sheet) flow of 3.9 MGD was present at the test site during the study, while the reference site was lentic. While the presence of water flow is known to favor macroinvertebrate success, it must be emphasized that this holds true only if the quality of the water is adequate. The well buffered pH at the test site may also have encouraged more alkaliphilous organisms to inhabit the area. The QSI for % composition and functional feeding groups indicated that the benthic assemblages inhabiting the study sites were fairly similar. The dominant taxon at the test site was the ephemeropteran, *Caenis* sp. While it made up 27.8 % of the total population, this was not a particular cause for concern, as *Caenis* sp. is a common inhabitant of undisturbed wetlands. The indication of degradation on the graph is a result of this abundance of *Caenis* sp. The presence of more pollution sensitive taxa at the test site compared to the control, as well as other factors (low nutrients), suggests that the facility is causing no adverse effects to the macroinvertebrate community.

Two measurements of phytoplankton community health (chlorophyll *a* and the blue-green/diatom ratio) indicated substantial improvements downstream of the OCPUD/ESA discharge, while phytoplankton taxa richness was reduced at the test site. These changes can also probably be explained by above mentioned hydrological effects. Water flow tends to reduce free-floating phytoplankton populations, decreasing biomass and favoring the development of rheophilic forms (which often are diatoms). Other parameters, including AGP and % contribution of the dominant taxon, were virtually unchanged between the sites. The algal QSI for % composition indicated a moderate shift in the phytoplankton populations, from a cyanophyte- and chlorophyte-rich assemblage at the reference site to one primarily composed of diatoms at the test site.

Conclusions

No organic priority pollutants or pesticides were present in the effluent at levels above detection limits. Effluent metals were well within Class III standards.

The effluent sample collected before discharge to the treatment wetland was not toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred in either 48 hour static acute bioassay.

Concentrations of bio-reactive nutrients at the test site were near or below detection limits, indicating excellent nutrient removal treatment by the facility. Algal growth potential was very low in the effluent (2.9 mg dry wt/L), and was unchanged between the reference and test sites (both were 0.3 mg dry wt/L). This low AGP was directly related to the low nutrient concentrations of the samples.

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Literature Cited

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.

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

Chemistry summary table for Orange Co. Public Utilities Division, Eastern Service Area WWTP.

