

Biological Assessment of

Park Manor Wastewater Treatment Plant

Orange County

NPDES #FL0028291

Sampled October 1996

February 1997

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Park Manor WWTP
County: Orange
NPDES Number: FL0028291
State Permit Expiration Date: 4-7-97

Toxics Sampling Inspection (XSI)

Date Sampled: 14 October 1996

Results: Atrazine was detected in the effluent at a non-problem level (0.28 µg/L). Metals detected in the effluent complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 14 October 1996

Results: The full strength effluent sample was acutely toxic to the invertebrate, *Ceriodaphnia dubia,* killing all exposed organisms within 24 hours (a violation of Rules 62-302.500(1)(d), 62-302.530(62), and 62-4.244(3)(a) FAC). The effluent was not toxic to the fish, *Cyprinella leedsi*

Impact Bioassessment Inspection (IBI)

Date Sampled: 14 October 1996

Results: Macroinvertebrate communities were not negatively affected by the discharge. In general, measures of invertebrate health at the test site were similar to, or better than, those found at the reference site. The Stream Condition Index (SCI) placed both sites in the "excellent" category. The loss of periphyton racks forced the evaluation of algal community health to be based on the phytoplankton data. Because of the high water velocity near the outfall, phytoplankton density was low and free water chlorophyll *a* was undetected at the reference and test sites alike. Based upon the nutrient data, it is likely that phytoplankton problems may only appear when the velocity is diminished, such as in the St. Johns River and Lake Harney.

Water Quality Inspection (WQI)

Date Sampled: 14 October 1996

Results: Extreme nitrate-nitrite enrichment (16 mg/L) was associated with the discharge. The discharge caused nitrate-nitrate to increase from 0.11 mg/L at the reference site to 2.6 mg/L at the test site, a concentration much higher than those found in 95% of all other Florida streams. Other nutrient levels were normal at the test site. These present results, in conjunction with a recent Econlockhatchee River basin study (FDEP 1996), clearly indicate that the Park Manor WWTP is a significant source of undesirable nitrate-nitrite to the Econlockhatchee River. Algal Growth Potential increased from 4.6 mg dry wt/L at the reference site to 25.2 mg dry wt/L at the test site, where it exceeded the 5 mg dry wt/L "problem threshold". The effluent AGP was 126.8 mg dry wt/L. During a recent basin study, the AGP was also elevated in the Little Econlockhatchee River downstream of the Park Manor WWTP, where the AGP was 27.1 mg dry wt/L (FDEP 1996).

Introduction

The Park Manor Wastewater Treatment Plant is a 0.35 MGD capacity domestic wastewater treatment facility. It is located near State Road 50 in Orange County (see maps in Appendix). The plant discharges into an unnamed ditch that flows north into a stream/wetland system and subsequently to the Class III Little Econlockhatchee River, located approximately one mile downstream. The treatment train consists of flow equalization, activated sludge processing, chemical phosphorus removal, tertiary filtration, and chlorination/dechlorination. The facility has a continuous discharge, which has averaged 0.29 MGD.

Permit limits are as follows: CBOD and TSS (20 mg/L monthly average), ammonia (2 mg/L monthly average), total phosphorus (1.0 mg/L monthly average), dissolved oxygen (minimum of 7.0 mg/L at 22° C as a 30 day average, see Appendix), pH (6.0 to 8.5 SU), fecal coliforms (maximum of 800 organisms/100 mL), and total residual chlorine (minimum of 0.5 mg/L for disinfection, maximum of 0.01 mg/L at discharge).

The plant has consistently met permit limits for the past year, although the effluent was acutely toxic in August, 1996 (Appendix). A previous bioassessment documented substantial nitrate-nitrite enrichment associated with the Park Manor facility, with an effluent value of 6.9 mg/L (FDER 1992). During a more recent, basin wide bioassessment, nitrate-nitrite concentrations in the Econlockhatchee River increased from 0.14 mg/L upstream of the Park manor discharge to 0.37 mg/L downstream of the discharge, again implicating the Park Manor WWTP as a nutrient contributor (FDEP 1996).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	21	35
Florida Index	7	15
SCI	27	27
EPT Index	5	7
% Contribution of Dominant Taxon	25.7	56.0
% Oligochaeta	13.3	5.6
% Diptera	37.2	64.2
% Ephemeroptera	13.3	6.2
% Trichoptera	4.4	2.3
% Odonata	6.2	8.3
% Coleoptera	0.9	0.5
% Gastropoda	0.9	1.1
% Pelecypoda	23.0	8.9
% Other	0.9	2.8
% Predators	11.5	13.1
% Above Surface Deposit Feeders	23.9	34.2
% Below Surface Deposit Feeders	13.3	5.6
% Suspension Feeders	23.9	10.9
% Scrapers	7.5	4.2
% Shredders	18.6	31.4
% Plant Piercers	1.3	0.4
Phytoplankton Algae		
Number of Taxa	6	5
Shannon-Weaver Diversity	2.4	2.2
Algal Density (#/mL)	126.0	84.0
Chlorophyll a (µg/L)	Undetected	Undetected
% Green	50.0	25.0
% Diatoms	41.7	37.5
% Cryptophytes	8.3	37.5
Algal Growth Potential (mg dry wt/l)	4.6	25.2

