Florida
Department of Environmental Protection

Biological Assessment of

Tampa Electric Company

Dinner Lake Plant

Highlands County

NPDES #FL0034029

Sampled April 1993

December 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Tampa Electric Company Dinner Lake Plant
County: Highlands
NPDES Number: FL0034029
State Permit Expiration Date: 7 February 1994

Toxics Sampling Inspection (XSI)	
Date Sampled:	Not sampled, plant not discharging.
Results:	

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	Not sampled, plant not discharging.
Results:	

Impact Bioassessment Inspection (IBI)	
Date Sampled:	21 April 1993
Results:	Benthic macroinvertebrate taxa richness and Shannon-Weaver diversity were excellent in Dinner Lake, higher than 95% of typical Florida lakes. The macroinvertebrate component of the Lake Condition Index clearly indicated that both Dinner Lake stations were unaltered by human activities. Although phytoplankton biomass and chlorophyll *a* was low, the algal assemblage of Dinner Lake, with blue-green algae strongly dominating, appeared more typical of a eutrophic system. Since nutrients and AGP were not a problem, it is thought that the algal community was responding to other factors (*e.g.*, pH). In any case, there is no evidence that the discharge was negatively affecting the phytoplankton.

Water Quality Inspection (WQI)	
Date Sampled:	21 April 1993
Results:	Nutrient concentrations were very low or undetected except for nitrate-nitrite, which was slightly above average for a Florida lake. Algal growth potential tests indicated oligotrophic conditions.

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 Tampa Electric Company Dinner Lake Plant, formerly owned by the Sebring Utilities Power Commission, is located in Highlands County, Florida (see map in Appendix). This steam-electricity generating plant operates on an "as needed" basis for power production, with a flow limit of 20.6 MGD. Once through cooling water is discharged through a 60 in, 1000 ft underwater pipe to Dinner Lake (see diagram in Appendix). The only permit limit other than flow is temperature, which may not exceed 102°F across the condenser and 92°F at discharge.

No permit violations have been noted during the past year, and the average temperature across the condenser was 89°F (see Facility Summary in Appendix). Past bioassays performed by FDEP (October, 1985) indicated no toxicity.

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 Dinner Lake near the facility's intake) and a test site (the area near the discharge) (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 study sites. Because the plant was not discharging at the time of the study, no toxicity bioassays or other effluent characteristics were measured. Nutrient analyses were performed on the 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. Collection methods consisted of three Ponar dredges per station. Phytoplankton was sampled at both reference and test sites via subsurface grabs (Ross 1990). 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).

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Ponar		
Number of Taxa	51	43
Lake Condition Index	28	22
Shannon-Weaver Diversity	3.98	3.72
% Oligochaeta	34.6	52.7
% Diptera	36.1	7.3
% Pelecypoda	11.5	22.0
% Malacostraca	10.6	2.8
% Rhynchocoela	0.2	7.2
% Other	7.0	8.0
% Below Surface Deposit Feeders	35.6	53.1
% Above Surface Deposit Feeders	27.6	12.6
% Suspension Feeders	25.5	23.9
% Predator/Carnivores	2.7	5.7
% Shredders	4.6	1.8
% Other	4.1	2.9
Phytoplankton Algae		
Number of Taxa	15	10
% Contribution of Dominant Taxon	64.4	74.4
Chlorophyll a (µg/L)	4.9	4.6
% Blue-green	87.2	94.1
% Green	10.1	5.0
% Diatoms	2.7	0.9
Algal Growth Potential (mg dry wt/l)	0.13	0.10