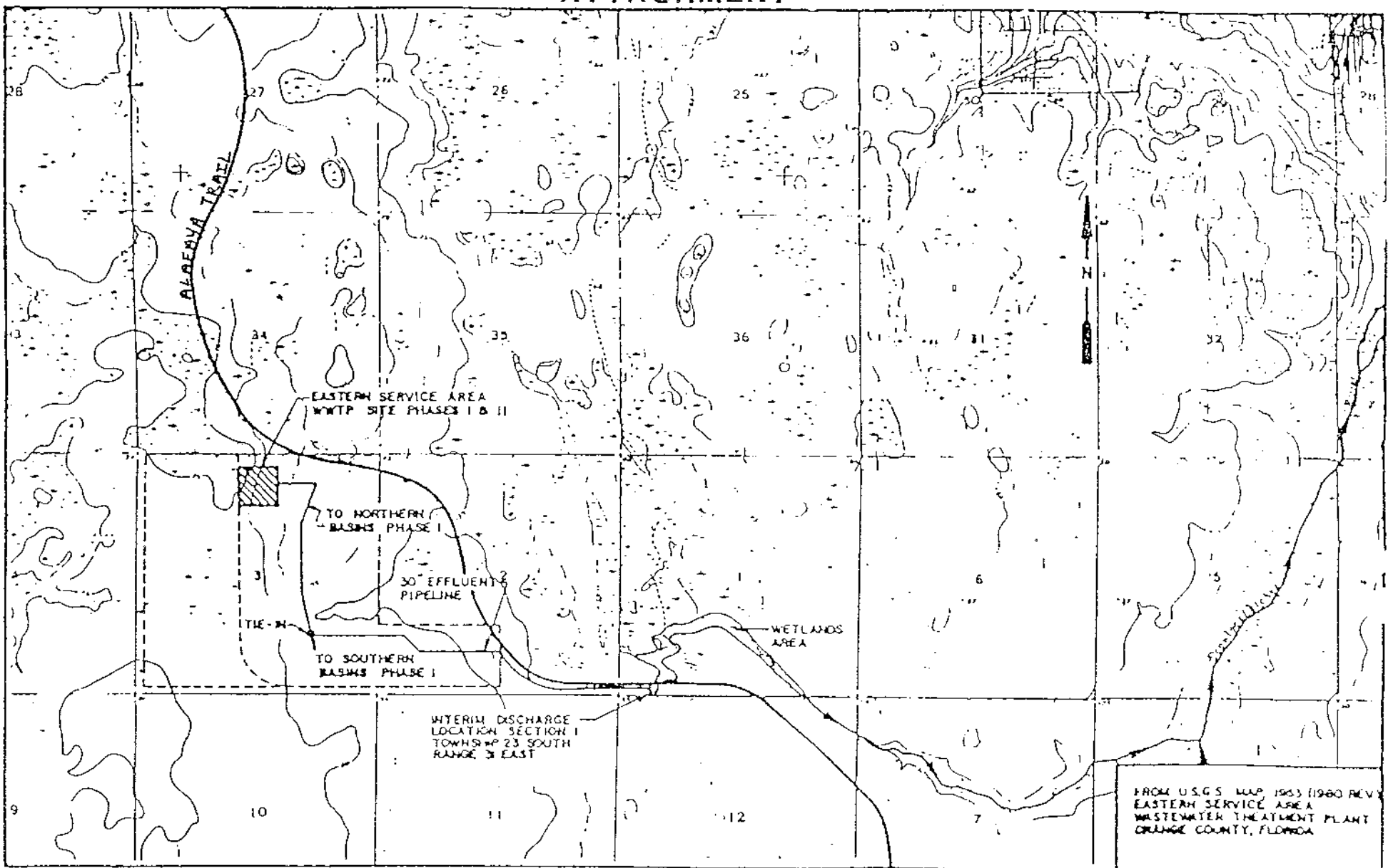
	Effluent	Control Site	Test Site
Organic Constituents (ug/L)			
NONE DETECTED	U		
Metals (ug/L)			
Aluminum	107		
Arsenic	20 U		
Cadmium	0.08 U		
Copper	5 U		
Chromium	10 U		
Iron	16		
Lead	15 U		
Mercury	0.1 U		
Nickel	5 U		
Silver	0.05 U		
Zinc	19		
Nutrients (mg/L)			
Ortho-phosphate	0.024 T	0.02 U	0.02 U
Total phosphorus	0.06	0.053	0.04 U
Ammonia	0.13	0.035 T	0.029 T
Nitrate+Nitrite	1.2 A	0.02 U	0.02 U
TKN	0.71	0.99	0.57
Other Parameters			
Habitat Assessment		63	62
D.O. (mg/L)	meter malfunction	meter malfunction	meter malfunction
pH (SU's)	7.3	4.8	7.5
Conductivity (µmhos/cm)	494	45	330
Temperature (°C)	meter malfunction	meter malfunction	meter malfunction
AGP (mg dry wt/L)	2.9	0.3	0.3
Bioassay Fish-Dechlorinated	Not toxic		
Bioassay Invertebrate-Dechlorinated	Not toxic		