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 an unnamed ditch upstream from the discharge) and a test site (located downstream of the discharge) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on water at the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for pesticide extractables and metals. Additionally, nutrient

analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP 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 by subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Additional sampling, using Hester-Dendy samplers and periphyton racks, was unsuccessful because the samplers did not remain submerged during the 28-day incubation period. Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

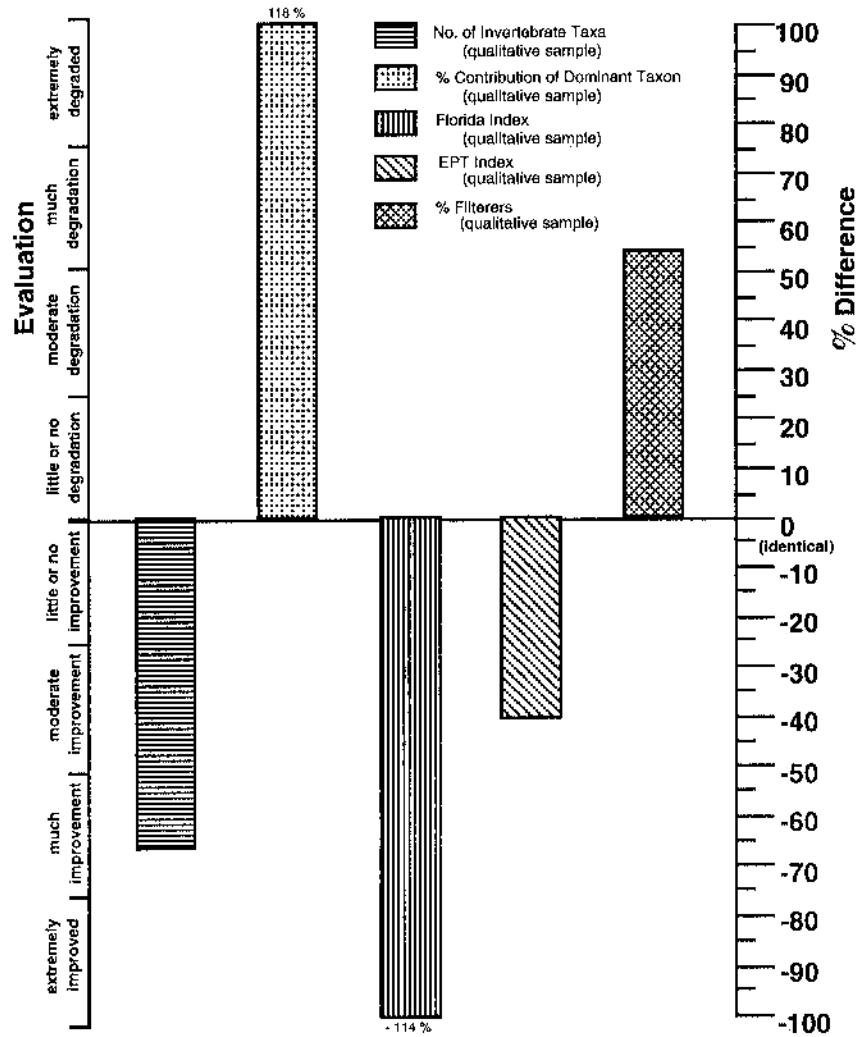
Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

Habitat Assessment: Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 points possible for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points).

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. For example, 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. Species sensitivity data from other sources, such as Hudson *et al.* (1990), Lenat



Effect of discharge on the benthic macroinvertebrate community.

(1993), and Chang *et al.* (1992) are used as appropriate.

Ephemeroptera/Plecoptera/Trichoptera Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

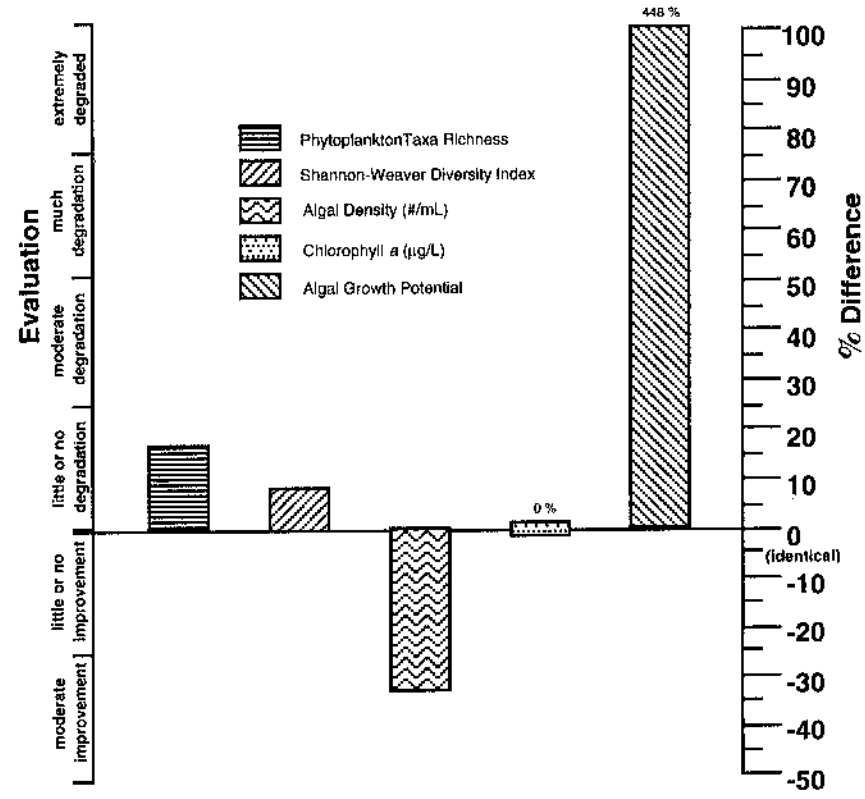
Community structure: Substantial shifts in proportions of major groups of organisms, compared to reference conditions, may indicate degradation.

