Florida
Department of Environmental Protection

Biological Assessment of

Ft. Myers South Wastewater Treatment Plant

Lee County

NPDES #FL0021270

Sampled February 1993

September 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Ft. Myers South Wastewater Treatment Plant
County: Lee
NPDES Number: FL0021270
State Permit Expiration Date: 8 December 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 23 February 1993

Results: No organic priority pollutants were detected in the effluent at this time. Samples for analysis of metals were not collected.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 23 February 1993

Results: The sample of final effluent was not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassays.

Impact Bioassessment Inspection (IBI)

Date Sampled: 23 February 1993

Results: Measures of benthic macroinvertebrate community health indicated little or no differences between the reference and test sites. All three areas were strongly dominated by epi-benthic crustaceans, particularly the amphipods, *Ampelisca* sp. and *Grandidierella bonnieroides*. Compared to other estuaries in the state, taxa richness was slightly above average (greater than 60% of typical systems). Shannon-Weaver diversity was virtually identical at all sites. Most measures of phytoplankton community health, except for the percent contribution of dominant taxon, indicated minimal effects from the discharge. While all three sites were dominated by the ubiquitous diatom, *Skeletonema costatum*, the test sites had a greater proportion of this diatom than did the reference site. Quantitative stability indices demonstrated a high degree of similarity of the test sites, compared to the reference. Chlorophyll *a* was elevated at all study areas, greater than 92% (reference site) and 95% (test sites) of representative estuaries in Florida, indicating the eutrophic condition of this estuary. Phytoplankton and nutrients may be imported from upstream, where the river drains Lake Okeechobee and predominantly agricultural lands.

Water Quality Inspection (WQI)

Date Sampled: 23 February 1993

Results: Algal growth potential was below the "problem threshold" at all study sites. While nutrient compounds were relatively low in the effluent, total phosphorus and TKN were somewhat elevated in the Caloosahatchee River, but to a lesser degree at the two test sites. It is possible that these nutrients are being transported from the upper reaches of the river, which drain Lake Okeechobee and the surrounding agricultural lands.

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 Ft. Myers South Wastewater Treatment Plant, is located at 1618 South Drive in Ft. Myers, Lee County (see maps in Appendix). The facility has a design capacity of 12 MGD and a mean flow of 6 MGD. Treatment of domestic waste is achieved by the Bardenpho biological system, an advanced modification of the activated sludge process. Following this treatment, effluent is clarified, chlorinated for disinfection, and subsequently dechlorinated with sulfur dioxide. Final effluent is discharged to the Caloosahatchee River through a submerged outfall pipe (see facility summary in Appendix).

Permit limits are as follows: TSS and BOD_5 (20 mg/L annual average), total chlorine residual (0.5 mg/L minimum for disinfection, 0.01 mg/L maximum at discharge), fecal coliform (800 organisms/100 mL, in a single grab sample), total nitrogen (3.0 mg/L at 12 MGD, ≤ 300 lbs/day), and total phosphorus (0.5 mg/L at 12 MGD, ≤ 50 lbs/day).

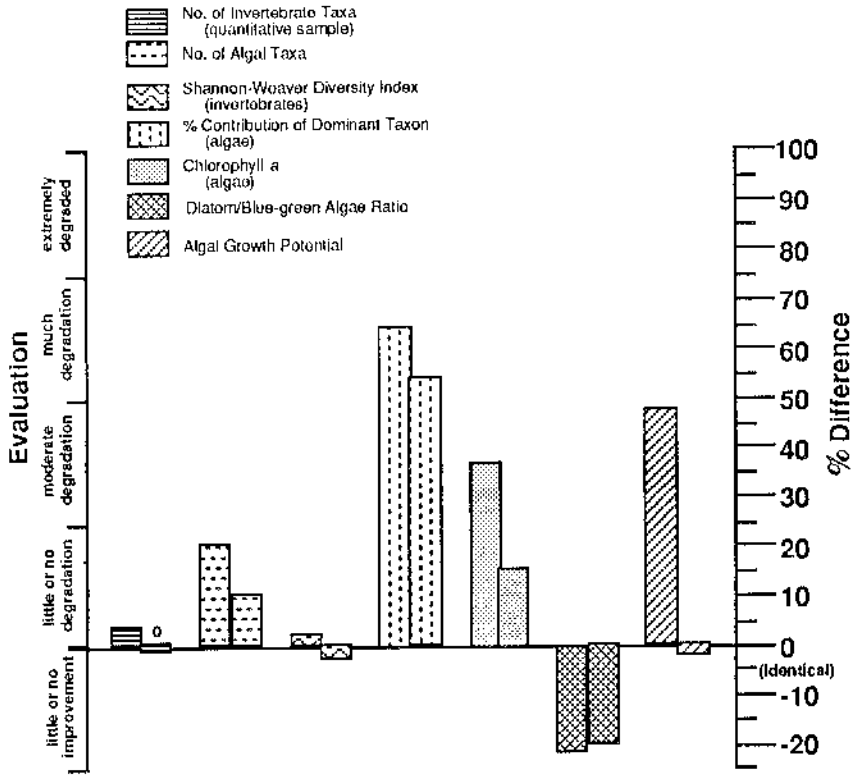
On two occasions in 1987, acute toxicity bioassays were performed by the FDER Biology Section on the Fort Myers South WWTP. In the January test, dechlorinated effluent was toxic to *Ceriodaphnia dubia, Daphnia pulex,* and *Notropis leedsi* (FDER 1987a). The June tests resulted in toxicity only to *C. dubia* (FDER 1987b). Various components were detected in the discharge on both sample dates, including the pesticide lindane, other unidentified organic compounds, and the metals zinc, arsenic (January), and silver (June). During the past year (1992), the only permit violations on record occurred in January and December, and involved odor complaints due to equipment malfunction. A consent order was executed in March, 1993, to address equipment problems, residuals management, and the failure to report abnormal events.