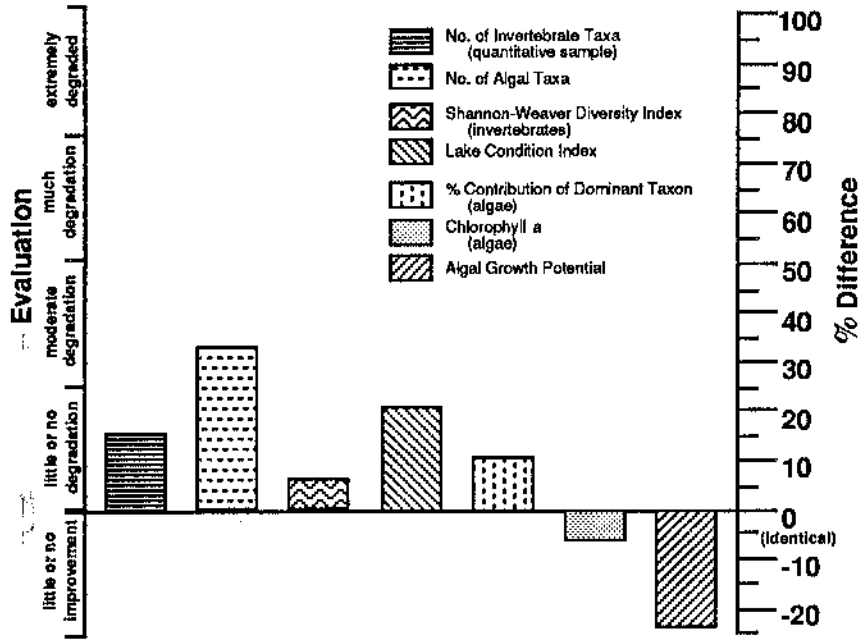
Explanation of Measurements of Community Health

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 Lake Condition Index is a scheme for evaluating the health of lentic systems, which utilizes diversity, nutrient content, and chlorophyll *a*, as well as the

presence of pollution sensitive macroinvertebrates (Hulbert 1990). A site with a high Lake Condition Index score is considered healthy or unaltered (*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. 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. 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, the diversity index, and the Lake Condition Index 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: Ford Walton and Gary Millington (DEP South District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Elizabeth Miller, Urania Quintana, 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.



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

Results and Discussion

Habitat assessment indicated that the reference site was very similar to the test site. Bank stability and vegetation quality were rated good to excellent, with essentially no evidence of erosion problems. Land use at both sites was primarily residential (50%) and agricultural (40%), with the remaining ten percent industrial. Depth of this sand-bottomed lake ranged from 1 to 10 m, with an excellent secchi depth (2.3 m and 2.5 m at reference and test sites, respectively). Aquatic macrophytes, periphyton, and fish were abundant or common at both stations. Physical chemical measurements were identical or nearly so, with temperatures of 23.5°C at both sites, pH values of 8.1 and 7.8 SU's, and specific conductance levels of 209 and 210 µmhos/cm at reference and test sites, respectively. Both sites were amply oxygenated, as bottom dissolved oxygen (taken at a depth of 5 m) was 9.0 mg/L (reference) and 8.8 mg/L (test) (Appendix).

Neither ammonia nor phosphorus-containing compounds were detected at the study sites, and only a small amount of TKN was measured. Nitrate-nitrite was slightly above average for a Florida lake system (see Table of Typical Water Quality Values in Appendix). However, algal growth potential tests indicated oligotrophic conditions, as AGP was a very low 0.1 mg dry wt/L at both sites. These data suggest that limiting phosphorus inputs to Dinner Lake will help maintain its oligotrophic character.

Benthic macroinvertebrate communities were healthy and diverse at the reference site and in the vicinity of the intermittent discharge. The figure on this page indicates the degree of difference between the control and test sites. Larger differences (that is, higher percentages) cor-

respond with greater degrees of degradation. Negative values mean that the test site is better than the control. **The figure on this page summarizes** similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation, unless the test site is better than the reference site. The average abundance of each individual taxon appears in the Appendix.