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

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).

The Stream Condition Index for Florida (SCI) is a composite macroinvertebrate metric (Barbour *et al.* 1996). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition (see SCI calculation table in Appendix).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, and the % filter-feeders are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving % contribution of dominant taxon, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.



Effect of discharge on the algal community.

The following personnel were involved in this investigation: Phil Kane, Steve Kent, and Karen Gottwald (DEP Central District) and Lyn Burton, Jennifer Eichelberger, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Kathleen Lurding, Elizabeth Miller, Urania Quintana, Bart Richard, Landon Ross, Lisa Tamburello, David Whiting, Vicki Whiting, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.

Results and Discussion

The unnamed ditch receiving the Park Manor WWTP effluent is a macrophyte dominated canal that receives runoff from predominantly residential, industrial and commercial areas. The ditch is artificially channelized, with poor bank stability and a low quality riparian zone. Signs of erosion were observed at both sites. Consequently, habitat quality was rated "marginal" (with 48 points apiece) at the reference and test sites (Appendix). Dissolved oxygen (reference site = 7.7 mg/L, test site = 7.9 mg/L) and pH (reference site = 6.8, test site = 6.6) were similar at both sites. Conductivity, with 135 µmhos/cm at the reference site and 215 µmhos/cm at the test site, was higher downstream of the discharge.

The full strength effluent sample was acutely toxic to the invertebrate, *Ceriodaphnia dubia,* killing all exposed organisms within 24 hours (a violation of Rules 62-302.500(1)(d), 62-302.530(62), and 62-4.244(3)(a) FAC). The effluent was not toxic to the fish, *Cyprinella leedsi* (Appendix).

Atrazine was detected in the grab sample of effluent at a non-problem level (0.28 µg/L). Aluminum (74 µg/L), cadmium (0.1 µg/L), copper (8.4 µg/L), iron (18 µg/L), and zinc (30 µg/L) were detected in the effluent at concentrations which comply with Class III water quality standards.

Extreme nitrate-nitrite enrichment was associated with the discharge. While total phosphorus (0.12 mg/L), orthophosphate (0.11 mg/L), ammonia (0.043 mg/L), and TKN (0.75 mg/L) levels were low in the effluent, the nitrate-nitrite concentration (16 mg/L) was extraordinarily elevated. The discharge caused nitrate-nitrate to increase from 0.11 mg/L at the reference site to 2.6 mg/L at the test site, a concentration much higher than those found in 95% of all other Florida streams (see Table of Typical Water Quality Values in Appendix). Other nutrient levels were normal at the test site. A recent basin survey showed levels of nitrate-nitrite to be elevated in the Little Econlockhatchee River downstream of the ditch which receives the Park Manor WWTP effluent (FDEP 1996). Nitrate-nitrite levels remained high at the remaining Little Econlockhatchee River sample sites, all the way to the St. Johns River (FDEP 1996). These present results, in conjunction with the basin study results, clearly indicate that the Park Manor WWTP is a significant source of undesirable nitrate-nitrite to the Econlockhatchee River.

Algal Growth Potential increased from 4.6 mg dry wt/L at the reference site to 25.2 mg dry wt/L at the test site, where it exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987). The effluent AGP was 126.8 mg dry wt/L. During the 1996 basin study, the AGP was also elevated in the Little Econlockhatchee River downstream of the Park Manor WWTP, where the AGP was 27.1 mg dry wt/L (FDEP 1996).

Despite the elevated nitrate-nitrite levels and the toxicity of the Park Manor effluent, macroinvertebrate communities did not appear to be negatively affected by the discharge. The figure on p. 2 indicates the degree of difference between the invertebrate populations of 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.

In general, measures of invertebrate health at the test site were similar to, or better than, those found at the reference site. For example, the number of taxa (reference = 21 taxa, test = 35 taxa), the Florida Index (reference = 7, test = 15) and the EPT Index (reference = 5, test = 7) were all higher at the test site than at the reference site. While there were fewer suspension feeders and a higher % contribution of the dominant taxon at the test site, the Stream Condition Index there (with 27 points) was identical to the reference site SCI value. The SCI placed both sites in the "excellent" category (see Appendix). The availability of aquatic macrophytes for habitat and very rapid water velocity at the test site were factors favorable to the macroinvertebrates there.