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 (in an area of the Caloosahatchee River located outside the influence of the facility) and two test sites bracketing 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 effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for organic constituents (base neutral and acid extractables, and pesticide extractables). Addi-

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	25	26	25
Shannon-Weaver Diversity	2.23	2.18	2.29
% Amphipoda	71.2	74.1	77.4
% Pelecypoda	17.1	10.7	10.8
% Isopoda	4.5	5.5	4.2
% Polychaeta	3.0	6.8	3.1
% Other	4.2	2.9	4.5
% Above Surface Deposit Feeders	75.6	82.4	81.9
% Suspension Feeders	19.7	10.8	12.9
% Predator/Carnivores	1.0	2.2	1.5
% Scavengers	1.5	1.9	1.4
% Shredders	1.5	2.0	1.4
% Other	0.7	0.7	0.9
Phytoplankton Algae			
Number of Taxa	29	23	26
% Contribution of Dominant Taxon	34.2	56.3	52.7
Chlorophyll a (µg/L)	19.2	26.3	22.3
Diatom/Blue-green Abundance Ratio	0.76	0.92	0.91
% Diatoms	69.0	88.7	85.2
% Blue-green	22.3	8.0	8.7
% Green	8.1	2.7	4.9
% Dinoflagellates	0.6	0.7	1.1
Algal Growth Potential (mg dry wt/l)	4.6	6.8	4.5



Effect of discharge on receiving water
(measured as difference between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

tionally, 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. Collection methods consisted of three Ponar dredges per station. Phytoplankton was collected via subsurface grabs (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* for the freshwater effluent and *Dunaliella tertiolecta* as the test organism for the estuarine receiving water stations, followed Miller *et al.* (1978) and EPA (1974).

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. Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (for % composition) of 100% means that the two sites being compared are identical. 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 diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Ford Walton (DER South District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Roberto Llansó, Kathleen Lurding, Elizabeth Miller, Kim Pearce, Urania Quintana, Landon Ross, 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.

