Biological Assessment of

Dale Mabry Wastewater Treatment Plant

Hillsborough

NPDES #FL0036820

Sampled July and September 1997

April 1998

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger:	Dale Mabry Wastewater Treatment Plant
County:	Hillsborough
NPDES Number:	FL0036820
NPDES Permit Expiration Date:	1 January 1998

Toxics Sampling Inspection (XSI)

Date Sampled: 19 September 1997

Results: Atrazine, diazinon, and malathion were detected at both sample sites. Malathion (1.40 µg/L at the reference site; 1.20 µg/L at the test site) was detected at concentrations that exceed Class III water quality standards (Rule 62-302.530(51)(n)FAC) (Table 1). The pesticide levels in Brushy Creek, a tributary of Tampa Bay, were not attributable to the Dale Mabry discharge, but were likely the result of aerial spraying of malathion for med-fly control, and possibly from other non-point sources. Diazinon and malathion were undetected in the effluent. Copper (4.3 µg/L), lead (0.7 µg/L), and zinc (53.0 µg/L) were detected in the effluent at levels that comply with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Results: Not sampled

Impact Bioassessment Inspection (IBI)

Date Sampled: 19 September 1997/21 July 1997

Results: In the Hester-Dendy samples, the Florida Index and the % filter-feeders were substantially lower at the test site, compared with the reference site. On the other hand, the Stream Condition Index, based on dip net sampling, placed the reference site (with 23 points) in the "good" category while the test site was at the lower end of the "excellent" category (with 27 points). This study was confounded by the aerial application of malathion in the study area, which took place during the Hester-Dendy sampler incubation. This spraying may have had localized effects on macroinvertebrate communities in Brushy Creek, making it difficult to attribute negative effects to the Dale Mabry effluent.

Quantitative measures of periphyton community health did not indicate degradation at the test site. Phytoplankton algal communities were essentially the same at both the reference and test sites. All algal measures of community health, including taxa richness, diversity, and algal density were comparable and indicative of a healthy algal community.

Water Quality Inspection (WQI)

Date Sampled: 19 September 1997

Results: Physical/chemical measurements were comparable at reference and test sites. Dissolved-oxygen levels, ranging from 2.8 mg/L at the reference site to 3.2 mg/L at the test site, were below Class III water quality standards (Rule 62-302.530(31)FAC), which is likely attributable to high sediment oxygen demand observed in Brushy Creek. Only slight increases in nutrient levels were associated with the Dale Mabry discharge. Algal Growth Potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at the reference site (13.1 mg dry wt/L), and the test site (15.4 mg dry wt/L). An AGP test was not performed on the effluent.

Introduction

The Dale Mabry Wastewater Treatment Plant is a 6.0 MGD municipal wastewater facility located in Hillsborough County, Florida (see maps in Appendix). Wastewater treatment consists of screening and degritting, activated sludge biological processing, clarification, filtration, and chlorination. The effluent is dechlorinated and reaerated prior to being discharged into Brushy Creek, a tributary of Tampa Bay.

State permit limits for the Dale Mabry WWTP effluent are listed in Table 1. The facility has consistently met permit limits for its discharge to Brushy Creek for the past year.

The DEP Consent Order for Hillsborough County's Dale Mabry WWTP requires the county to monitor a wetland in Brushy Creek downstream of Dale Mabry WWTP's outfall for a period of three years. The monitoring was required to determine if the effluent is impacting Brushy Creek and its associated wetlands downstream of Dale Mabry WWTP's outfall.

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 30 meters upstream of the discharge in Brushy Creek) and a test site (located in the same tributary, 30 meters 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 the reference and test sites. At the time the initial sampling was performed (July, 1997), the study area was being sprayed with malathion due to an infestation of the Mediterranean fruit fly. Normally, acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms (Weber 1991), and an Algal Growth Potential (AGP) test would be performed on the effluent sample. However, these tests were not performed as the effluent was being discharged to the reuse system and was therefore chlorinated. The effluent was analyzed for metals, nutrients, and organic constituents (base neutral and acid extractables, and pesticide extractables). Reference and test site samples were analyzed for pesticide extractables and nutrients. Methods used for all chemical analyses are on file at the DEP Central Chemistry Laboratory in Tallahassee.

Benthic macroinvertebrate communities were evaluated at the study sites on two different dates. On July 21, 1997, invertebrates were collected from Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Since malathion spraying was being conducted at that time, the qualitative macroinvertebrate sampling was not performed until September 19, allowing time for recovery from the possible toxic effects of malathion. Qualitative invertebrate collections were taken from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Periphyton and phytoplankton communities were sampled on July 21. Periphyton was sampled via glass microscope slides incubated for 28 days, while phytoplankton was collected by taking subsurface grab samples. Chlorophyll *a* was determined for periphyton and phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism (Miller *et al.* 1978) were performed at the reference and test sites.

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 possible points 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,

Table 1. Effluent limits and summary of chemistry data.

Dale Mabry WWTP	Effluent Permit Limits	Effluent Sample	Reference Site	Test Site
Organic Constituents (µg/L)				
Atrazine	-	0.054 I	0.60	0.57
Diazinon	-	0.095 U	0.28	0.24
Malathion	≤ 0.1 **	0.14 U	1.4	1.2
Metals (µg/L)				
Aluminum	≤ 1,500 **	99.0 I	-	-
Arsenic	≤ 50 **	40 U	-	-
Cadmium	≤ 1.8 **c	0.1 I	-	-
Chromium	≤ 345 **c	10 U	-	-
Copper	≤ 20 **c	4.3	-	-
Iron	≤ 1,000 **	20 U	-	-
Lead	≤ 7.0 **c	0.70 A	-	-
Mercury	≤ 0.012 **	0.10 U	-	-
Nickel	≤ 267.1 **c	6 U	-	-
Selenium	≤ 5.0 **	50 U	-	-
Silver	≤ 0.07 **	0.04 U	-	-
Zinc	≤ 179.7 **c	53 A	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	0.23	0.042	0.12
Total phosphorus	-	0.24	0.082	0.20
Ammonia	-	0.026	0.044 A	0.044
Nitrate+Nitrite	-	0.49 A	0.10	0.15
TKN	-	0.56	0.88	0.92
Total Nitrogen	≤ 3.0 *a	1.05	-	-
General Phys-Chem Parameters				
Habitat Assessment	-	-	122	125
D.O. (mg/L)	≥ 5.0 *	-	2.8	3.2
pH (SU)	6.0-8.5 *	-	6.8	6.8
Conductivity (µmhos/cm)	-	-	302	298
Temperature (°C)	-	-	25.2	25.0
B.O.D., 5 day (mg/L)	≤ 5.0 *a	-	3.5 A	2.8
Tot. Residual Chlorine (mg/L)	≤ 0.01 *	-	-	-
Flow (MGD)	≤ 6.0 *a	-	-	-
Hardness (mg CaCO3)	-	186.5	-	-
AGP (mg dry wt/L)	-	-	13.1	15.4
Toxicity				
Bioassay Fish	-	not sampled	-	-
Bioassay Invertebrate	-	not sampled	-	-
Microbiology (# organisms/100 mL)				
Fecal Coliforms	***	-	-	-