The figure on p. 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Although periphyton (attached algae) is the preferred community for making assessments in flowing waters, the loss of periphyton racks forced the evaluation of algal community health to be based on the phytoplankton data. This was considered somewhat unsatisfactory, as rapid water velocity at the test site would tend to prevent phytoplankton problems from occurring in the immediate vicinity of the outfall. Not surprisingly, phytoplankton density was low (reference site = 126 organisms/mL, test site = 84 organisms/mL) and free water chlorophyll *a* was undetected. The number of taxa (reference site = 6 taxa, test site = 5 taxa) and Shannon-Weaver diversity (reference site = 2.4, test site = 2.2) were similar at both receiving water stations. Because of the high water velocity near the outfall, it is likely that phytoplankton problems may not appear until the velocity is diminished, such as at the St. Johns River and Lake Harney.

Conclusions

The full strength effluent sample was acutely toxic to the invertebrate, *Ceriodaphnia dubia,* killing all exposed organisms within 24 hours (a violation of Rules 62-302.500(1)(d), 62-302.530(62), and

62-4.244(3)(a) FAC). The effluent was not toxic to the fish, *Cyprinella leedsi*.

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Literature Cited

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Chemistry summary table for Park Manor WWTP.	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
Atrazine	0.28		
Metals (ug/L)			
Aluminum	74 A		
Arsenic	20 U		
Cadmium	0.1 I		
Copper	8.4 A		
Chromium	5 U		
Iron	18 A		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.04 U		
Zinc	30		
Nutrients (mg/L)			
Ortho-phosphate	0.11 A	0.013	0.027
Total phosphorus	0.12	0.025 I	0.042
Ammonia	0.043 A	0.056	0.056
Nitrate+Nitrite	16	0.11 A	2.6
TKN	0.75	0.45	0.57
General Phys-Chem Parameters			
Habitat Assessment		48	48
D.O. (mg/L)	7.4	7.7	7.9
pH (SU)	6.7	6.8	6.6
Conductivity (µmhos/cm)	584	135	215
Temperature (°C)	26.8	23.2	24.2
Hardness (mg CaCO3)	108.9		
Algal Growth Potential (mg dry wt/L)	126.8	4.6	25.2
Toxicity			
Bioassay Fish-Dechlorinated	Not toxic		
Bioassay Invertebrate-Dechlorinated	Toxic - 100% mortality at 24 hours		

A - Value reported is the mean of two or more determinations

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit

U - Material analyzed for but not detected; value reported is the minimum detection limit

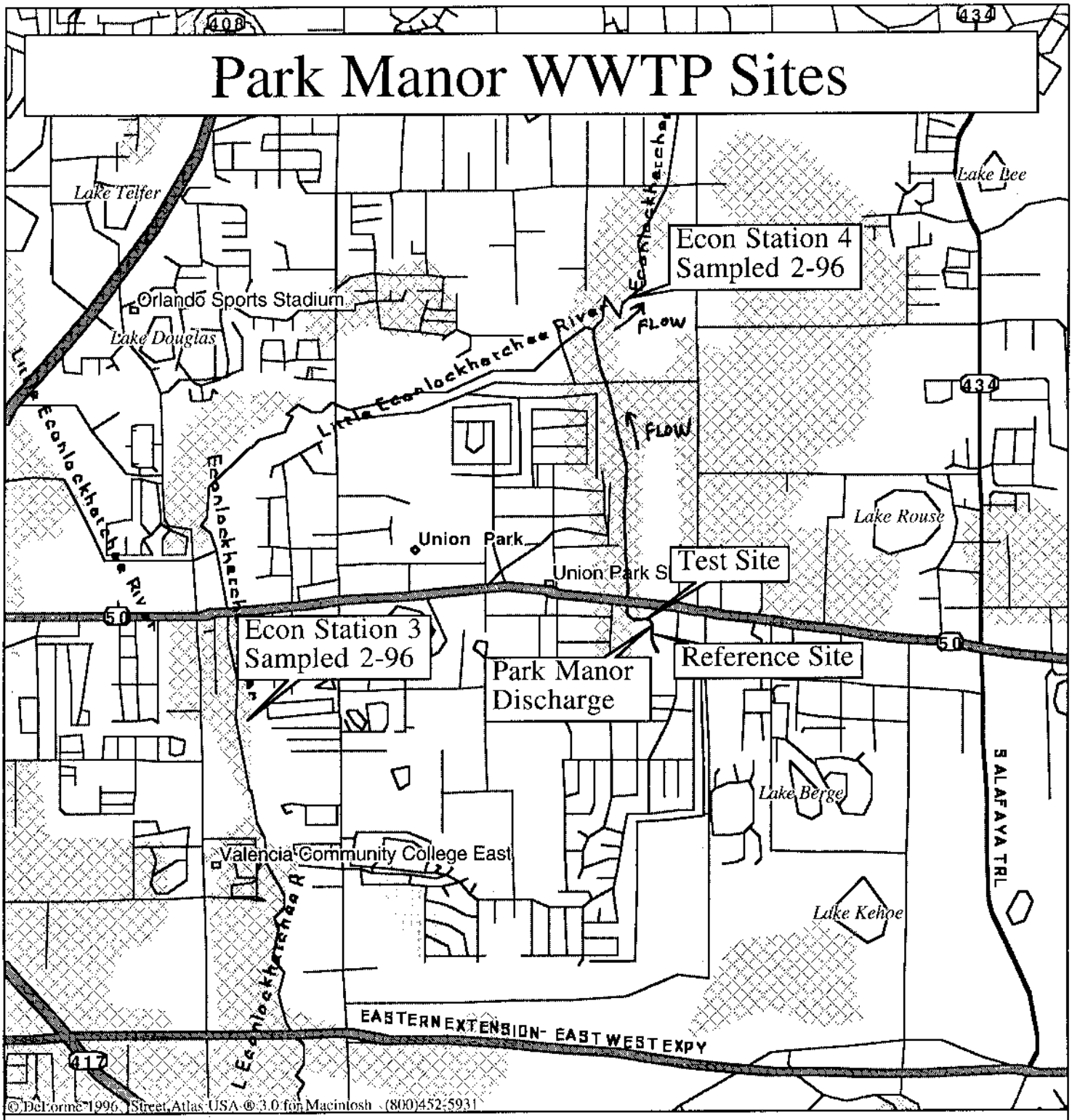
Typical Values for Selected Parameters in Florida Waters