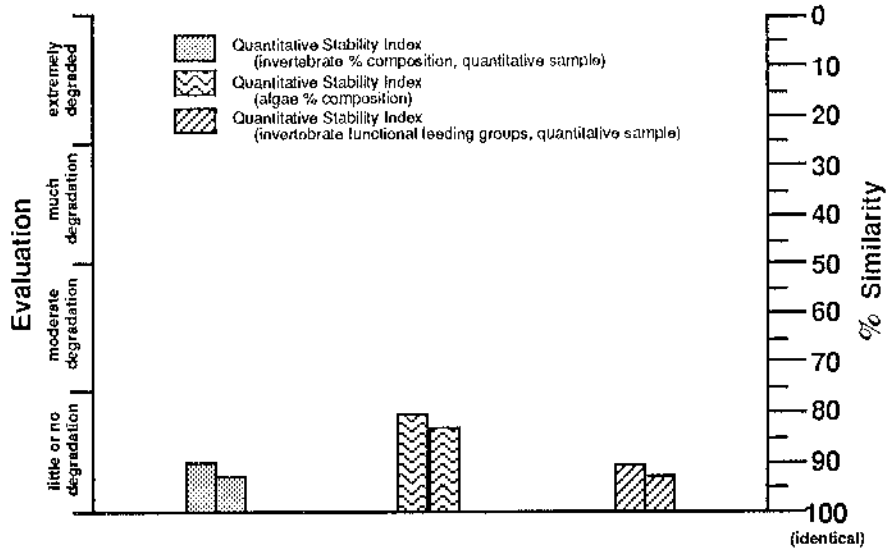
Results and Discussion

Scores for habitat quality were equally low at all three study sites, with 40 points apiece. The study area was located in part of the Caloosahatchee River where land use is entirely residential. Shorelines consisted almost completely of riprap and vertical seawalls, with no natural plant communities, oyster beds, or beach areas. Stormwater discharge potential from surrounding impervious surfaces was rated high. The bottom sediments at all stations were characterized as a mixture of sand and mud. Water from all sites was well oxygenated (ranging from 8.6 mg/L to 9.7 mg/L) and alkaline (8.2 to 8.4 SU's). Specific conductance was somewhat lower at the reference site (3660 µmhos/cm), compared to 5860 and 5560 µmhos/cm at test sites 1 and 2, respectively (Appendix).

No organic pollutants were detected in the effluent sample. Samples for metals analysis were not collected.

The effluent sample was not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassays (Appendix).

Nutrients were low in the effluent, with a total phosphorus of 0.08 mg/L, an ammonia concentration of 0.061 mg/L, and a TKN of 0.84 mg/L. Ortho-phosphate and nitrate-nitrite were below the practical quantitation limit in the effluent and at all three study sites. Total phosphorus and TKN were somewhat elevated at the reference site, 0.16 mg/L and 1.7 mg/L, respectively. Concentrations of these nutrient compounds were slightly lower at the test sites (see chemistry summary table). It is possible that these nutrients are being transported from the upper reaches of the Caloosahatchee, which drain Lake Okeechobee and the surrounding agricultural lands.



Effect of discharge on receiving water
(measured as similarity between control and test sites).
(Left bar represents comparison between control site and test site 1; right bar represents comparison between control site and test site 2.)

Algal growth potential of the freshwater effluent was 9.8 mg dry wt/L. Although AGP samples were held beyond the normal holding time, general trends or differences between stations would still be apparent. For marine or estuarine samples using *Dunaliella tertiolecta* as the test alga, a "problem threshold" of 10 mg dry wt/L is used to predict the likelihood of detrimental enrichment effects, such as excessive macrophyte or algal growth, D. O. sags, and fish kills (Dr. Ron Raschke, U.S. EPA, personal communication). All three study sites yielded AGP values below this limit, at 4.6 mg dry wt/L (reference site), 6.8 mg dry wt/L (test site 1), and 4.5 mg dry wt/L (test site 2).

Measures of benthic macroinvertebrate community health indicated little or no differences between the reference and test sites. The figure on p. 2 indicates the degree of difference between the control 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 control. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation, unless the test sites are better than the reference site. The average abundance of each individual taxon appears in the Appendix.

All three areas were strongly dominated by epi-benthic crusta-

ceans, particularly the amphipods, *Ampelisca* sp. and *Grandidierella bonneroides*. Compared to other estuaries in the state, taxa richness was slightly above average (greater than 60% of typical systems). Shannon-Weaver diversities remained virtually unchanged from the reference site (2.2) to the test sites (2.2 and 2.3). However, these diversities were slightly lower than an average estuary, probably due to the abundant amphipod populations and the oligohaline nature of the waters. Taxa considered sensitive to contaminant stress, such as *Bowmaniella* sp., *Mysidopsis* sp., and *Odostomia impressa*, were found in the vicinity of the outfall, suggesting no negative effects from the discharge. Quantitative stability indices further demonstrate the strong similarity between the reference and test sites, both in terms of percent composition and functional feeding groups.

Phytoplankton, with both freshwater and marine organisms present, were abundant (see taxa list in the Appendix). Most measures of community health indicated minimal affects from the discharge. However, the percent contribution of dominant taxon was higher at the two test sites, due to the high relative populations of the ubiquitous diatom, *Skeletonema costatum*. In addition to being dominated by *S. costatum*, the reference site algal assemblage consisted of a greater proportion of blue-greens and chlorophytes. Despite these differences in community composition, the quantitative stability index for % composition demonstrated a high degree of similarity. Chlorophyll *a* was elevated at all study areas, 19.2 µg/L at the reference site, 26.3 µg/L at test site 1, and 22.3 µg/L at test site 2. These values are greater than 92% (reference site) and 95% (test sites) of representative estuaries in Florida, indicating eutrophic conditions (see table of typical values in Appendix). Phytoplankton and nutrients may be imported from upstream, where the Caloosahatchee River drains Lake Okeechobee and predominantly agricultural lands.