Shannon-Weaver diversity was 4.0 at the reference site and 3.7 at the test site. Both diversity values are higher than 95% of representative Florida lakes (see Table of Typical Water Quality Values in Appendix). Similarly, taxa richness at both Dinner Lake stations was very good (51 at the reference site, 43 at the test site), also higher than 95% of other Florida lakes. The macroinvertebrate component of the Lake Condition Index, with 28 points at the reference site and 22 points at the test site, placed both Dinner Lake stations solidly in the unaltered category. The Quantitative Stability Index for macroinvertebrate percent composition indicated some moderate differences between the sites. Fewer dipterans (mostly *Cladotanytarsus* sp.), and a greater number of oligochaetes (mainly *Limnodrilus hoffmeisteri)* and pelecypods (*Corbicula manilensis)* were found at the test site. Even if these slight changes in community structure were related to the thermal discharge, based on the measures of invertebrate health discussed above, the test site may still be considered undisturbed.

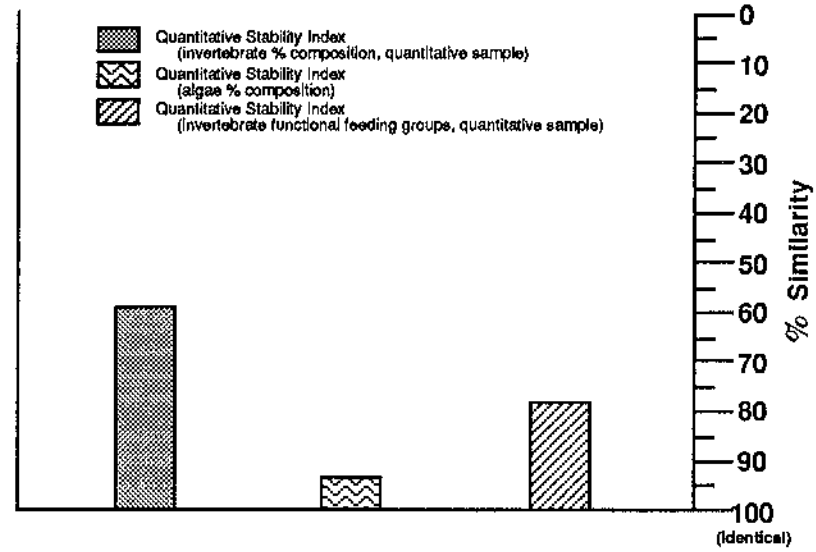
Phytoplankton assemblages of the relatively low-nutrient Dinner Lake were unusual, in that they appeared taxonomically more similar to communities expected from a lake with higher nutrient levels. Populations at both sites were strongly dominated by cyanophytes, particularly eutrophication-tolerant forms such as *Microcystis* sp. and *Chroococcus* sp. Taxa richness was low throughout the study area, with 15 and 10 taxa at the reference and test sites, respectively. However, chlorophyll *a* values, 4.9 µg/L at the reference site and 4.6 µg/L at the test site, suggested oligotrophic conditions, as did the very low AGPs. One possible explanation for the disparity between the algal community data and nutrient concentrations involves the pH of Dinner Lake. In relatively alkaline systems such as Dinner Lake (*e.g.*, the reference site pH was 8.1), cyanophytes have a tendency to outcompete other forms, even in the absence of nutrient enrichment (Reynolds 1984). In any case, there is no evidence that the discharge was negatively affecting the phytoplankton.

Conclusions

Dinner Lake, which receives intermittent effluent inputs from the Tampa Electric Company power plant, did not appear to suffer any degradation that could be related to the discharge. Nutrient concentrations were very low or undetected except for nitrate-nitrite, which was slightly above average for a Florida lake. Algal growth potential was well below the level that would indicate the likelihood of enrichment problems.

Benthic macroinvertebrate taxa richness and Shannon-Weaver diversity were excellent in Dinner Lake, higher than 95% of typical Florida lakes. The macroinvertebrate component of the Lake Condition Index clearly indicated that both Dinner Lake stations were unaltered by human activities.