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

B/E

OCPUD/ESH · WWTP

ATTACHMENT



TWP 23E RNG 31S

Surface Water Effluent Discharge

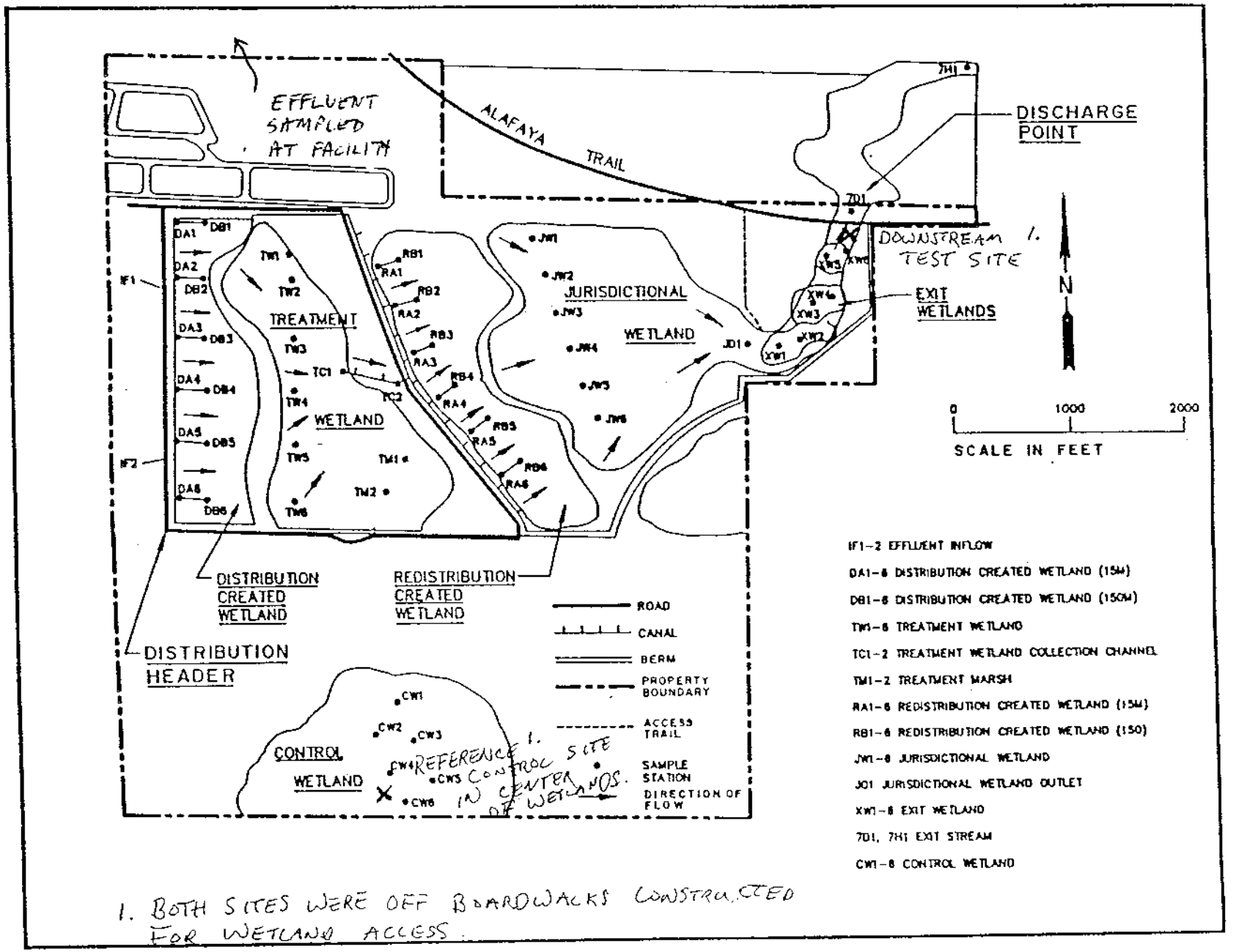


Figure 1-1. Wetlands and sampling stations with the Orange County Eastern Service Area integrated wetland reuse system.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Orange County Public Utilities Division/Eastern Service Area WWTP		Date Summary Prepared: 10/21/92 (completed)
Location (attach detailed map): See Attached	County: Orange	District: CENTRAL
Federal Permit # FL0038849 and expiration date: 3/10/93	State GMS # and 3048C00334 State expiration date: 8/25/95 DO 48-179466	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Domestic Wastewater Treatment Plant

Description of treatment process: A 13.5 MGD Design Capacity Bardenpho process wastewater treatment facility providing treatment beyond secondary with chemical addition and Tertiary filtration. The disinfected reclaimed water is discharge to: 1) Groundwater via 14 percolation ponds (2.5 MGD permitted capacity); 2) Surface water via 150 ± acres of man-made wetlands, 159 ± acres of natural wetlands for a permitted capacity of 3.5 MGD to the Econlockhatchee River; 3) industrial reuse cooling water at the Curtis Stanton Power Plant (permitted capacity of 3.7 MGD). Flows to the plant are limited to 9.7 MGD, the total permitted reuse/discharge capacity.