Conclusions

The sample was not acutely toxic to either the water flea, *Ceriodaphnia dubia*, or the bannerfin shiner, *Notropis leedsi*. No mortality occurred during the 48 hour bioassays. No organic pollutants were detected in the effluent at this time. Samples for metals analysis were not collected.

Ortho-phosphate and nitrate-nitrite were below the practical quantitation limit in the effluent and at all three study sites. Other nutrient compounds were relatively low in the effluent. Total phosphorus and TKN were somewhat elevated at the Caloosahatchee reference site, but to a lesser degree at the two test sites. It is possible that these nutrients are being transported from the upper reaches of the river, which drain Lake Okeechobee and surrounding agricultural lands.

Algal growth potential (AGP) was somewhat higher in the effluent than expected, however, all three study sites yielded AGP values below the "problem threshold" of 10 mg dry wt/L.

Measures of benthic macroinvertebrate community health indicated little or no differences between the reference and test sites. All three areas were strongly dominated by epi-benthic crustaceans, particularly the amphipods, *Ampelisca* sp. and *Grandidierella bonneroides*. Compared to other estuaries in the state, taxa richness was slightly above average (greater than 60% of typical systems). Shannon-Weaver diversity was virtually identical at all sites.

Most measures of phytoplankton community health, except for the percent contribution of dominant taxon, indicated minimal effects from the discharge. While all three sites were dominated by the ubiquitous diatom, *Skeletonema costatum*, the test sites had a greater proportion of this diatom than did the reference site. Quantitative stability indices demonstrated a high degree of similarity of the test sites, compared to the reference. Chlorophyll *a* was elevated at all study areas, greater than 92% (reference site) and 95% (test sites) of representative estuaries in Florida, indicating the eutrophic condition of this estuary. Phytoplankton and nutrients may be imported from upstream, where the river drains Lake Okeechobee and predominantly agricultural lands.

Literature Cited

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Environmental Protection Agency. 1974. Marine algal assay procedure: Bottle test. Nat'l Environ. Res. Center, Office of Res. and Dev., U.S. EPA, Corvallis, Oregon. 43 p.

Florida Department of Environmental Regulation. 1987a. Bioassays of Ft. Myers South Sewage Treatment Plant, Ft. Myers, Lee County, Florida, NPDES #FL0021270, FDER, 20 p.

Florida Department of Environmental Regulation. 1987b. Bioassays of Ft. Myers South Sewage Treatment Plant, Ft. Myers, Lee County, Florida, NPDES #FL0021270, FDER, 17 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.

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

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 p.

Chemistry summary table for

Ft. Myers South WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None detected				
Nutrients (mg/L)				
Ortho-phosphate	0.020 U	0.038 T	0.033 T	0.028 T
Total phosphorus	0.080	0.16	0.12 A	0.10
Ammonia	0.061	0.020 U	0.020 U	0.020 U
Nitrate+Nitrite	0.050 T	0.030 U	0.030 U	0.030 U
TKN	0.84	1.7	1.6	1.5
Other Parameters				
Habitat Assessment		40	40	40
D. O. (mg/L)	8.1	9.7	8.6	9.3
pH (SU's)	6.5	8.4	8.2	8.2
Specific Conductance (µmhos/cm)	660	3660	5860	5560
Temperature (°C)	21.7	20.6	20.5	20.5
Algal Growth Potential (mg dry wt/L)	9.8 Q	4.6 Q	6.8 Q	4.5 Q
Bioassay Fish-Dechlorinated	Not toxic			
Bioassay Invertebrate-Dechlorinated	Not toxic			

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

Q - Sample held beyond normal holding time

T - Value reported is less than the practical quantitation limit

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

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Ft Myers South WWTP	Date Summary Prepared	
Location (attach detailed map):	County	District
Federal Permit # and expiration date:	State GMS # and State expiration date:	Facility Type: Industrial Municipal Federal Agricultural Other (list):
Function of facility:		
Description of treatment process:		
Receiving waters:	Classification: I II III	
Design Flow:	Mean Flow:	Flow during survey:
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.):		

List effluent limits (if necessary, attach relevant paperwork):		Describe special permit conditions and permit modifications:
Parameter	Limit (units)	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

(Facility)

Description of permitted outfall(s):

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

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

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

Additional information:

Staff contributing to this review (signature):

(Biologist)