* Permit limit

** Class III water quality standard

*** Required to be non-detectable in at least 75% of samples collected during the monthly operating period

a - Annual average

c - Value is calculated based on hardness

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

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 (1993), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

Ephemeroptera/Plecoptera/Trichoptera (EPT) 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 (SCI) for Florida 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, the diatom to blue-green algae ratio, and the % filter-feeders are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving algal density, 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: Andrea Grainger and Brent Johnson (DEP Southwest District), Lyn Burton, Jennifer Eichelberger, Ken Espy, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Scott Lashbrook, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Tamburello, David Whiting, and Vicki Whiting (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

Habitat quality was "optimal" at the reference (122 points) and test (125 points) sites (see Habitat Assessment Field Data Sheets in Appendix). Substrate at both sites consisted of woody debris, leaf packs or mats, aquatic vegetation, rock or shell rubble, and undercut banks and roots. The reference site was also characterized by a layer of detrital material (covering 40% of the stream bottom), while the downstream site had a 30% coverage of sand/silt.

Physical/chemical measurements were comparable at the reference and test sites (Table 1). Dissolved oxygen levels, ranging from 2.8 mg/L at the reference site to 3.2 mg/L at the test site, were below the Class III water quality standard of 5.0 mg/L (Rule 62-302. 530(31)FAC). The pH was 6.8 - 6.9 SU at both the reference and test sites. Temperature (25.2°C at the reference site and 25.0°C at the test site) and conductivity (302 µmhos/cm at the reference site and 298 µmhos/cm at the test site) were similar at both stations.

Three pesticides were found at both the reference and test sites in similar concentrations. These include atrazine (0.60 µg/L at the reference site; 0.57 µg/L at the test site), diazinon (0.28 µg/L at the reference site; 0.24 µg/L at the test site), and malathion (1.40 µg/L at the reference site; 1.20 µg/L at the test site) (Table 1). In contrast, malathion and diazinon were not detected in the Dale Mabry discharge, while atrazine was detected at a level below the minimum quantitation limit (0.054 µg/L) and well below acutely toxic levels. Due

Table 2. Major characteristics of community structure of control and test sites

Dale Mabry WWTP	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	26	29
Florida Index	18	10
SCI	23	27
EPT Index	1	3
% Dominant Taxon	52	56
Community Composition		
% Amphipoda	2	0.5
% Coleoptera	2	5
% Diptera	26	25
% Ephemeroptera	0.0	2
% Gastropoda	52	56
% Odonata	6	1
% Oligochaeta	3	2
% Pelecypoda	2	3
% Trichoptera	4	2
% Other	4	4
Functional Feeding Groups		
% Predators	21	12
% Surface Deposit Feeders	11	9
% Suspension Feeders	3	13
% Scrapers	55	59
% Shredders	5	3
Macroinvertebrate Hester-Dendy		
Number of Taxa	26	25
Florida Index	13	7
Shannon-Weaver Diversity	3.1	2.7
EPT Index	3	3
Community Composition		
% Coleoptera	1	2
% Diptera	40	13
% Ephemeroptera	0.1	2
% Gastropoda	57	80
% Trichoptera	0.4	0.3
% Other	1	2
Functional Feeding Groups		
% Predators	9	6
% Surface Deposit Feeders	6	5
% Suspension Feeders	26	7
% Scrapers	45	80
% Shredders	2	0.6
Phytoplankton Algae		
Number of Taxa	50	55
Shannon-Weaver Diversity	4.5	4.7
Chlorophyll a (µg/L)	5.5 A	1.0 U
Algal Density (#/mL)	4,170	3,002
% Blue-green	37	38
% Green	47	43
% Diatoms	6	8
Periphyton Algae		
Number of Taxa	26	23
Shannon-Weaver Diversity	3.0	3.9
Algal Density (#/cm2)	123,624	9,968
Chlorophyll a (mg/m2)	11.3	2.5
Diatom/Diatom + B-G Ratio	0.9	0.7
% Blue-green	12	46
% Green	10	13
% Diatoms	77	37
AGP (mg dry wt/l)	13.1	15.4

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

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

to the spraying of malathion for med-fly control, the malathion concentrations detected at both Brushy Creek sites exceeded Class III water quality standards (Rule 62-302. 530(51)(n)FAC) and approached acutely toxic concentrations.

At the time of sampling, the WWTP was not discharging to surface waters, but to the reuse system. Due to the high levels of chlorine in the reuse water, bioassay samples were not collected.

Copper, lead, and zinc were detected in the effluent at levels that complied with Class III water quality standards (Table 1). Aluminum and cadmium were detected in the effluent at concentrations which were less than the minimum quantitation limit, but greater than or equal to the minimum detection limit. For regulatory purposes, the aluminum and cadmium concentrations were set at the minimum detection limit, (99.0 µg/L and 0.1 µg/L, respectively). These values comply with Class III water quality standards.

Some increases in nutrient levels were associated with the Dale Mabry discharge (Table 1). For example, total phosphorus increased from 0.08 mg/L at the reference site to 0.20 mg/L at the test site (the effluent concentration was 0.24 mg/L). The ortho-phosphate concentrations followed an analogous pattern. Nitrate-nitrite increased from 0.10 mg/L at the reference site to 0.15 mg/L at the test site. The discharge had a nitrate-nitrite level of 0.49 mg/L. Ammonia and TKN concentrations were not elevated in the effluent or in the reference and test site samples.

Algal Growth Potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at the reference site (13.1 mg dry wt/L) and at the test site (15.4 mg dry wt/L) (Raschke and Schultz 1987). As with the bioassay samples, AGP samples were not taken due to the high levels of chlorine in the reuse water.

Some of the quantitative measures of macroinvertebrate community health derived from the Hester-Dendy sampler results suggested the test site community was similar to, but moderately more stressed than, the reference site population (Table 2). Figure 1 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 at the test site. Negative values mean the test site is better than the reference site.