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



Mag 14.00
Fri Feb 07 07:55 1997
Scale 1:31,250 (at center)
2000 Feet
1000 Meters

Secondary SR, Road, Hwy R
State Route
Toll Highway
Primary State Route
Utility
Point of Interest
Town, Small City
Population Center
Lake, Ocean
Woodland
Sand
Wetland
River

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Park Manor Estates, WWTP		**Date Summary Prepared:** 10/3/96
Location (attach detailed map): See map attached	**County** Orange	**District** Central
Federal Permit # FL0028291 **and expiration date:** 9/30/97	**State GMS # and** 3048P02218 **State expiration date:** DO48-208010 4/7/97	**Facility Type:** Industrial Municipal Federal Agricultural (Other) (list): (Privately owned utility)

Function of facility: Domestic Wastewater Treatment

Description of treatment process: This facility is a 0.350 MGD design capacity conventional activated sludge wastewater treatment plant with flow equalization, chemical phosphorus removal, tertiary filtration, substandard holding pond (570,000 gallons), chlorination/dechlorination and post aeration. The disinfected effluent is discharged to surface water via an outfall pipe to a drainage ditch through a stream/wetland system to the Little Econlockhatchee River. (Approx 1 mile upstream from Outstanding FL Waters)

Receiving waters: Little Econlockhatchee River	**Classification:** I II (III)	
Design Flow: 0.350 MGD	**Mean Flow:** 0.288 MGD for period 9/95-8/96	**Flow during survey:** To be Determined

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

therefore, the best time to sample is: During regular business hours.

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)
CBOD5	20 mg/L (30-day average)
TSS	20 mg/L (30-day average)
Ammonia as N	2.0 mg/L (30-day aver.)
Total Phosphorus	1.0 mg/L (30-day aver.)
Dissolved Oxygen	≥7.0 mg/L at ≤22°C (30-day average)
Total Chlorine Residual for Disinfection	0.5 mg/L minimum
Total Chlorine Residual for Dechlorination	≤0.01 mg/L maximum
pH	6.0-8.5 s.u.
fecal coliform	≤800 values/100 mL (Single sample)

Describe special permit conditions and permit modifications:
Bimonthly toxicity sampling is required, until it is demonstrated that there are no toxicity peaks or diurnal toxicity variations resulting in violations. At that point, toxicity samples are required once every 6 months.

Park Manor Estates, WWTF
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Description of permitted outfall(s):

The facility outfall (001) is a 12-inch ductile iron pipe which discharges to a drainage ditch.

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

No permit violations have occurred within the past year.

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

- There is no pending enforcement action at this time. Facility won the FDEP award in 1995 for plants in this size category.
- The effluent limits were originally established by Consent Order OGC Case No. 84-0591. (see page 1 for $CBOD_5$, TSS, NH_3 + TP).
- The biological assessment conducted in January 1992 showed no acute toxicity and no metals or nutrients violations. Macroinvertebrate communities were moderately affected perhaps partly due to construction runoff at time of sampling.
- There are no WQBELS at this time. A SWIS R is due in May 1997 to determine the necessity of a level I/II WQBEL in the future.

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

MORs + DMRs were reviewed for the past 24 months. These reports showed that the plant effluent has consistently met secondary and additional effluent limits stipulated in the first page of this summary + the NPDES limits shown on the attachment.

Additional information: Toxicity Sampling:
The sampling on 8/26/96 showed acute toxicity to Ceriodaphnia dubia. All other sample results were satisfactory with regard to toxicity.

Staff contributing to this review (signature):

Philip N. Kan, Ed.D. (Biologist)
Karen Gotterald (Inspector)
Chris Jenard Wat Fac Admin (Engineer)
Al Coates Engineer ( )
( )
( )

Part I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

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

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

PARAMETER	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Average	Measurement Frequency	Sample Type	Sampling Point
Flow, MGD	Report	Report	Report	Continuous	Recording Flowmeter	Effluent
Carbonaceous Biochemical Oxygen Demand, 5 Day, mg/l	20.0	30.0	40.0	1/2 Weeks	12-hour composite	Effluent
Total Suspended Solids, mg/l	20.0	30.0	40.0	1/2 Weeks	12-hour composite	Effluent
Total Ammonia Nitrogen, as N, mg/l	2.0	3.0	--	1/2 Weeks	12-hour composite	Effluent
Total Phosphorus, as P, mg/l	1.0	1.5	--	1/2 Weeks	12-hour composite	Effluent
Fecal Coliform, #/100 ml [1]	See Item 6 on Page I-3			1/2 Weeks	Grab	Effluent
pH, Std. Units [4]	See Item 7 on Page I-3			Daily, 5/Week	Grab	Effluent
Total Residual Chlorine, mg/l [6]	See Item 8 on Page I-3			Daily, 5/Week	Grab	Effluent