Although phytoplankton biomass and chlorophyll *a* were low, the algal assemblage of Dinner Lake, with blue-green algae strongly dominating, appeared more typical of a eutrophic system. Since nutrients and AGP were not a problem, it is thought that the algal community was responding to other factors (pH).



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

Literature Cited

Hulbert, J. L. 1990. A proposed Lake Condition Index for Florida. North Amer. Benth. Soc. 38th Ann. Mtg., Blacksburg, VA. 11 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.

Reynolds, C. S. 1984. The ecology of freshwater phytoplankton. Cambridge University Press. 384 p.

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

	Reference Site	Test Site
Nutrients (mg/L)		
Ortho-phosphate	0.020 U	0.020 U
Total phosphorus	0.015 U	0.015 U
Ammonia	0.020 U	0.020 U
Nitrate + Nitrite	0.40 A	0.46 A
TKN	0.41 A	0.37
Other Parameters		
Habitat Assessment	51	51
D.O. (mg/L)	8.9	8.7
pH (SU's)	8.1	7.8
Specific conductance (µmhos/cm)	209	210
Temperature (°C)	23.5	23.5

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

U - Material was analyzed for but not detected; The value reported is the method 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

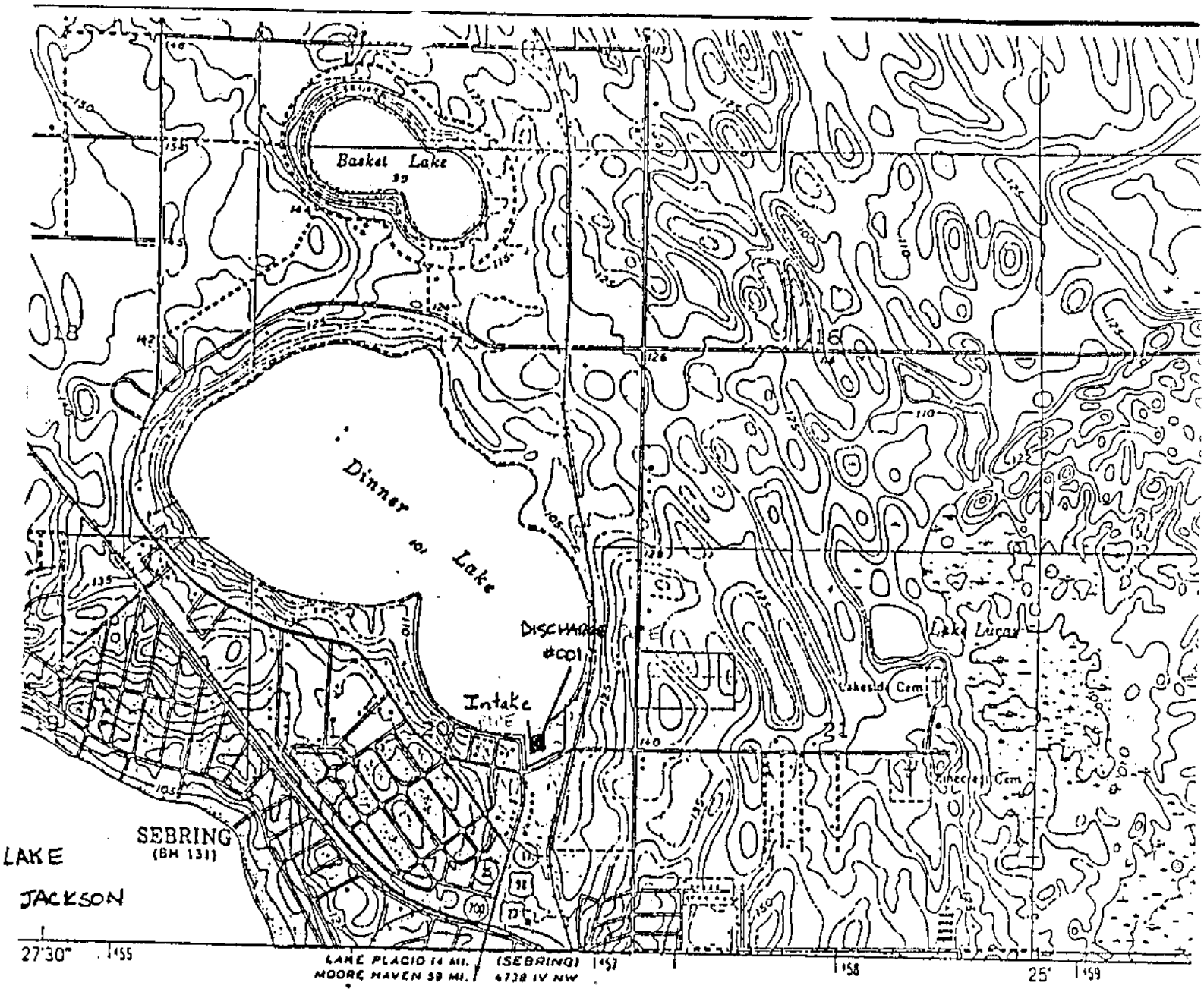
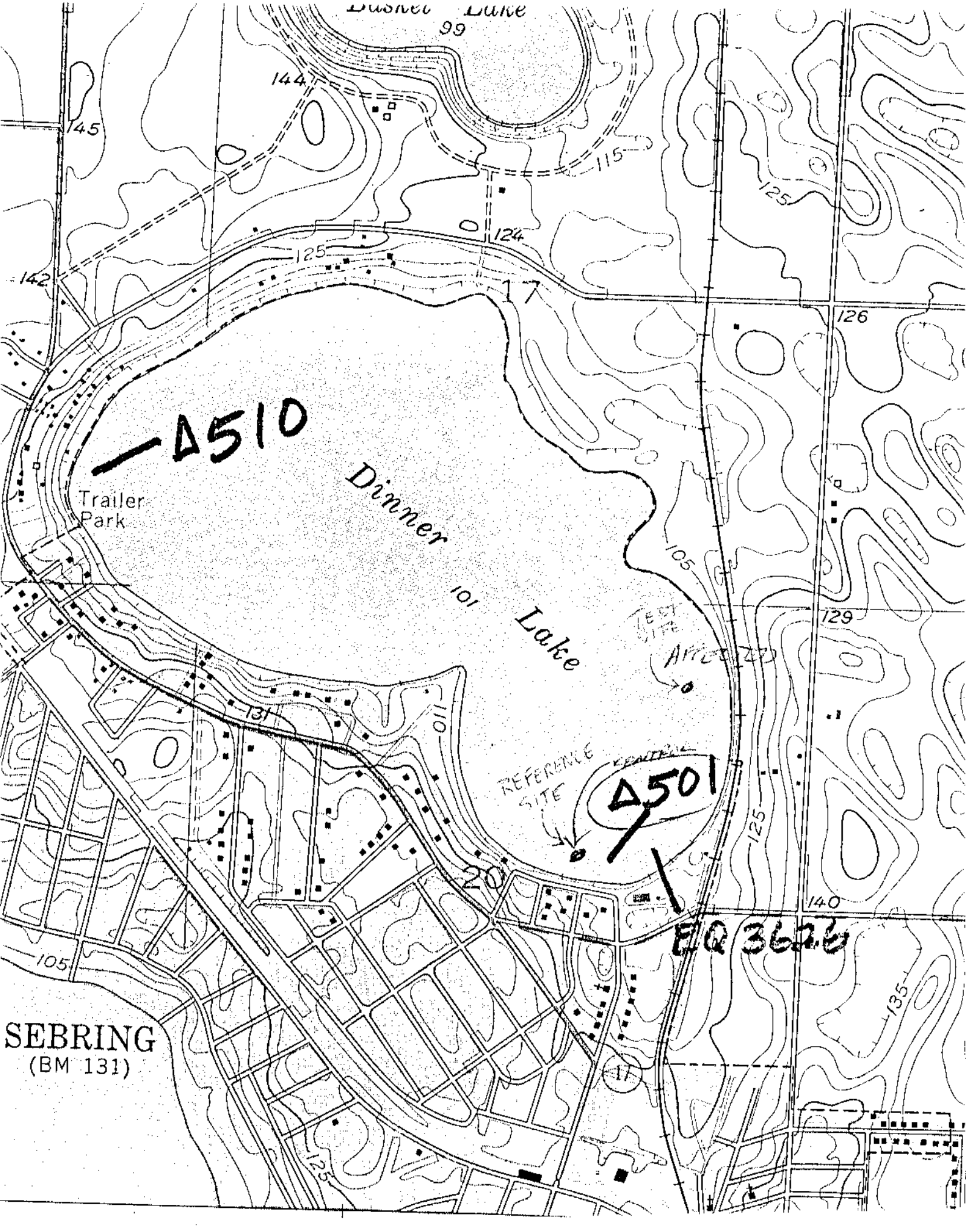