In the Hester-Dendy samples, the Florida Index decreased from 13 points at the reference site to 7 points

at the test site. Filter-feeders, an indicator of good water quality, made up 26% of the reference-site community, but only 7% of the test-site community. Shannon-Weaver diversity decreased from 3.1 at the reference site to 2.7 at the test site (a 13% reduction). Taxa richness was similar at both sites, with 26 taxa found at the reference site and 25 taxa at the test site. Three EPT taxa were recovered from the test and reference sites alike. Since aerial spraying of malathion took place while the Hester-Dendy samplers were deployed, it is possible that the macroinvertebrate results may have been influenced by the presence of the pesticide. Based upon a grab sample, malathion levels were similar at both sites (Table 1), although localized concentrations during the incubation of the samplers may have varied.

The results of the dip net sampling suggested the test and reference site measures of community health were mostly similar, with the exception of the Florida Index, which was reduced at the test site (Table 2). Taxa richness (26 at the reference site; 29 at the test site), and the EPT Index (1 at the reference site; 3 at the test site) were relatively similar at both Brushy Creek stations. The % filter-feeders increased from 3% at the reference site to 13% at the test site. As shown in the Hester-Dendy samples, the dip net Florida Index value was higher at the reference site (18) than at the test site (10). The % contribution of the dominant taxon was similar at both sites (52% at the reference site; 56% at the test site). The reference site, with a Stream Condition Index (SCI) score of 23 points, was in the "good" category, while the test site was at the lower end of the "excellent" category, with 27 points (see SCI Worksheets in Appendix).

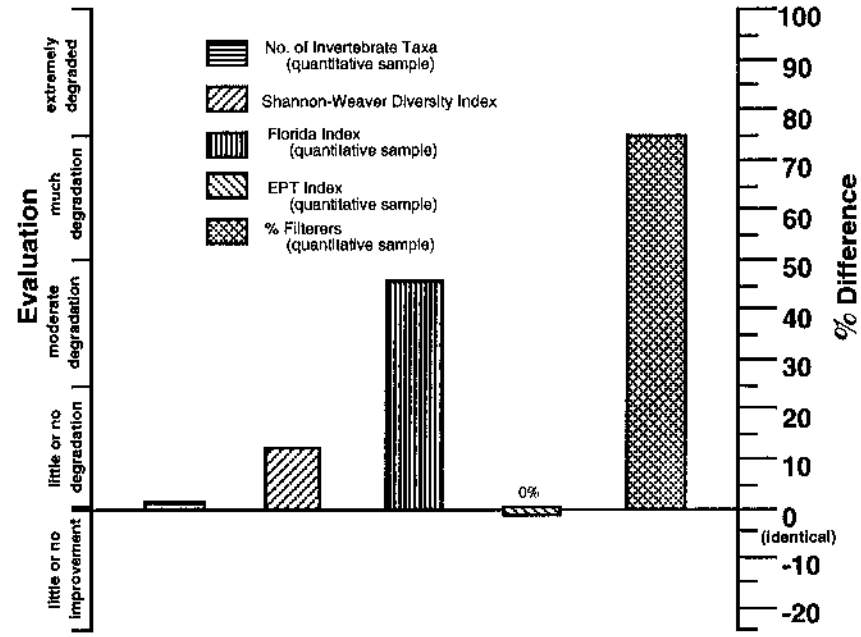

Figure 1. Effect of discharge on the benthic macroinvertebrate community.

Figure 2 represents changes in the periphyton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Most measures of community health indicated that the test site was similar to or healthier than the reference site. While taxa richness was similar at both sites (26 and 23 taxa at reference and test sites, respectively), diversity, algal density, and chlorophyll *a* were better at the test site (Table 2, Figure 2). The Shannon-Weaver diversity increased from 3.0 at the reference site to 3.9 at the test site. Periphyton density at the reference site (123,624 organisms/cm^2) was significantly higher than that found at the test site (9,968 organisms/cm^2) and chlorophyll *a* was also higher at the reference site (11.3 mg/m^2) than at the test site (2.5 mg/m^2). Although copper concentrations in the effluent were low (4.3 µg/L), its presence may have caused a reduction in algal density and chlorophyll *a* at the test site.

Phytoplankton algal communities were similar at the reference and test sites (Table 2). Taxa richness was good at both sites, with 50 taxa found at the reference site and 55 at the test site. Shannon-Weaver diversity was 4.5 at the reference site and 4.7 at the test site, indicating well-balanced algal communities. Phytoplankton density at the reference site (4,170 organisms/cm^2) was slightly higher than that found at the test site (3,002 organisms/cm^2). Chlorophyll *a* was also higher at the reference site (5.5 µg/m^2) than at the test site, where chlorophyll *a* was undetected.

Conclusions

Habitat quality was "optimal" at both of the sample sites in Brushy Creek. Physical/chemical measurements were comparable at the reference and test sites. Dis-

solved oxygen levels were below the Class III water quality standard of 5.0 mg/L (Rule 62-302. 530(31)FAC) at both sites. The low dissolved oxygen levels are likely due to the presence of an anoxic detritus layer as well as low stream velocity.

Atrazine, diazinon, and malathion were detected at both sample sites. Malathion (1.40 µg/L at the reference site; 1.20 µg/L at the test site) was detected at concentrations that exceed Class III water quality standards (Rule 62-302. 530(51)(n)FAC). The malathion was a result of aerial spraying for medfly control. Diazinon and atrazine were likely a result of other non-point sources. Diazinon and malathion were undetected in the effluent and atrazine was detected at a level below the minimum quantitation limit and significantly lower than acutely toxic levels. The elevated pesticide levels in Brushy Creek were not attributable to the Dale Mabry discharge.

Aluminum (99.0 µg/L), cadmium (0.1 µg/L), copper (4.3 µg/L), lead (0.7 µg/L), and zinc (53.0 µg/L) were detected in the effluent at levels which complied with Class III water quality standards.

At the time of sampling, the WWTP was discharging to the reuse system and not to the surface waters. Due to the high levels of chlorine in the reuse water, bioassay and AGP samples were not collected.

Slightly elevated levels of total phosphorus, ortho-phosphate, and nitrate-nitrite in the effluent were associated with increases in the concentrations of these nutrients at the test site in Brushy Creek. Ammonia and TKN concentrations were not elevated in the effluent or in the reference and test site samples. Nutrient levels observed at both study sites in Brushy Creek were fairly typical for a Florida stream.

Algal Growth Potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at the reference site (13.1 mg dry wt/L) and at the test site (15.4 mg dry wt/L) (Raschke and Schultz 1987).