Receiving waters: Econlockhatchee River via sheetflow through man-made/natural wetlands and adjacent tributary	Classification: I II (III) - Natural wetlands and unnamed Tributary OFW: Big Econlockhatchee River	
Design Flow: 13.5 MGD, 3.5 MGD to wetlands limited by permit to 9.7 MGD	Mean Flow: 9/91 - 8/92 Plant: 6.7 MGD To wetlands: 2.54 MGD (Annual)	Flow during survey: Plant Effluent: 7.67 MGD To wetlands: 3.85 MGD

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.):

N/A

List effluent limits (if necessary, attach relevant paperwork):

Parameter	Limit (units)
See Attached Sheets	

Describe special permit conditions and permit modifications: DER Final Order VE-48-199 (issued 7/22/85) granted exemption from class III criteria for ~~DO~~ DO in the jurisdictional wetland. The Final order is incorporated in the operating permit by reference and allows a request to be made to increase the ultimate permitted capacity for discharge to the wetland of 6.2 MGD

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

OCPUD/Eastern Service Area (Facility)

FACILITY SUMMARY

Description of permitted outfall(s): Overland flow through a ±35 Acre artificial wetland to an isolated natural wetland, then recollected and redistributed to a ± 45 Acre artificial wetland. The reclaimed water then flows to a second natural (jurisdictional) wetland and ultimately to the Big Econlockhatchee River via an unnamed tributary. The outfall (culvert) to the headwater of the unnamed tributary is ± 5 meters south of Alafaya Trail (see Map).

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: No known plant upsets within past year. The pH in the jurisdictional treatment wetland (2nd one) has historically shifted upward gradually and is consistently above the permit limitation range documented on the attached page, the past year being no exception. However, the Department has recognized the gradual upward pH shift and the County has revised it's wetland monitoring and research program to document the shift and evaluate any changes which may occur to type, and function of the wetland system. nature

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: No previous or pending enforcement actions are known. No known previous bioassessments conducted by the Department or EPA. However, the County's ongoing wetland monitoring and research program is required under the wetland exemption (Final order), provides a complete evaluation of any changes in water quality and biological community in the wetland systems. The Department files in Tallahassee should contain information about this program. The Final order (exemption) established the effluent limitations for discharge from the plant (BOD5, TSS, TN and TP). The order also required a monitoring program to establish background conditions in the jurisdictional wetlands that could be affected by the pH, DO and nutrient limitations in the discharge from the plant.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: Comparing the MORs for the periods 9/91-8/92 vs 9/90-8/91 reveal that TN and TP (for reclaimed water discharged from the plant) are slightly up on an annual average during the most recent period. However, the monthly and annual averages for these parameters are still below the effluent limits. No significant trends were noted for other plant discharge parameters. The 3rd Annual summary report (1/92) recently submitted by the County documents that over the last three years the monitoring and research program has revealed that the reclaimed water wetlands system is functioning well with no adverse impacts on the wetlands or the receiving waters. The files in Tallahassee should have this report.

Additional information: The OCPUD Eastern Service Area WWTP was recently awarded "The best operated publicly owned wastewater treatment plant in the Central District for Calendar Year 1991.