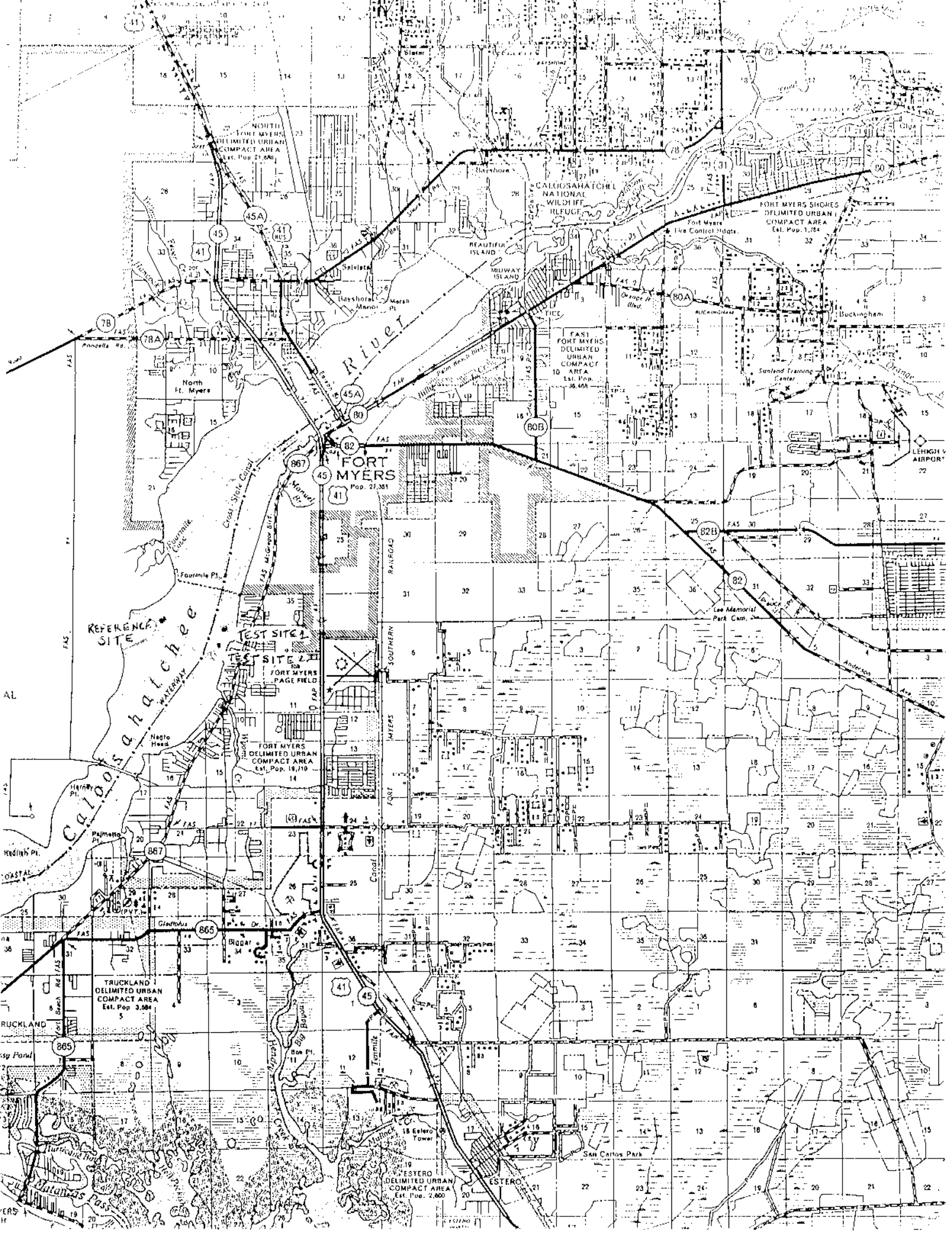
(Inspector)

(Engineer)

( )