Part I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL (Continuation)

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

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

PARAMETER	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Average	Measurement Frequency	Sample Type	Sampling Point
Dissolved Oxygen, mg/l	See Item 9 on Page I-4			1/2 Weeks	Grab	Effluent
Temperature, °C	See Item 9 on Page I-4			1/2 Weeks	Grab	Effluent
Acute Whole Effluent Toxicity	See Item 10 on Page I-4			Part IV	Grab	Effluent

UPSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 10/14/96	TIME: 0930	RECEIVING BODY OF WATER: LITTLE EGON

REMARKS:	LOCATION: PARK MANOR STP 1527 PARK MANOR DRIVE ORLANDO, FL	FIELD ID/NAME:
UPSTREAM		PM

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
				30	20	50	

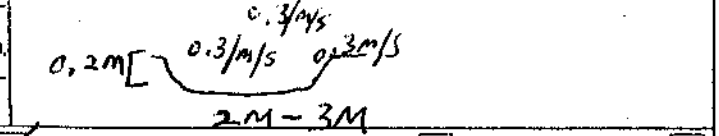
Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☑ Heavy ☐

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

Width of riparian vegetation (m) on least buffered side: 0

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)



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

Artificially Impounded ☑ yes

High Water Mark (m above bed): 0.25

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

SEDIMENT/SUBSTRATE

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none slight (moderate) severe Silt smothering: (none) slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	0			Sand	75	5	NET
Leaf Packs or Mats	0			Mud/Muck/Silt			
Aquatic Vegetation	20	7	NET	Other:			
Rock or Shell Rubble	5	7	NET	Other:			
Shorezone (Roots/Veg.)	0			*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								TO BOT
Mid-depth	0.2M	23.21	6.87 6.82	7.70	135			
Bottom								

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ DITCH

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

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

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

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

Weather Conditions/Notes:

SUN CLEAR

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Philip N. Kane	DATE: 10/14/96

UPSTREAM

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 10/14/96	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS:	LOCATION:	FIELD ID/NAME:
UPSTREAM	PARK MANOR ESTATES STP 1527 PARK MANOR DRIVE ORLANDO, FL	PM

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 10	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 30	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 3	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 2	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 3	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		TOTAL SCORE
0	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	48

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/14/96	P. KANG	Phil Kang

DOWNSTREAM

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 10/14/96	RECEIVING BODY OF WATER: LITTLE ECON

REMARKS:	LOCATION:	FIELD ID/NAME:
DOWNSTREAM	PARK MANOR ESTATES STP 1529 PARK MANOR DRIVE ORLANDO, FL.	PM

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 10	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 30	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 3	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 2	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 3	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		TOTAL SCORE
0	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	48

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10/14/96	P. KANE	Phil Kane

DOWNSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 32 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 10/14/96	TIME 1030	RECEIVING BODY OF WATER: LITTLE ECOA

REMARKS: DOWNSTREAM	LOCATION: PARK MANOR STP 1527 PARK MANOR DRIVE ORLANDO, FL	FIELD ID/NAME: PM

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
				30	20	50	

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

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

Width of riparian vegetation (m) on least buffered side: 0M

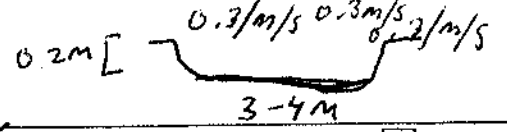
List & map dominant vegetation on back

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

Artificially Impounded ☑ yes

High Water Mark (m above bed): 0.25M

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)



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

SEDIMENT/SUBSTRATE

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none / slight / (moderate) / severe Silt smothering: (none) / slight / moderate / severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	0			Sand	80	7	
Leaf Packs or Mats	0			Mud/Muck/Silt	0	NET	
Aquatic Vegetation	20	14	NET	Other:			
Rock or Shell Rubble	0			Other:			
Shorezone (Roots/Veg.)	0						

Draw aerial view sketch of habitats found in 100 m section

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								TO BOT
Mid-depth	0.2M	24.2	6.65	7.91	215			
Bottom								

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ DITCH

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

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

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

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

Weather Conditions/Notes: SUN CLEAR

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Kent N. Kane	DATE: 10/14/96

Reference Site

Summer Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	21	≥ 31	30-16	<16		≥ 26	25-14	<14	3	≥ 22	21-12	<12	
EPT Index	5	≥ 7	6-4	<4		≥ 4	3-2	<2	5	-	≥2	<2	
# Chironomid Taxa	7	≥9	8-5	<5		≥7	6-4	<4	5	≥7	6-4	<4	
% Contribution of Dominant Taxon	25.7	≤22	23-61	>61		≤29	30-64	>64	5	≤31	32-66	>66	
% Diptera	37.2	-	≤50	>50		-	≤37	>37	1	-	≤47	> 47	
Florida Index	7	≥ 16	15-8	<8		≥7	6-4	<4	5	≥ 8	7-4	<5	
% Suspension feeders/Filterers	23.9	≥ 12	11-6	<6		-	≥7	<7	3	-	≥7	<7	
Total Score		Panhandle				Peninsula			(27)	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			26-32	Excellent			25-29
		Good			21-26	Good			20-25	Good			19-24
		Poor			14-20	Poor			13-19	Poor			13-18
		Severely Degraded			7-13	Severely Degraded			7-12	Severely Degraded			7-12