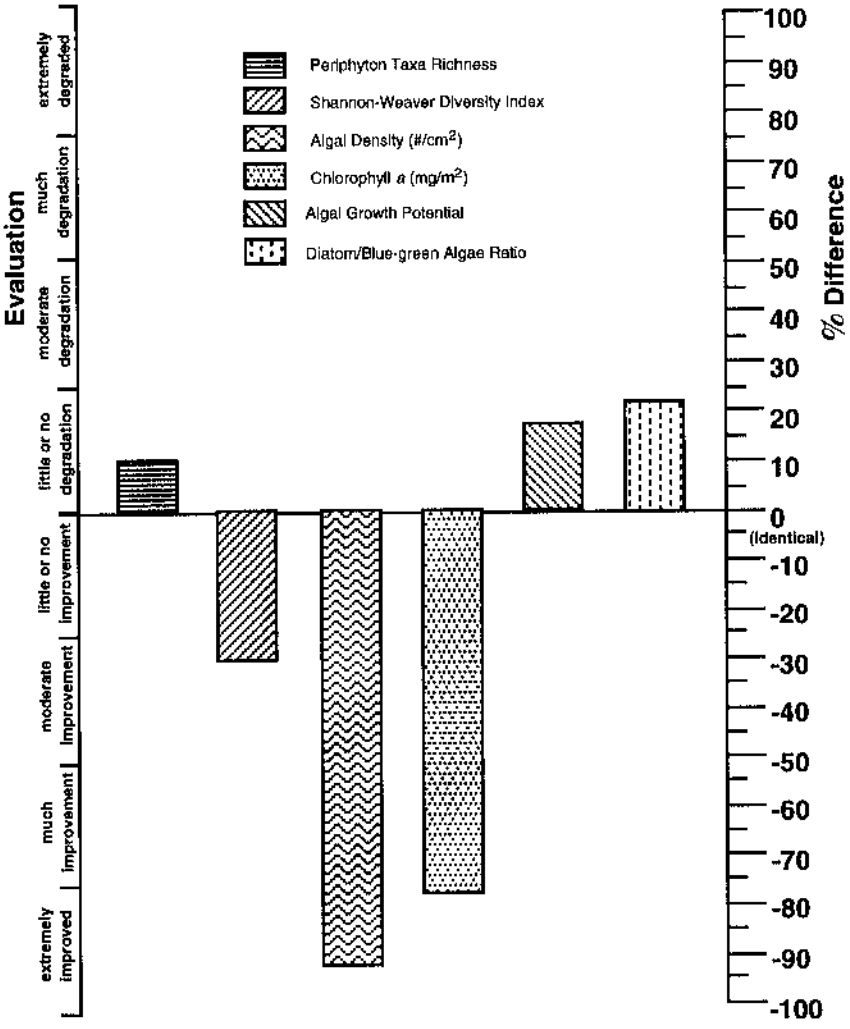

Figure 2. Effect of discharge on the periphyton community.

Some of the quantitative measures of macroinvertebrate community health derived from the Hester-Dendy sampler results suggested the test site was more disturbed than the reference site. For example, the Florida Index and the % filter-feeders were substantially lower at the test site, compared with the reference site. On the other hand, the Stream Condition Index, based on dip net sampling, placed the reference site in the "good" category while the test site was at the lower end of the "excellent" category. This study was confounded by the aerial application of malathion in the study area, which took place during the Hester-Dendy sampler incubation. This spraying may have had localized effects on macroinvertebrate communities in Brushy Creek, making it difficult to attribute negative effects to the Dale Mabry effluent.

Quantitative measures of periphyton community health did not indicate degradation at the test site. Decreases in algal density and chlorophyll *a* at the test site were most likely attributable to the slight increase in flow observed downstream of the discharge.

Phytoplankton algal communities were essentially the same at both the reference and test sites. All measures of community health, including taxa richness, diversity, and algal density were comparable and indicative of a healthy algal community. The algal communities at both sites were actually characteristic of a non-flowing system, which can be attributed to the low flow at both sites. However, the slight increase in water velocity at the test site coupled with the presence of copper in the effluent may account for the lower density and chlorophyll *a* observed there. Overall, the facility did not appear to be causing any degradation to the algal community in Brushy Creek.