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REFERENCE SITE
TEST SITE 1
TEST SITE 2
FORT MYERS
Pop. 27,351
FORT MYERS PAGE FIELD
NORTH FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop. 21,680
FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop. 19,110
FORT MYERS SHORES DELIMITED URBAN COMPACT AREA Est. Pop. 1,784
SANIBEL FORT MYERS DELIMITED URBAN COMPACT AREA Est. Pop. 36,468
TRUCKLAND DELIMITED URBAN COMPACT AREA Est. Pop. 3,884
ESTERO DELIMITED URBAN COMPACT AREA Est. Pop. 2,600
CALOOSAHATCHEE NATIONAL WILDLIFE REFUGE
Caloosahatchee River
Caloosahatchee Waterway
Coast Line Canal
Canal
Bayshore
North Ft. Myers
Bayshore Manor
Salvation
BEAUTIFUL ISLAND
MIDWAY ISLAND
Fort Myers Tice Control Station
Buckingham
Sunland Training Center
LEHIGH AIRPORT
Lee Memorial Park Cem.
San Carlos Park
ESTERO
Negro Head
Palmetto Pt.
Harney Pt.
Fourmile Pt.
Fourmile Cove
Glenhaus Dr.
Bigger
Big Bayou
Bow Pt.
Hurricane Pass
Matanzas Pass
Estero Tower
RAILROAD
SOUTHERN
FORT MYERS
Canal
Creek
Terminal
Anderson
Palm Beach Blvd.
Edison Ave.
Colonial Blvd.
Pondella Rd.
Summerlin Rd.
Fort Myers Beach
Estero Pkwy
Bonita Beach Rd.
Old Bridge Rd.
Old 41
Tice
Iona
Alva
Olga
Gladiolus
Daniels Pkwy
Ortiz Ave.
Metro Pkwy
Six Mile Cypress Pkwy
Gunnery Rd.
Winkler Ave.
Veterans Memorial Blvd.
Cleveland Ave.
Evans Ave.
Hanson St.
Edwards Dr.
Ft. Myers Beach
Sanibel
Captiva
Gasparilla Island
Boca Grande
Pine Island
Matlacha
Pine Island Sound
Gulf of Mexico
Charlotte Harbor
Lemon Bay
Peace River
Myakka River
Myakka State Forest
Port Charlotte
Punta Gorda
Englewood
Venice
Nokomis
Osprey
Sarasota
Bradenton
Manatee
Palmetto
Ellenton
Parrish
Duette
Wimauma
Ruskin
Sun City
Apollo Beach
Gibsonton
Riverview
Brandon
Valrico
Plant City
Dover
Lithia
Fishhawk
Seffner
Mango
Thonotosassa
Temple Terrace
Tampa
Hillsborough River
Hillsborough Bay
Old Tampa Bay
Tampa Bay
Clearwater
Dunedin
Tarpon Springs
Palm Harbor
Oldsmar
Safety Harbor
Largo
Pinellas Park
St. Petersburg
Gulfport
Seminole
Pinellas Peninsula
Boca Ciega Bay
Gulf Beaches
Treasure Island
St. Pete Beach
Pass-a-Grille
Madeira Beach
Indian Rocks Beach
Belleair
Clearwater Beach
Honeymoon Island
Anclote Key
Hudson
New Port Richey
Port Richey
Holiday
Tarpon Springs
Crystal River
Homosassa Springs
Inverness
Floral City
Citrus Springs
Dunnellon
Rainbow Springs
Ocala
Silver Springs
Belleview
Summerfield
Lake Weir
Orange Lake
Micanopy
Gainesville
Alachua
Newberry
Archer
Williston
Cedar Key
Suwannee River
Withlacoochee River
Withlacoochee State Forest
Withlacoochee State Trail
Green Swamp
Lake Wales
Haines City
Davenport
Kissimmee
Lake Kissimmee
Lake Tohopekaliga
Lake Toho
Lake Wales Ridge
Lake Placid
Sebring
Avon Park
Lake Istokpoga
Arbuckle Creek
Fisheating Creek
Okeechobee
Lake Okeechobee
Moore Haven
Clewiston
Belle Glade
Pahokee
Canal Point
Port Mayaca
Stuart
Jupiter
Palm Beach
Boca Raton
Delray Beach
Boynton Beach
Lake Worth
West Palm Beach
Riviera Beach
Lake Park
Palm Beach Gardens
North Palm Beach
Juno Beach
Jupiter Inlet
Jupiter Island
Hobe Sound
Tequesta
Palm City
Port Salerno
Indiantown
Loxahatchee
Jonathan Dickinson State Park
Loxahatchee National Wildlife Refuge
Everglades
Everglades National Park
Big Cypress National Preserve
Big Cypress Swamp
Fakahatchee Strand
Fakahatchee Strand State Preserve
Collier-Seminole State Park
Marco Island
Naples
Golden Gate
Immokalee
Corkscrew Swamp
Corkscrew Swamp Sanctuary
Lake Trafford
Lake Hicpochee
Lake Okeechobee
Lake Flirt
Lake Hancock
Lake Parker
Lake Hunter
Lake Gibson
Lake Lena
Lake Hollingsworth
Lake Morton
Lake Mirror
Lake Alfred
Lake Eloise
Lake Ariana
Lake Maggiore
Lake Tarpon
Lake Seminole
Lake Chicot
Lake Crescent
Lake Pasadena
Lake Maggiore
Lake Vista
Lake Roberts
Lake Placid
Lake Istokpoga
Lake Josephine
Lake Clay
Lake Parker
Lake Hunter
Lake Gibson
Lake Lena
Lake Hollingsworth
Lake Morton
Lake Mirror
Lake Alfred
Lake Eloise
Lake Ariana
Lake Maggiore
Lake Tarpon
Lake Seminole
Lake Chicot
Lake Crescent
Lake Pasadena
Lake Maggiore
Lake Vista
Lake Roberts
Lake Placid
Lake Istokpoga
Lake Josephine
Lake Clay