Figure 2. Location of

Plant NPDES discharge #001.


Dinner Lake
Trailer Park
TEST SITE
REFERENCE SITE
A510
A501
EQ 3626
SEBRING
(BM 131)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		4/-	96			

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):	Estimated System Depth (range, m):		yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ 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)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☒ Wetland: ☐ Estuary: ☐ Other: ☐

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

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

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

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

Weather Conditions:

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

SAMPLING TEAM:	SIGNATURE:	DATE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
LAKE HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	LAKE NAME:

ECO-REGION:	COUNTY:	SAMPLING LOCATIONDESCRIPTION:	FIELD ID/NAME:

Parameter	Check the box that most closely characterizes the attributes of the lake. At an altered test lake, write "E" for expected parameter condition prior to disturbance, and a check for observed conditions.				
	Natural conditions			**Human influence**	
Hydrology	Surface water inflow and outflow present (or outflow only), sometimes with visible flow, short water residence time A ☐	Surface water inflow present, but flow is rare, moderate to long water residence time B ☐	No surface inflow or outflow present, very long water residence time, lateral groundwater seepage dominates C ☒	Impounded, hydrology of sytstem artificially controlled ☐	
Waterbody Size	Over 1000 acres A ☐	From 100 acres to 999 acres B ☒	Less than 99 acres C ☐		
Color/ Secchi	Very clear, uncolored water, Secchi > 2 m. A ☒	Water somewhat tannin stained, Secchi 0.7 m -2 m. B ☐	Very dark water, but no algae or turbidity, Secchi 0.3 m -0.7 m C ☐	Visibility reduced, from tubidity or algae, moderate color, Secchi 0.3 m -0.7 m. ☐	At one time, system may have fit into a category at left, but now , extremely green or turbid water, Secchi <0.3 m. ☐
Littoral Zone Vegetation Quality (List of species on back)	Diverse macrophyte community covering most of littoral zone, but no nuisance growths A ☒	Woody species (e.g., cypress) dominate littoral zone, although some macrophytes may be present B ☐	Naturally sparse plant community present in littoral zone (e.g., some sand-hill lakes) C ☐	Fits into a category at left, but moderate growths of nuisance macrophytes ☐	At one time, system may have fit into a category at left, but now choked with nuisance macrophytes, an obvious problem ☐
Bottom Substrate Composition	Diverse mixture of sand, shell hash, detritus, with small amounts of mud. ☒	Mixture of sand or clay and detritus with higher mud/muck content. ☐	Hard-packed sand only (little detritus). ☐	Natural sand or clay is far below thick deposits of detritus and somewhat anaerobic muck /mud ☐	
Littoral Zone Alterations	No erosion, very few man-made structures, much native vegetation between uplands and littoral zone, basically unaltered shore ☒			Some erosion, shoreline fairly altered, reduced amounts of native vegetation between uplands and littoral zone ☐	Erosion problems, little to no native vegetation between uplands and littoral zone (e.g., mostly lawn or bare), highly developed shore ☐

To compare lakes, you must match eco-region, and then in decreasing importance: hydrological condition, relative size, tannic color (or expected tannic color if green), and vegetation type (macrophyte, woody plants, or sparse). The A, B, and C, categories help facilitate this.