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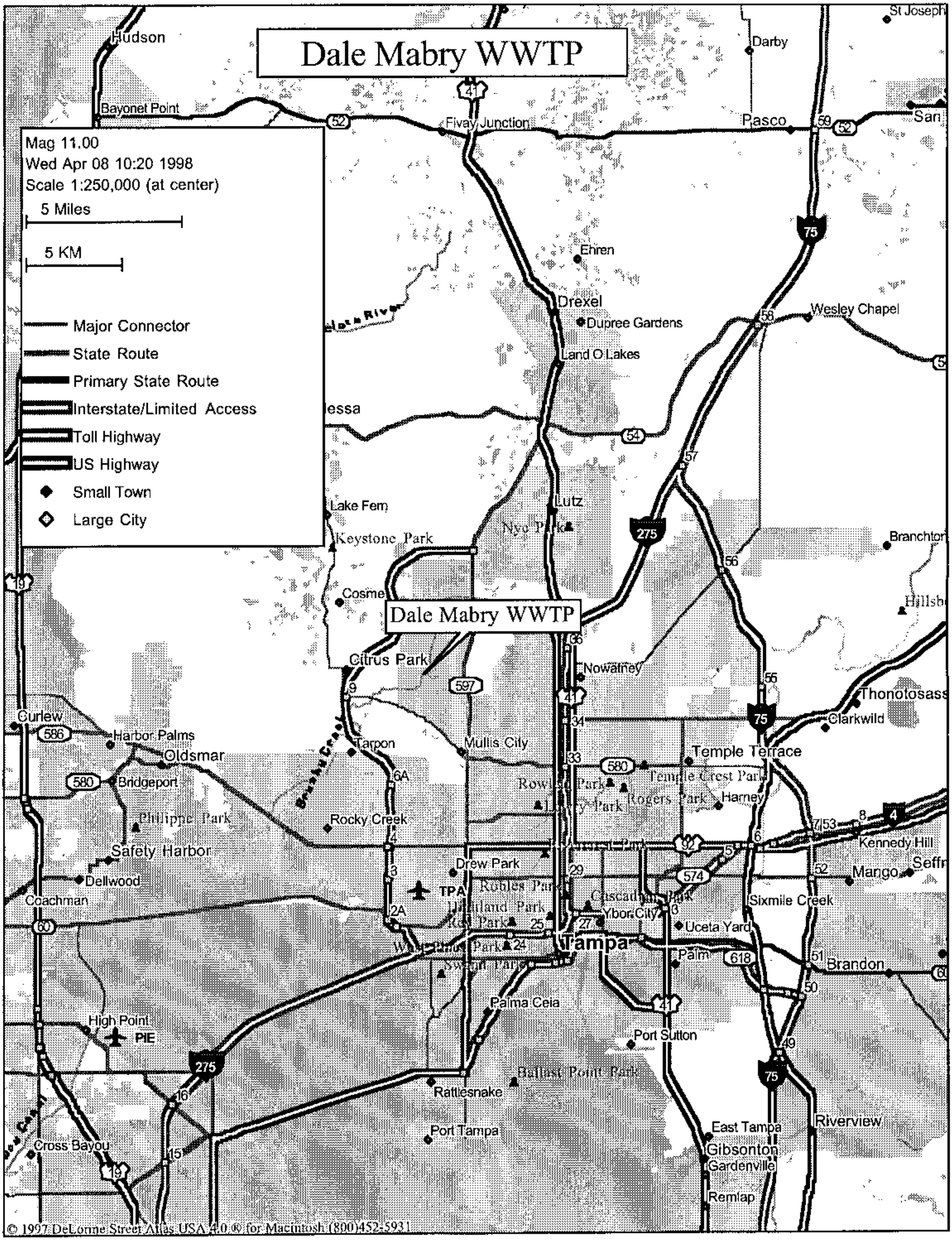
Dale Mabry WWTP
Mag 11.00
Wed Apr 08 10:20 1998
Scale 1:250,000 (at center)
5 Miles
5 KM
Major Connector
State Route
Primary State Route
Interstate/Limited Access
Toll Highway
US Highway
Small Town
Large City
Hudson
Bayonet Point
Fivay Junction
Darby
St Joseph
Pasco
San
Ehren
Drexel
Dupree Gardens
Wesley Chapel
Land O Lakes
Lutz
Lake Fern
Keystone Park
Nye Park
Branchton
Cosme
Dale Mabry WWTP
Citrus Park
Nowatney
Thonotosass
Clarkwild
Curlew
Harbor Palms
Oldsmar
Bridgeport
Tarpon
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Tampa
Palm
Palma Ceia
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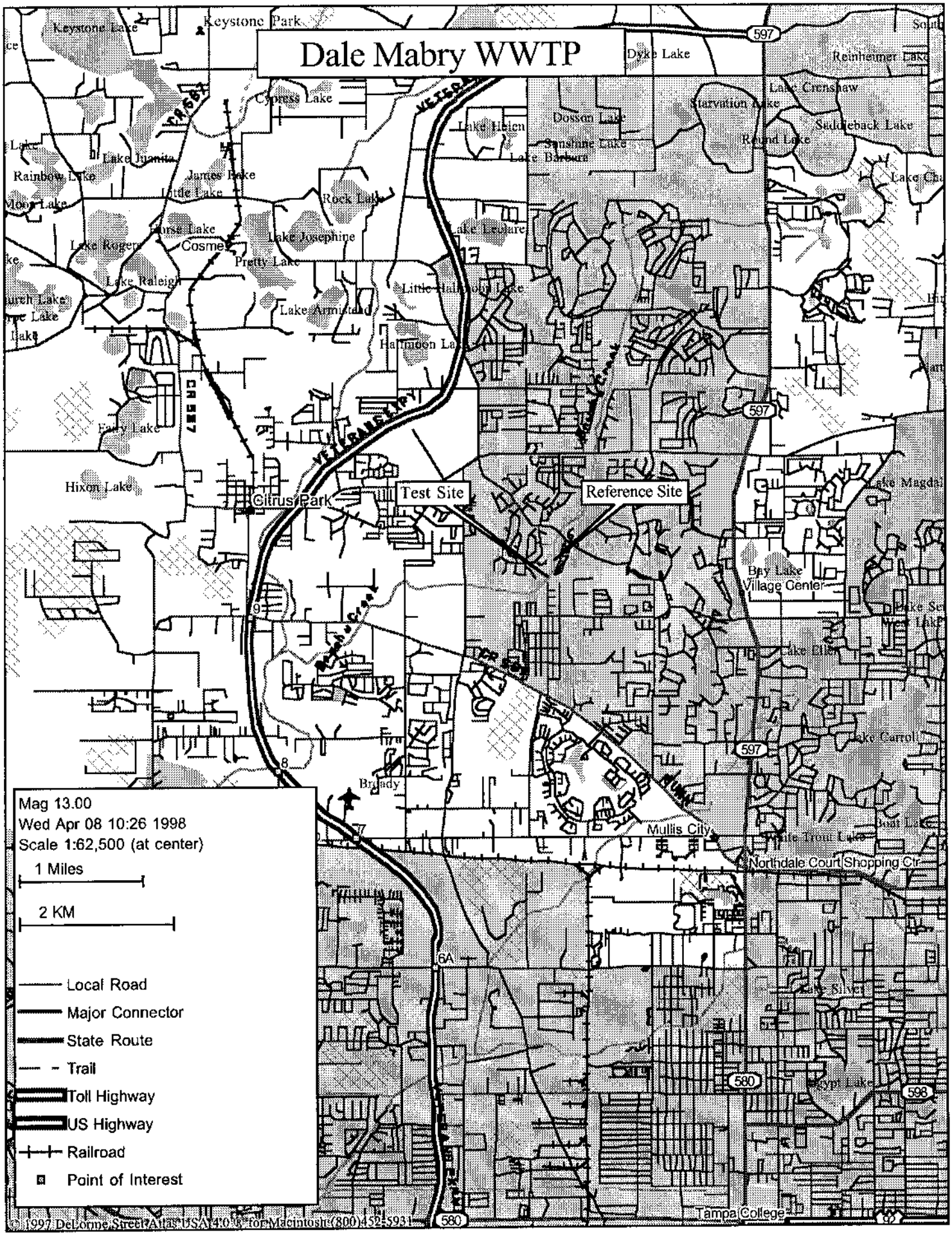
Dale Mabry WWTP
Test Site
Reference Site
Keystone Park
Keystone Lake
Cypress Lake
Lake Juanita
Rainbow Lake
James Lake
Little Lake
Rock Lake
Horse Lake
Lake Josephine
Cosme
Pretty Lake
Lake Raleigh
Lake Armistead
Hillsboro Lake
Early Lake
Hixon Lake
Citrus Park
Dyke Lake
Reinheimer Lake
Lake Crenshaw
Starvation Lake
Dosson Lake
Lake Helen
Sunshine Lake
Lake Barbara
Round Lake
Saddleback Lake
Lake Leelare
Bay Lake
Village Center
Lake Elbert
Lake Carroll
Brady
Mullis City
Little Trout Lake
Boat Lake
Northdale Court Shopping Ctr
Lake Silver
Egypt Lake
Tampa College
Mag 13.00
Wed Apr 08 10:26 1998
Scale 1:62,500 (at center)
1 Miles
2 KM
Local Road
Major Connector
State Route
Trail
Toll Highway
US Highway
Railroad
Point of Interest
597
580
598
92
6A
9
8
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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Dale Mabry WWTP		Date Summary Prepared: 7/3/97
Location (attach detailed map):	County: Hillsborough	District: SW District
Federal Permit # FL0036820 and expiration date:	State GMS # and 4029C00192 State expiration date:	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Domestic wastewater treatment and disposal plant.