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

SUBMITTING AGENCY CODE: 35-32 SUBMITTING AGENCY NAME: 30 Env-Intl	STORET STATION NUMBER:	DATE (M/D/Y): 2-23-93	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER

REMARKS:	LOCATION: FT MYERS SOUTH UTIL OUTFALL (CALOOSAHATCHEE R)	FIELD ID/NAME: DW 022393 —

Habitat Parameter (score)	Excellent	Good	Fair	Poor
Littoral Alterations (4)	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed (12)	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation (3)	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations (5)	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action (9)	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type (7)	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 40

COMMENTS: FAIRLY TYPICAL ESTUARINE SOFT BOTTOM, ANAEROBIC LAYER ~ 3cm BELOW SURFACE OF SEDIMENT

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-23-93	A.S. WALTON	Albert S Walton Jr

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 2-23-93	RECEIVING BODY OF WATER:
REMARKS:	LOCATION: REFERENCE STATION (Chassahowitzka)	FIELD ID/NAME: DC 2-23-93

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 4	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 12	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 3	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 5	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 7	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 40

COMMENTS: FAIRLY TYPICAL ESTUARINE SOFT BOTTOM, ANAEROBIC LAYER ~ 3cm BELOW SURFACE OF SEDIMENT

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-23-93	A.S. Weston	Albert S. Weston

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

SUBMITTING AGENCY CODE: DER	STORET STATION NUMBER:	DATE (M/D/Y): 2-23-93	RECEIVING BODY OF WATER: CALOOSAHATCHEE RIVER
SUBMITTING AGENCY NAME: DER FMRI/TMF			

REMARKS:	LOCATION: FT MYERS SOUTH WWTP OUTFALL AREA (CALOOSAHATCHEE R)	FIELD ID/NAME: DW 022393 —

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 4	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 12	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 40

COMMENTS:
FAIRLY TYPICAL ESTUARINE SOFT BOTTOM, ANAEROBIC LAYER ~ 3cm BELOW SURFACE OF SEDIMENT

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2-23-93	A.S. WALTON	Albert S. Walton Jr.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 2 23 93	TIME: 1055	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)
			100			

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): FT MYERS SEWAGE PLANT

Estimated System Width (range, m): 2600	Estimated System Depth (range, m): 1-3		yes
High Water Mark (m above bed): 0.5	Velocity (range, m/s): 0 0 2	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 (FT):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top		20.6	8.4	9.7	3660			2.2
Mid-depth	2.5	20.6	8.4	9.1	3660			
Bottom	4.5	20.6	8.4	9.2	3660			

System Type : Stream: ☐ (Sand Bottomed, Swamp & Bog, Alluvial, Sand Bot w/ Spring, Calcareous, 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: COOL WINDY

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

SAMPLING TEAM:	SIGNATURE:	DATE:
ALBERT WALTON	Albert A. Walton Jr.	2-23-93

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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:
			1140	

REMARKS:	LOCATION: AFFECTED UPSTREAM	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)
			100			

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): FT MYERS SOUTH EAST

Estimated System Width (range, m): 200	Estimated System Depth (range, m): 1-3		yes
High Water Mark (m above bed): 0.5	Velocity (range, m/s): 0-0.2	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

FT

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top		20.5	8.2	8.6	5346			1.6
Mid-depth	2.5	20.6	8.2	8.3	5370			
Bottom	5 ft	21.5	8.2	8.6	6020			

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: WINDY/ COOL

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

SAMPLING TEAM:	SIGNATURE:	DATE:
ALBERT WALTON	Albert L Walton Jr	

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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)
			100			

Local Watershed Erosion (check box): None [1] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [ ] Some potential sources [2] Obvious sources [ ]

Point-Source Pollution (list location and describe): FT MYERS STP (WWTP)

Estimated System Width (range, m):	200	Estimated System Depth (range, m):	1-3
High Water Mark (m above bed):	0.5	Velocity (range, m/s):	

yes
Impounded [ ]
Channelized [ ]

Canopy Cover % : Open : [1] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [1] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ] Sulfurey

Sediment Oils: Absent: [1] 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	L		
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots				Other:			

WATER QUALITY FT

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top	SURF	28.5	8.2	9.3	51 60			0.7
Mid-depth	2.5	28.0	8.2	8.6	53 90			
Bottom	5 ft	28.7	8.2	8.6	54 40			

System Type : Stream: [ ] (Sand Bottomed Swamp & Bog Alluvial / Sand Bot w/ Spring Calcareous Misc.) Lake: [ ] Wetland: [ ] Estuary: [1] Other: [ ]