Test Site

Summer Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	35	≥ 31	30-16	<16		≥ 26	25-14	<14	5	≥ 22	21-12	<12	
EPT Index	7	≥ 7	6-4	<4		≥ 4	3-2	<2	5	-	≥2	<2	
# Chironomid Taxa	7	≥9	8-5	<5		≥7	6-4	<4	5	≥7	6-4	<4	
% Contribution of Dominant Taxon	56.0	≤22	23-61	>61		≤29	30-64	>64	3	≤31	32-66	>66	
% Diptera	64.2	-	≤50	>50		-	≤37	>37	1	-	≤47	> 47	
Florida Index	15	≥ 16	15-8	<8		≥7	6-4	<4	5	≥ 8	7-4	<5	
% Suspension feeders/Filterers	10.9	≥ 12	11-6	<6		-	≥7	<7	3	-	≥7	<7	
Total Score		Panhandle				Peninsula			(27)	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			26-32	Excellent			25-29
		Good			21-26	Good			20-25	Good			19-24
		Poor			14-20	Poor			13-19	Poor			13-18
		Severely Degraded			7-13	Severely Degraded			7-12	Severely Degraded			7-12

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Park Manor, Estate WWTP
County: Orange
Contact / District: Dr. Phil Kane / Central
NPDES Permit #: FL00 28921
LIMS Sample #: 156099 LIMS Job #: 96-07-15 22
sample log 12-2546

Sample Collection: Date 10-14-96 Time 0836
Test Beginning: Date 10-15-96 Time 1400
Test Ending: Date 10-16-96 Time 1400
Organism Batch #: 46 Diluent Batch #: 44
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

Test Type: Screening / Definitive
Static / Static Renewal / Flow-through

Test Number: 1 of 2

Remarks:
* in wrong row JS
A = Acad

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.9 @ 23.0	8.5 @ 23.1 °C	106.4 @ 105.4 996 @ 1079 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.5	8.3 @ 24.5 °C	115.0 @ 105.4 1010 @ 1077 @ 24.3 °C
48 hr	___ @ 7.0 ___ @ ___	___ @ ___	___ @ ___ °C	___ @ ___ ___ @ ___ @ ___ °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	A	5	5		7.9	8.3		24.4	23.9		7.8	7.8		180	190	
Control B	B	5	5			8.3			24.1			7.9			190	
Control C	C	~~5~~ 6	6			8.3			24.0			7.9			190	
Control D	D	5	5			8.3			23.9			7.9			195	
100% A	A	5	0 SD		7.6	~~7.8~~ **		24.4	24.0		7.4	7.7		560	570	
100% B	B	5	0 SD			8.1		~~2~~ *	24.0		~~7.4~~ *	7.8			595	
100% C	C	5	0 SD			8.2			24.0			7.7			600	
100% D	D	5	0 SD			8.3			23.7			7.7			580	
Measured/Loaded by:		MF	DN		MF	DN		MF	DN		MF	DN		MF	DN	
Recorded by:		CM	DN		JS	ND		JS	ND		JS	ND		JS	ND	

Investigators' Signatures
Marshall Faircloth
Julie Sharp
Dennis Nowicki
reviewer

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not Done		
Lab Total Residual Cl2 (mg/L):	2.03	2.03	2.04	DR-160	JS
Alkalinity (mg/L as $CaCO_3$):	122	71	73	HACH	DN
Hardness (mg/L as $CaCO_3$):	125	85	113	HACH	DN
Total ammonia (mg/L as N):	< 0.017	< 0.017	< 0.017		ND

Ammonia Meter #98136 Ammonia Meter Slope: 58.9
Ammonia Blank: < 0.017
Control Salinity: ___ ppt
Sample Salinity: ___ ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

ample Source: Park Manor Estates WWTP
County: Orange
ntact / District: Dr. Phil Kane / Central
DES Permit #: FL00 28921
IMS Sample #: 156099 LIMS Job #: 96-Oct-15-22
sample log 102896
st Type: Screening / Definitive
Static / Static Renewal / Flow-through
st Number: 2 of 2
emarks:
* entry error 7.9 JS

Sample Collection: Date 10-14-96 Time 0830
Test Beginning: Date 10-15-96 Time 1405
Test Ending: Date 10-17-96 Time 1405
Organism Batch #: 78 Diluent Batch #: well
Organism Age: 8 days
Test Organism: Cyprinella leedsi