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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):	Estimated System Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ 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)				Riffles			
Leaf Packs				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY

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

System Type : Stream: ☐ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, Misc.) Lake: ☒ Wetland: ☐ Estuary: ☐ Other: ☐

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

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

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

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

Weather Conditions:

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

SAMPLING TEAM:	SIGNATURE:	DATE:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
LAKE HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	LAKE NAME:

ECO-REGION:	COUNTY:	SAMPLING LOCATIONDESCRIPTION:	FIELD ID/NAME:
	HIGHLANDS		

Parameter	Check the box that most closely characterizes the attributes of the lake. At an altered test lake, write "E" for expected parameter condition prior to disturbance, and a check for observed conditions.				
	Natural conditions			**Human influence**	
Hydrology	Surface water inflow and outflow present (or outflow only), sometimes with visible flow, short water residence time **A** ☐	Surface water inflow present, but flow is rare, moderate to long water residence time **B** ☐	No surface inflow or outflow present, very long water residence time, lateral groundwater seepage dominates **C** ☒	Impounded, hydrology of sytstem artificially controlled ☐	
Waterbody Size	Over 1000 acres **A** ☐	From 100 acres to 999 acres **B** ☒	Less than 99 acres **C** ☐		
Color/ Secchi	Very clear, uncolored water, Secchi > 2 m. **A** ☒	Water somewhat tannin stained, Secchi 0.7 m -2 m. **B** ☐	Very dark water, but no algae or turbidity, Secchi 0.3 m -0.7 m **C** ☐	Visibility reduced, from tubidity or algae, moderate color, Secchi 0.3 m -0.7 m. ☐	At one time, system may have fit into a category at left, but now , extremely green or turbid water, Secchi <0.3 m. ☐
Littoral Zone Vegetation Quality (List of species on back)	Diverse macrophyte community covering most of littoral zone, but no nuisance growths **A** ☒	Woody species (e.g., cypress) dominate littoral zone, although some macrophytes may be present **B** ☐	Naturally sparse plant community present in littoral zone (e.g., some sand-hill lakes) **C** ☐	Fits into a category at left, but moderate growths of nuisance macrophytes ☐	At one time, system may have fit into a category at left, but now choked with nuisance macrophytes, an obvious problem ☐
Bottom Substrate Composition	Diverse mixture of sand, shell hash, detritus, with small amounts of mud. ☒	Mixture of sand or clay and detritus with higher mud/muck content. ☐	Hard-packed sand only (little detritus). ☐	Natural sand or clay is far below thick deposits of detritus and somewhat anaerobic muck /mud ☐	
Littoral Zone Alterations	No erosion, very few man-made structures, much native vegetation between uplands and littoral zone, basically unaltered shore ☒			Some erosion, shoreline fairly altered, reduced amounts of native vegetation between uplands and littoral zone ☐	Erosion problems, little to no native vegetation between uplands and littoral zone (e.g., mostly lawn or bare), highly developed shore ☐

To compare lakes, you must match eco-region, and then in decreasing importance: hydrological condition, relative size, tannic color (or expected tannic color if green), and vegetation type (macrophyte, woody plants, or sparse). The A, B, and C, categories help facilitate this.