Description of treatment process:

Treatment consists of screening and degritting, followed by an oxidation ditch activated sludge process, clarification, and filtration. The effluent is chlorinated and all flow to the creek is dechlorinated and reaerated prior to discharge.

Receiving waters: Brushy Creek	Classification: I II (III)	
Design Flow: 6.0 MGD	Mean Flow: 2.8 MGD 3 month ADF	Flow during survey: 5.0 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.):

No

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

... The effluent shall be ... in accordance with Chapter ... F.A.C. and shall meet the following limitations:

Parameter	Unit	Minimum	Maximum	Sample Type	Frequency
Permitted Capacity (flow)	mgd	-	6 mgd Ann.Avg.	*****rfmt	Continuous
pH	std un	6.00	8.50	*****meter	Continuous
CBOD,*	mg/l	-	5 Annual Avg.	**fpc	Daily/5 wk
Total Suspended Solids*	mg/l	-	5 Annual Avg.	**fpc	Daily/5 wk
Total Nitrogen	mg/l		3 Annual Avg.	**fpc	Daily/5 wk
Total Phosphorous	mg/l		1 Annual Avg.		
Cl_2	mg/l	0.01		grab	Hourly
Fecal coliform	#/100 ml	***Non-detectable		grab	Daily/5 wk
DO	mg/l	5.00		*****meter	Continuous

* Influent shall be monitored and reported monthly (Rule 17-601.300(1), F.A.C.)

** fpc - flow proportional composite - 24 hours

*** Non-detectable in at least seventy-five percent (75%) of samples collected during the monthly operating period (e.g. 23 per 30 samples).

**** rfm&t - Recording flowmeter and totalizer

***** Hourly measurements for 24 hours may be substituted for continuous measurement.

Describe special permit conditions and permit modifications:

Dale Mabry
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): Outfall is located approximately 3/4 mile east of the WWTP. It discharges along side a culverted crossing over Brushy Creek within the TECO ROW.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
The plant consistently meets AWT standards for the discharge to Brushy Creek.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Due to potential impacts on wetlands, the County moved the outfall location and was required to meet a minimum number of no discharge days for dry weather months. This was done under a Consent Order. The long-term assessment of the new location did not reveal significant impacts on the receiving water quality.

The DEP Consent Order for Hillsborough County's Dale Mabry WWTP requires the County to monitor a wetland in Brushy Creek downstream of Dale Mabry WWTP's outfall for a period of three years. This study was required by the Department to determine if the effluent was impacting Brushy Creek and its associated wetlands downstream of Dale Mabry WWTP's outfall. For more information on the Department's concerns, please refer to Pat Fricano's memo dated 18 September 1991 (SWFTA #1004).

Unfortunately the study did not include a control wetland, therefore, Technical Services cannot determine if effluent discharged from Dale Mabry WWTP was impacting the monitored Brushy Creek wetland. However the volume of effluent discharge from the WWTP decreased steadily during the three year study (see Chart 1). This overall decrease in effluent volume into Brushy Creek may have been beneficial hydrologically to Brushy Creek and its associated wetlands downstream of the WWTP's outfall during the dry season.

Staff contributing to this review (signature):

Andrea Gray	(Biologist)
J Gratian	(Inspector)
	(Engineer)
	( )
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	24040087	9/19/97	1100	Brushy Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Sunny, warm, few clouds.	Hills	Dale Mabry WWTP	~~Downstream~~ Upstream AG

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
40				60			

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

Local Watershed NPS Pollution (check box): No evidence [ ] Slight [X] Moderate potential [ ] Obvious sources [ ]

Width of riparian vegetation (m) on least buffered side: 20

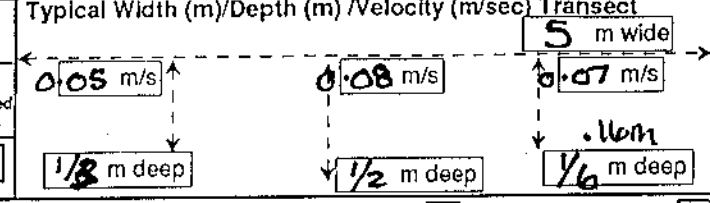
List & map dominant vegetation on back

Artificially Channelized [X] no [ ] recent, severe [ ] some recovery [ ] mostly recovered

Artificially Impounded [ ] yes more sinuous

High Water Mark: 1/2 (m above present water level) + 1/3 (present depth in m) = 5/6 (m above bed)

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



Canopy Cover % : Open : [ ] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [X] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [ ] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [X] Other: [ ]

Sediment Oils: Absent: [ ] Slight: [X] 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)	10	4		Sand			
Leaf Packs or Mats	10	4		Mud/Muck/Silt			
Aquatic Vegetation	20	6		Other: detritus layer	40	2	
Rock or Shell Rubble				Other:			
Undercut banks/Roots	10	4		*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):	Battery		Secchi (m):
Top	1/6	25.17	6.78	2.75	302	12.6		VOB
Mid-depth								
Bottom								

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

Water Odors (check box): Normal: [X] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [X] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [ ] Slightly turbid: [X] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [X] Green (algae): [ ] Clear: [ ] Other: [ ]

~~Weather Conditions~~/Notes: There was a thicky soupy layer of detritus approximately 6 inches deep. It was made up predominantly of rotting leaves.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger / Person	Chandra Grainger	9/26/97

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (4-22-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	24040087	9/19/97	Brushy Creek.

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Thick detritus layer on bottom of creek.	Hills	Dale Mabry WWTP	Upstream

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Substrate Types & Availability **16**	Greater than 30% snags, logs, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock, or other stable habitat. 20 19 18 17 **(16)**	16% to 30% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 15% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Water Velocity **8**	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 **(8)** 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Artificial Channelization **20**	No artificial channelization or dredging. Stream with normal, sinuous pattern **(20)** 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Habitat Smothering **18**	Less than 20% of habitats affected by sand or silt accumulation 20 19 **(18)** 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **20**	Stable. No evidence of erosion or bank failure. Little potential for future problems. **(20)** 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **20**	Width of native vegetation (least buffered side) greater than 18 m **(20)** 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality **20**	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. **(20)** 19 18 17 16	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

5 — Add **5 points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

122 **TOTAL SCORE**

Comments
Site was extremely hard to access — forested is thick + dense

ANALYSIS DATE:	ANALYST:	SIGNATURE:
9/26/97	Granger	Andrea Granger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-90)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	24040086	9/1997	1000	Brushy Creek.