Staff contributing to this review (signature):

Philip N. Kane, Ed.D.	(Biologist)
Al Coates	(Inspector)
Al Coates	(Engineer)
	( )
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: EAER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/15/92	TIME: 1130	RECEIVING BODY OF WATER: UNNAMED TRIBUTARY TO BIG ECON/LOCKHATCHEE RIVER

REMARKS: TEST DOWNSTREAM SITE	LOCATION: OCPUD/ES STP 1621 S. ALAFAYA TRAIL ORLANDO, FLORIDA 32801	FIELD ID/NAME: OCPUD/EAST STP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
50						50

Local Watershed Erosion (check box): None [✓] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [✓] Some potential sources [ ] Obvious sources [ ]

Point-Source Pollution (list location and describe):

Estimated System Width (range, m): N/A	Estimated System Depth (range, m): 0-1.0M	N/A Impounded	yes [ ]
High Water Mark (m above bed): 0.5M	Velocity (range, m/s): 0 m/s		Channelized [ ]

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: [ ]

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	40	5	NET	Rock or Shell Rubble			
Leaf Packs	5	2	"	Sand			
Aquatic Vegetation	45	10	"	Mud/Muck	5	2	NET
Submerged Roots	5	2	"	Other:			
Undercut Banks				Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m
Top								TO BOTTOM
Mid-depth			7.5	330				
Bottom								

System Type : Stream: [ ] (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: [ ] Wetland: [✓] Estuary: [ ] Other: [ ]

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: SUN/CLOUD

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[✓]	[ ]	[ ]
Fish	[ ]	[ ]	[✓]	[ ]
Aquatic Macrophytes	[ ]	[ ]	[ ]	[✓]
Iron/sulfur Bacteria	[✓]	[ ]	[ ]	[ ]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/15/92	PHILIP N. KANE, Ed.D.	Philip N. Kane, Ed.D.

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/15/92	RECEIVING BODY OF WATER: UNAMED TRIBUTARY TO BIG ELONLOCKHATCHEE RIVER

REMARKS: TEST DOWNSTREAM SITE	LOCATION: OCPUD/E S STP 1621 S. ALAFAYA TRAIL ORLANDO, FLORIDA 32801	FIELD ID/NAME: OCPUD/EAST STP

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover **30**	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 **0**	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 **15**	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 **8**	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 **0**	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 **62**

COMMENTS: CATTAILS AND DUCKWEED PRESENT HERE AND ABSENT IN COMPARABLE SITE.

ANALYSIS DATE: 09/15/92	ANALYST: PHILIP N. KANE, Ed.D.	SIGNATURE: Philip N. Kane, Ed.D.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/15/92	TIME: 0930	RECEIVING BODY OF WATER: UNAMED TRIB TO BIG ECON/LOCKHATCHEE RIVER

REMARKS: REFERENCE UPSTREAM SITE	LOCATION: OCPUD/ES STP 1621 S. ALAFAYA TRAIL ORLANDO, FLORIDA 32801	FIELD ID/NAME: OCPUD/EAST STP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
50						SCRUB 50

Local Watershed Erosion (check box): None [✓] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [✓] Some potential sources [ ] Obvious sources [ ]

Point-Source Pollution (list location and describe):

Estimated System Width (range, m): N/A	Estimated System Depth (range, m): 0 to 1.0M		N/A yes Impounded [ ]
High Water Mark (m above bed): 0.75M	Velocity (range, m/s): 0 m/s		Channelized [ ]

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: [ ]

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	40	5	NET	Rock or Shell Rubble			
Leaf Packs	5	2	"	Sand			
Aquatic Vegetation	45	10	"	Mud/Muck	5	1	NET
Submerged Roots	5	2	"	Other:			"
Undercut Banks				Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m)
Top								
Mid-depth			4.8	45				TO BOTTOM
Bottom								

System Type : Stream: [ ] (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: [ ] Wetland: [✓] Estuary: [ ] Other: [ ]

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: SUN/CLOUD

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[ ]	[ ]	[✓]	[ ]
Fish	[ ]	[ ]	[✓]	[ ]
Aquatic Macrophytes	[ ]	[ ]	[ ]	[✓]
Iron/sulfur Bacteria	[✓]	[ ]	[ ]	[ ]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/15/92	PHILIP N. KANE, Ed.D.	Philip N. Kane, Ed.D.