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:

Benthic macroinvertebrate taxa list for Tampa Electric Company, collected via Ponar grab samples in Dinner Lake, on 21 April, 1993. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site
Diptera		
Chironomus sp.	12.5	12.5
Cladotanytarsus sp.	1734.0	124.8
Cladopelma sp.	25.0	12.5
Coelotanypus sp.	–	25.0
Corynoneura sp.	–	12.5
Cricotopus/Orthocladius grp. sp.	12.5	–
Cryptotendipes sp.	124.8	49.9
Dicrotendipes modestus	25.0	12.5
Djalmabatista pulcher	25.0	12.5
Glyptotendipes sp.	12.5	25.0
G. paripes	–	112.3
Nilothauma sp.	74.9	–
Palpomyia grp. sp.	49.9	37.4
Paralauterborniella nigrohalteralis	37.4	–
Polypedilum halterale grp.	25.0	–
Procladius sp.	–	12.5
Pseudochironomus sp.	12.5	–
Stictochironomus devinctus	49.9	–
Stilocladius sp.	12.5	–
Tanytarsus sp. C Epler	12.5	–
T. sp. K Epler	–	12.5
T. sp. L Epler	12.5	–
Tanypus punctipennis	12.5	–
T. stellatus	–	12.5
Undetermined dipteran pupa	162.2	49.9
Ephemeroptera		
Caenis sp.	12.5	12.5
Hexagenia limbata	112.3	37.4
H. orlando	187.1	49.9
Gastropoda		
Elimia floridensis	12.5	–
Melanoides sp.	–	12.5
M. tuberculata	12.5	–
Micromenetus sp.	–	12.5
M. dilatus	–	12.5
Viviparus georgianus	–	99.8
Malacostraca		
Hyalella azteca	711.1	199.6
Odonata		
Celithemis sp.	12.5	–
Miathyria marcella	12.5	–

Oligochaeta		
Aulodrilus pigueti	25.0	–
Dero digitata	25.0	25.0
D. pectinata	49.9	124.8
D. trifida	1110.3	1185.1
Eclipidrilus sp.	187.1	99.8
E. palustris	25.0	112.3
Limnodrilus hoffmeisteri	99.8	1522.0
Lumbriculus variegatus	12.5	274.5
Nais communis	49.9	–
N. pardalis	99.8	361.8
Pristina aequiseta	262.0	25.0
P. leidyi	12.5	–
P. synclites	49.9	–
Pristinella jenkinae	62.4	–
P. osborni	212.1	–
Tubifex tubifex	12.5	12.5
Undetermined enchytraeid	25.0	12.5
Undetermined lumbriculid	12.5	12.5
Pelecypoda		
Corbicula manilensis	524.0	1447.1
Elliptio buckleyi	–	49.9
Sphaerium or *Musculium* sp.	249.5	74.9
Platyhelminthes		
Dugesia sp.	–	237.0
D. tigrina	37.4	74.9
Rhynchocoela		
Prostoma rubra	12.5	511.5
Trichoptera		
Cernotina sp.	37.4	12.5
Oecetis sp.	25.0	12.5
Undetermined trichopteran pupa	12.5	–
Total	6737.6	7149.1

Phytoplankton taxa list and densities (#/mL) for Tampa Electric Company, collected via subsurface grabs in Dinner Lake, on 21 April, 1993.

	Reference Site	Test Site
Diatoms		
Cocconeis sp.	49	50
Cyclotella sp.	49	50
Cymbella sp.	49	–
Eunotia sp.	49	–
Navicula sp.	49	–
Chlorophyta		
Coelastrum sp.	247	249
Gloeocystis sp.	445	299
Kirchneriella sp.	99	–
Scenedesmus sp.	49	–
Unknown chlorophyte flagellate	99	–
Cyanophyta		
Aphanocapsa sp.	445	100
Chroococcus sp.	1187	1345
Gloeocapsa sp.	346	448
Gloeothece sp.	148	199
Lyngbya sp.	–	50
Microcystis sp.	5984	8119
Total	9294	10909