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Sunny, warm, few clouds.	Hillsboro	Dale Mabry WWTP	Downstream Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
40				60			

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

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☒ Moderate potential ☐ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: ~20 — *List & map dominant vegetation on back*

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

Artificially Impounded ☐ yes

High Water Mark: 1/2 (m above present water level) + 1/3 (present depth in m) = 5/6 (m above bed)

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

4 m wide

0.04 m/s — 1/4 m deep | 0.13 m/s — 1/2 m deep | 0.06 m/s — 1/4 m deep

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: a side

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	10	4	net	Sand / some silt	30	2	net
Leaf Packs or Mats	10	4	net	Mud/Muck/Silt			
Aquatic Vegetation	40	6	net	Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	10	4	net	*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):	Battery		Secchi (m):
Top								
Mid-depth	1/6 1/4	25.02	6.85	3.24	298	12.6		VOB
Bottom								

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) 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): tanic Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes:

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger, Person	Candace Grainger	9/26/97

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (4-22-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	24040086	9/19/97	Brushy Creek

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Hills	Dale Mabry WWTP	upstream downstream

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Substrate Types & Availability 18	Greater than 30% snags, logs, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock, or other stable habitat. 20 19 (18) 17 16	16% to 30% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 15% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, aquatic vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Water Velocity 11	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 (11)	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Artificial Channelization 20	No artificial channelization or dredging. Stream with normal, sinuous pattern (20) 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Habitat Smothering 16	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 (16)	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability 20	Stable. No evidence of erosion or bank failure. Little potential for future problems. (20) 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width 20	Width of native vegetation (least buffered side) greater than 18 m (20) 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality 20	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. (20) 19 18 17 16	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

[ ] Add **5 points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

125 TOTAL SCORE

Comments: Site was very hard to access — dense forested wetland.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
9/26/97	Grant	Chelsea Granger

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 Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphate	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphate	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

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

Benthic macroinvertebrate taxa list for Dale Mabry WWTP, collected via 20 discrete dip net sweeps in Brushy Creek, on 19 September, 1997.

	Reference Site	Test Site
Acarina		
Hygrobates sp.	-	1
Limnesia sp.	-	3
Amphipoda		
Hyalella azteca	2	1
Coleoptera		
Dubiraphia vittata	-	2
Microcylloepus pusillus	-	2
Stenelmis sp.	1	2
Undetermined Dryopidae	1	1
Undetermined Elmidae	-	2
Decapoda		
Palaemonetes sp.	1	-
Diptera		
Ablabesmyia rhamphe grp.	4	6
Clinotanypus sp.	3	1
Corynoneura sp.	2	-
Corynoneura taris	2	-
Labrundinia pilosella	1	-
Labrundinia sp.	2	2
Palpomyia/Bezzia grp.	-	5
Pentaneura inconspicua	5	6
Polypedilum illinoense grp.	2	1
Polypedilum sp.	-	1
Rheotanytarsus distincissimus grp.	-	1
Rheotanytarsus exiguus grp.	1	2
Rheotanytarsus sp.	-	16
Tanytarsus sp. L Epler	1	-
Thienemanniella sp. A Epler	3	2
Thienemannimyia grp.	-	1
Undetermined Chironomidae	-	1
Undetermined Diptera	1	-
Undetermined Tipulidae	-	2
Ephemeroptera		
Caenis sp.	-	4
Gastropoda		
Undetermined Hydrobiidae	-	72
Oligochaeta		
Limnodrilus hoffmeisteri	-	1
Littoridinops monroensis	55	-
Pyrogophorus platyrachis	-	34

Lepidoptera		
Parapoynx sp.	1	-
Petrophila sp.	2	-
Undetermined Pyralidae	-	3
Odonata		
Argia sedula	3	-
Enallagma sp.	1	-
Macromia taeniolata	1	-
Undetermined Corduliidae	1	-
Undetermined Odonata	-	1
Zygoptera	-	1
Oligochaeta		
Dero trifida	1	1
Eclipidrilus sp.	1	-
Helobdella triserialis	1	2
Pelecypoda		
Corbicula fluminea	1	-
Undetermined Pisidiidae	1	6
Trichoptera		
Oecetis sp.	4	1
Undetermined Hydroptilidae	-	2
Undetermined Trichoptera	-	1

Benthic macroinvertebrate taxa list for Dale Mabry WWTP, collected via Hester-Dendy artificial substrates in Brushy Creek, on 21 July, 1997. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site
Acarina		
Hygrobates sp.	8	-
Trombidiformes	-	3
Amphipoda		
Hyalella azteca	3	8
Coleoptera		
Elmidae	13	-
Microcylloepus pusillus	13	-
Stenelmis sp.	-	21
Diptera		
Ablabesmyia rhamphe grp.	5	-
Asheum beckae	5	-
Chironomidae	90	5
Dicrotendipes sp.	5	-
Dicrotendipes modestus	13	11
Hemerodromia sp.	13	3
Palpomyia/bezzia grp.	-	11
Parachironomus sp.	-	3
Parachironomus carinatus	3	3
Paratanytarsus sp. A Epler	5	-
Pentaneura inconspicua	61	34
Polypedilum illinoense grp.	50	3
Polypedilum scalaenum grp.	5	-
Rheotanytarsus sp.	220	-
Rheotanytarsus distinctissimus grp.	143	32
Rheotanytarsus exiguus grp.	138	19
Tanytarsus sp. E Epler	5	-
Thienemanniella sp.	21	-
Thienemanniella xena	16	-
Ephemeroptera		
Caenis sp.	3	16
Stenacron sp.	-	3
Gastropoda		
Amnicola dalli johnsoni	243	21
Ancylidae	140	90
Ferrissia sp.	8	5
Undetermined Gastropoda	13	5
Hebetancylus excentricus	-	37
Hydrobiidae	497	13
Laevapex sp.	-	3
Micromenetus sp.	-	34
Micromenetus dilatatus	11	42

Physella sp.	-	3
Planorbella sp.	21	3
Planorbidae	11	-
Pyrogophorus sp.	172	-
Pyrogophorus platyrachis	11	474
Hirudinea		
Gloiobdella elongata	-	3
Helobdella fusca	-	3
Megaloptera		
Corydalus sp.	3	-
Corydalus cornutus	3	-
Pelecypoda		
Corbicula fluminea	-	5
Pisidiidae	3	-
Trichoptera		
Cheumatopsyche sp.	3	-
Oxyethira sp.	3	3
Undetermined Trichoptera	3	-

Periphyton taxa list and densities (#/cm^2) for Dale Mabry WWTP, collected via glass microscope slides in Brushy Creek, on 21 July, 1997.