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/15/92	RECEIVING BODY OF WATER: UNAMED TRIBUTARY TO BIG ECONLOCKHATCHEE RIVER

REMARKS: REFERENCE UPSTREAM SITE	LOCATION: OCPUD/ES STP 1621 S. ALAFAYA TRAIL ORLANDO, FLORIDA 32801	FIELD ID/NAME: OCPUD/EAST STP

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 30	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 0	Max. observed; >0.3 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 **0-7 points**
Artificial Channel/ Flow Alteration 15	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 0	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:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/15/92	PHILIP N. KANE, Ed.D.	Philip N. Kane, Ed.D.

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: OCPUD
Address/City:
County:
Contact/District: PHIL KANE C
NPDES Permit #: FL00 Outfall #:

Sample Collection: Date 9-15-92 Time
Test Beginning: Date 9-16-92 Time 1400
Test Ending: Date 9/18/92 Time 1400
Test Organism: C. DUBIA
Life Stage/Age: <24 HRS

Test Number: 1 of 24 KP Test Type: (Screening) | Definitive
(Static) Static Renewal | Flow-through

41183 92-SEP-16-27
entered 9/18/92

Remarks:
DECHLORINATED SAMPLE IN LAB W/ SODIUM THIOSULFATE

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.5@24	24.0@24.1	979 @ 9680 @ 24.0
24 hr	7@7; 10@10	8.5@24	23.1@23.1	985 9710@23.7
48 hr	7@7; 10@10	8.2@23°C	23.4@23.4°C	983 9650@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	8.3		8.1	23.2		22.0	9.1		8.0	163		170
control	B	5	5	4			8.1						8.0			
control	C	5	5	5			8.2						8.0			
control	D	5	5	5			8.2						8.0			
100%	A	5	5	5	7.4		8.2	23.1		22.1	8.8		8.1	471		490
100%	B	5	5	5			8.2						8.1			
100%	C	5	5	5			8.2						8.1			
100%	D	5	5	5			8.2						8.1			
Measured/Loaded by:		MF	MF	MF	MF		MF	MF		MF	MF			MF		MF
Recorded by:		MF	MF	MF	KP		MF	KP		MF	KP			KP		MF

Investigators' Signatures
Kim Pearce
Marshall Faircloth

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:	0.0	6.0	0.55	DR-100	KP
Alkalinity:	121	73	65	Hach	MF
Hardness:	123	82	120	Hach	MF
Total Ammonia:	0.0	0.0	0.0	Hach	MF

Ammonia Meter Slope:
Ammonia Blank: 0.0
Salinity Sample: ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: OCPUD
Address/City: _____
County: _____
Contact/District: PHIL KANE C
NPDES Permit #: FL00 Outfall #: _____

Test Number: 2 of ~~2~~ 4 KP Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through

Sample Collection: Date 9-15-92 Time _____
Test Beginning: Date 9-16-92 Time 1400
Test Ending: Date 9-18-92 Time 1400
Test Organism: N. LEEDSI
Life Stage/Age: 12 days

41183 92-SEP-16-27
entered 9/18/92

Remarks:
DECHLORINATED SAMPLE IN LAB

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 10@10	8.5@24	24.0@24.1	979 9680@24.0
24 hr	7@7, 10@10	8.5@24°C	23.1@23.1	985 9710@23.7
48 hr	7@7, 10@10	8.7@23°C	23.4@23.4°C	993 9650@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	67	5	5	5	7.8	8.3	8.4	23.6	23.2	23.1	9.0	8.1	7.8			
control	53	5	5	5	7.8	8.3	8.4				9.0	8.1	7.8	243	243	245
100%	10	5	5	5	7.3	8.0	8.1	23.5	23.2	23.1	8.8	8.0	7.9			
100%	62	5	5	5	7.3	8.0	8.1				8.8	8.0	7.9	494	489	495
Measured/Loaded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		MF	MF	MF	KP	MF	MF	KP	MF	MF	KP	MF	MF	KP	MF	MF

Investigators' Signatures
Kim Pearce
Marshall Faircloth
_____
_____
_____
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:	0.0	0.0	0.55	DR-100	KP
Alkalinity:	121	73	65	Hach	MF
Hardness:	123	82	120	Hach	MF
Total Ammonia:	0.0	0.0	0.0	Hach	MF

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

Taxa list for Orange Co. Public Utilities Division, Eastern Services Area STP, collected via 20 discrete dip net sweeps in the control and jurisdictional discharge wetlands, on 15 September 1992.