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.9 @ 23.0	8.5 @ 23.1 °C	1064 @ 105.4 996 @ 1079 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.2 @ 23.8	8.3 @ 24.5 °C	1155 @ 105.4 1014 @ 1079 @ 24.3 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.4 @ 23.5	8.5 @ 23.3 °C	1112 @ 105.4 932 @ 1071 @ 24.1 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	A1	5	5	5	8.0	8.3	8.4	23.6	23.4	23.7	7.8	8.1	6.6	245	245	250
Control B	A2	5	5	5	8.0	8.4	8.5	23.5	23.3	23.5	7.8	8.0	8.0	245	245	250
Control C	A3	5	5	5	8.0	8.4	8.5	23.4	23.4	23.5	7.9	8.0	7.9	245	245	245
Control D	A4	5	5	5	8.0	8.4	8.5	23.5	23.7	23.6	7.9	8.0	7.9	245	245	245
100% A	A5	5	5	5	7.5	8.1	8.2	23.8	23.4	23.6	7.7	7.6	7.8	570	570	575
100% B	A6	5	5	5	7.5	8.0	8.2	23.8	23.3	23.5	7.5	7.6	7.8	570	570	575
100% C	A7	5	5	5	7.5	7.9	8.2	23.8	23.3	23.4	7.5	7.5	7.7	570	570	575
100% D	A8	5	5	5	7.5	7.9	8.2	23.8	23.7	23.6	7.5	7.6	7.6	570	575	575
Measured/Loaded by:		DN	ND	MF	MF	DN	ND	MF	DN	ND	MF	DN	ND	MF	DN	ND
Recorded by:		JS	ND	MF	JS	ND	JS	JS	ND	JS	JS	ND	JS	JS	ND	JS

Investigators' Signatures

Marilyn Faircloth
Julie Shapiro
Dawn Nicholson
Mark Knight

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):				Not Measured	
Lab Total Residual Cl2 (mg/L):	<.03	<.03	<.04	DR-100	JS
Alkalinity (mg/L as $CaCO_3$):	122	71	93	HACH	DN
Hardness (mg/L as $CaCO_3$):	125	84	113	HACH	DN
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	ND

Ammonia Meter #98136 Meter Slope: -58.9 Ammonia Blank: <0.017 Control Salinity: ppt Sample Salinity: ppt

Benthic macroinvertebrate taxa list for Park Manor WWTP, collected via 20 discrete dip net sweeps of multiple substrates above and below the discharge on 14 October, 1996.

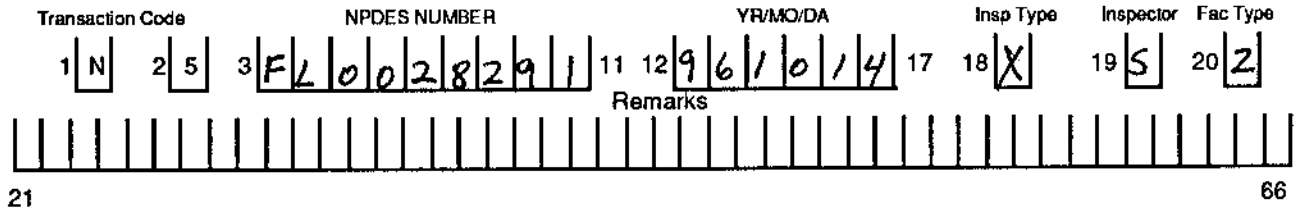
	Reference Site	Test Site
Acarina		
Hygrobates sp.	–	2
Coleoptera		
Peltodytes sp.	1	4
Collembola		
Undetermined Collembola	–	1
Decapoda		
Cambaridae	–	2
Diptera		
Ablabesmyia rhamphe grp.	1	13
Chironomidae	2	16
Cryptochironomus sp.	1	4
Glyptotendipes sp. B Epler	1	–
Labrundinia sp.	1	–
Labrundinia pilosella	–	4
Palpomyia/bezzia grp.	1	3
Polypedilum convictum grp.	5	4
Polypedilum halterale grp.	1	4
Polypedilum illinoense grp.	29	416
Simulium sp.	–	5
Tanytarsus sp.	–	4
Tanytarsus sp. G Epler	–	4
Ephemeroptera		
Acerpenna pygmaeus	2	4
Baetidae	–	5
Caenis sp.	13	30
Labiobaetis sp.	–	7
Hemiptera		
Mesovelia sp.	–	1
Lepidoptera		
Pyralidae	1	15
Odonata		
Argia sp.	–	17
Coenagrionidae	–	2
Corduliidae	–	1
Enallagma sp.	–	1
Enallagma cardenium	–	39
Ischnura sp.	5	2
Ischnura posita	2	–
Oligochaeta		
Aulodrilus pigueti	–	1
Enchytraeidae	–	1

Limnodrilus hoffmeisteri	6	5
Nais communis	9	31
Nais elinguis	–	1
Nais pardalis	–	3
Pelecypoda		
Ancylidae	1	7
Corbicula fluminea	14	54
Physella sp.	–	1
Pisidiidae	12	12
Trichoptera		
Cheumatopsyche sp.	1	4
Hydroptila sp.	1	1
Oecetis sp.	2	6
Oxyethira sp.	–	1
Undetermined Trichoptera	1	5

Phytoplankton taxa list and densities (#/mL) for Park Manor WWTP, collected via subsurface grabs above and below the discharge, on 14 October, 1996.

	Reference Site	Test Site
Bacillariophyceae		
Achnanthes sp.	42	21
Gomphonema sp.	–	11
Navicula sp.	11	–
Chlorophyceae		
Chlamydomonas sp.	21	–
Gloeocystis sp.	–	11
Scenedesmus sp.	32	11
Schroederia sp.	11	–
Cryptophyceae		
Chroomonas sp.	11	32

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



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