	Reference Site	Test Site
Bacillariophyceae		
Achnanthes exigua	636	-
Achnanthes hustedtii	636	158
Achnanthes lanceolata	24471	633
Bacillaria paradoxa	318	-
Cocconeis fluviatilis	45763	475
Cocconeis placentula	13348	475
Cyclotella sp.	1271	-
Eunotia pectinalis	-	158
Eunotia sp.	5720	475
Gomphonema angustatum	-	158
Gomphonema parvulum	636	158
Gomphonema sp.	318	-
Navicula cincta	-	158
Navicula cryptocephala	-	158
Navicula minima	636	-
Navicula pupula	318	-
Navicula sp.	636	-
Nitzschia amphibia	-	158
Nitzschia fonticola	318	158
Nitzschia romana	-	158
Nitzschia sp.	318	-
Synedra ulna	-	158
Chlorophyceae		
Chlorococcum sp.	318	-
Golenkinia sp.	318	-
Mougeotia sp.	2225	-
Scenedesmus sp.	8581	791
Schroederia sp.	-	316
Stigeoclonium sp.	636	-
Tetraedron sp.	318	158
Cryptophyceae		
Chroomonas sp.	-	475
Compsopogon sp.	636	-
Cyanophyceae		
Anabaena sp.	-	158
Aphanizomenon sp.	318	-
Aphanocapsa sp.	636	-
Dactylococcopsis sp.	953	949
Gloeothece sp.	-	158
Lyngbya sp.	9534	2373

Lyngbya contorta	1271	158
Merismopedia sp.	1907	158
Oscillatoria sp.	318	633
Euglenophyceae		
Lepocinclis sp.	318	-

Phytoplankton taxa list and densities (#/mL) for Dale Mabry WWTP, collected via subsurface grabs in Brushy Creek, on 21 July, 1997.

	Reference Site	Test Site
Bacillariophyceae		
Cyclotella sp.	23	61
Gomphonema sp.	8	4
Melosira sp.	15	30
Navicula sp.	8	-
Nitzschia sp.	168	125
Rhizosolenia sp.	31	17
Chlorophyceae		
Ankistrodesmus sp.	46	22
Arthrodesmus sp.	23	4
Carteria sp.	-	9
Chlamydomonas sp.	222	203
Chlorogonium sp.	15	-
Undetermined Chlorophyceae	122	108
Chodatella sp.	-	22
Closterium sp.	15	4
Coelastrum sp.	46	30
Cosmarium sp.	38	26
Crucigenia sp.	53	48
Cylindrocapsa sp.	53	-
Dictyosphaerium sp.	15	4
Elakatothrix sp.	-	9
Euastrum sp.	8	4
Franceia sp.	8	9
Golenkinia sp.	61	9
Kirchneriella sp.	15	-
Mougeotia sp.	38	9
Oocystis sp.	115	65
Pediastrum sp.	8	9
Phacotus sp.	23	13
Scenedesmus sp.	764	433
Schroederia sp.	23	26
Selenastrum sp.	31	26
Spermatozoopsis sp.	8	4
Staurastrum sp.	8	4
Tetradesmus sp.	23	-
Tetraedron sp.	145	164
Tetrastrum sp.	-	13
Treubaria sp.	23	4

Chrysophyceae		
Dinobryon sp.	-	4
Mallomonas sp.	-	13
Cryptophyceae		
Chroomonas sp.	107	99
Cryptomonas sp.	214	130
Cyanophycea		
Anabaena sp.	76	39
Aphanizomenon sp.	15	4
Aphanocapsa sp.	313	177
Chroococcus sp.	69	65
Cylindrospermopsis sp.	-	30
Dactylococcopsis sp.	290	238
Gloeocapsa sp.	-	17
Lyngbya contorta	53	17
Lyngbya sp.	145	95
Marssoniella sp.	8	13
Merismopedia sp.	351	195
Microcystis sp.	160	156
Oscillatoria sp.	46	78
Romeria sp.	8	4
Spirulina sp.	-	4
Dinophyceae		
Ceratium sp.	-	17
Peridinium sp.	38	9
Euglenophyceae		
Euglena sp.	15	26
Lepocinclis sp.	15	13
Phacus sp.	8	9
Trachelomonas sp.	38	30

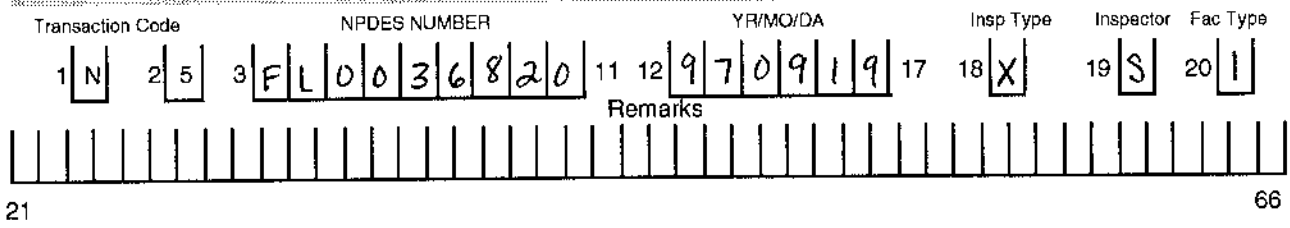
Dale Mabry Reference Site

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	26	≥ 31	30-16	<16		≥ 26	25-14	<14	5	≥ 22	21-12	<12	
EPT Index	1	≥ 7	6-4	<4		≥ 4	3-2	<2	1	-	≥2	<2	
# Chironomid Taxa	9	≥9	8-5	<5		≥7	6-4	<4	5	≥7	6-4	<4	
% Contribution of Dominant Taxon	52.4	≤22	23-61	>61		≤29	30-64	>64	3	≤31	32-66	>66	
% Diptera	25.7	-	≤50	>50		-	≤37	>37	3	-	≤47	> 47	
Florida Index	18	≥ 16	15-8	<8		≥7	6-4	<4	5	≥ 8	7-4	<5	
% Suspension feeders/Filterers	3.3	≥ 12	11-6	<6		-	≥7	<7	1	-	≥7	<7	
Total Score		Panhandle				Peninsula			(23)	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

Dale Mabry 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	29	≥ 31	30-16	<16		≥ 26	25-14	<14	5	≥ 22	21-12	<12	
EPT Index	3	≥ 7	6-4	<4		≥ 4	3-2	<2	3	-	≥2	<2	
# Chironomid Taxa	9	≥9	8-5	<5		≥7	6-4	<4	5	≥7	6-4	<4	
% Contribution of Dominant Taxon	55.8	≤22	23-61	>61		≤29	30-64	>64	3	≤31	32-66	>66	
% Diptera	24.7	-	≤50	>50		-	≤37	>37	3	-	≤47	> 47	
Florida Index	10	≥ 16	15-8	<8		≥7	6-4	<4	5	≥ 8	7-4	<5	
% Suspension feeders/Filterers	13.2	≥ 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

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



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