	Reference site	Test site
Acarina		
Arrenurus sp.	4	–
Sperchon sp.	4	–
Coleoptera		
Helobata striata	4	–
Hydrocanthus sp.	–	6
Hydroporus sp.	52	6
Peltodytes sexmaculata	4	–
Diptera		
Ablabesmyia sp. B Epler	8	18
Chironomus sp.	44	18
Cladopelma sp.	–	42
Dicrotendipes leucoscelis	12	6
Fittkauimyia serta	–	6
Geranomyia sp.	4	–
Guttipelopia guttipennis	12	72
Kiefferulus sp.	56	42
Labrundinia pilosella	–	6
Larsia berneri	–	6
Palpomyia grp	–	18
Parachironomus hirtalatus	12	18
Parachironomus schneideri	–	6
Polypedilum halterale grp.	–	12
Procladius sp.	–	12
Undetermined dipteran pupae	–	6
Tipula sp.	4	6
Ephemeroptera		
Caenis sp.	28	204
Gastropoda		
Laevapex sp.	4	24
Micromenetus dilatus	–	6
Physella sp.	–	6
Pomacea paludosa	–	6
Hemiptera		
Pelocoris sp.	–	6
Hirudinea		
Placobdella parasitica	4	–
Lepidoptera		
Undetermined lepidopteran	–	6
Malacostraca		
Asellus sp.	12	–
Gammarus sp.	–	6
Hyalella azteca	–	18

Procambarus sp.	–	30
Megaloptera		
Chauliodes pectinicornis	–	6
Sialis americana	–	24
Odonata		
Coryphaeschna ingens	–	6
Erythemis simplicicollis	12	42
Ischnura posita	8	24
Libellula incesta	–	6
Pachydiplax longipennis	44	–
Tramea carolina	4	–
Trichoptera		
Oecetis sp.	4	6
Polycentropus sp.	4	–

Phytoplankton taxa list for OCPUD, collected via subsurface grab samples on 15 September 1992.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	–	67
Cocconeis sp.	–	67
Eunotia sp.	–	34
Frustulia sp.	33	–
Navicula sp.	–	34
Nitzschia sp.	335	67
Pinnularia sp.	–	67
Chlorophyta		
Ankistrodesmus sp.	–	34
Characium sp.	33	–
Chlamydomonas sp.	–	34
Closterium sp.	33	–
Euastrum sp.	33	–
Unknown chlorophyte flagellate	167	236
Gloeocystis sp.	67	–
Kirchneriella sp.	201	–
Mougeotia sp.	33	–
Pleurotaenium sp.	33	–
Tetraedron sp.	–	34
Chrysophyta		
Dinobryon sp.	33	–
Synura sp.	33	–
Cyanophyta		
Anabaena sp.	–	101
Aphanocapsa sp.	201	–
Chroococcus sp.	602	67
Coelosphaerium sp.	67	–
Gloeocapsa sp.	268	–
Gloeothece sp.	1004	–
Microcystis sp.	468	–
Nostoc sp.	335	–
Oscillatoria sp.	167	101
Phormidium sp.	33	–
Spirulina sp.	–	67
Pyrrhophyta		
Peridinium sp.	33	–

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 3 8 8 4 9 11	12 9 2 0 9 1 5 17	18 B	19 S	20 1

Remarks

21 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 0 3 8 8 4 9 11	12 9 2 0 9 1 5 17	18 X	19 S	20 1

Remarks

21 66