Water Odors (check box): Normal: [1] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [1] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [ ] Slightly turbid: [1] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [1] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions: WIND / COOL

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[1]	[ ]	[ ]	[ ]
Fish	[ ]	[ ]	[1]	[ ]
Aquatic Macrophytes	[1]	[ ]	[ ]	[ ]
Iron/sulfur Bacteria	[1]	[ ]	[ ]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
ALBERT WATSON	Albert A. Watson	2-25-03

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: FT Myers South
Location:
County: Lee
Contact/District: Ron McGregor / South
NPDES Permit #: FL0036110 Outfall #:

Sample Collection: Date 02-23-93 Time 1140
Test Beginning: Date 02-24-93 Time 1215
Test Ending: Date 02-26-93 Time 1200
Organism Batch #: Diluent Batch #:
Organism Age: 24 hrs
Test Organism: Ceriodaphnia Dubia

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

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0	20.0 @ 20.7	5.8 @ 21.4	945 @ 1,000 @ 22.0
	10.0 @ 10.0			9410 @ 10,000
24 hr	7.0 @ 7.0	21.5 @ 21.6	5.6 @ 22.4	960 @ 1,000 @ 23.0
	10.0 @ 10.0			9600 @ 10,000
48 hr	7.0 @ 7.0	25.0 @ 25.2	7.6 @ 24.3	970 @ 1,000 @ 24.0
	10.0 @ 10.0			9650 @ 10,000

* 8.4 recalculated TM

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	A	5	5	5	8.0	8	8.1	21.5		24.1	8.5		6.8	140		170
Control	B	5	5	5			8.1						6.8			170
Control	C	5	5	5			8.1						6.9			160
Control	D	5	5	5			8.1						6.9			170
100%	A	5	5	5	6.6		8.1	21.7		24.3	8.3		6.8	600		625
100%	B	5	5	5			8.1						6.8			640
100%	C	5	5	5			8.1						6.7			680
100%	D	5	5	5			8.1						6.8			685
Measured/Loaded by:		MF	TM	TM	TM		TM	TM		TM	TM		TM	TM		TM
Recorded by:		TR	TM	TM	TR		TM	TR		TM	TR		TM	TR		TM

Investigators' Signatures

Tina Mikulski
Tobin Rader
Marshall Faircloth

Reviewer

form updated 10/20/92

	Salt Water / (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	* .02	* .02	0.04	DR160	MF
Alkalinity:	120	65	75	Hach	TM
Hardness:	125	70	155	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -55.9 Ammonia Blank: <0.017 Sample Salinity: — ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Ft. Myers South
Location:
County: Lee
Contact/District: Ron Mallegro / Lauri
NPDES Permit #: FL0035410 Outfall #:

Sample Collection: Date 04-23-93 Time 1140
Test Beginning: Date 04-24-93 Time 1215
Test Ending: Date 04-28-93 Time 1200
Organism Batch #: Diluent Batch #:
Organism Age: 11 days
Test Organism: Notropis leedsi

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

Test Number: 2 of 2

Remarks:

Instrument Callbrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0	20.6 @ 20.7	8.8 @ 21.4	9415 @ 1,000
	10.0 @ 10.0			9410 @ 10,000
24 hr	7.0 @ 7.0	21.5 @ 21.6	8.6 @ 22.4	960 @ 1,000 (D.O. 3.)
	10.0 @ 10.0			9600 @ 10,000
48 hr	7.0 @ 7.0 (*8.4 recorded wrong TM)	25.0 @ 25.2	*7.6 @ 24.3	970 @ 1,000 (for 240)
	10.0 @ 10.0			9650 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48
Control	263	5	5	5	7.6	8.0	8.2	23.2	23.3	23.3	8.0	8.1	8.1	240	240	245
Control	22	5	5	5	7.6	8.0	8.2				8.0	8.2	8.1	240	240	245
100%	65	5	5	5	6.5	7.5	7.8	21.7	22.0	23.2	8.1	8.0	7.1	660	665	690
100%	74	5	5	5	6.5	7.5	7.7				8.1	8.0	*7.7	660	670	690
													*7.7			
												recorded A in B TM				
Measured/Loaded by:		TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM	TM
Recorded by:		TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM

Investigators' Signatures

Tina Mikulski
Robin Kadel
Marshall Faircloth

Reviewer

form updated 10/20/92

Water Quality Parameters	Salt Water/ (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:					
Lab Total Residual Cl2:	*.02	*.02	0.04	DR100	MF
Alkalinity:	120	65	75	Hach	TM
Hardness:	125	70	155	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -55.9 Ammonia Blank: <0.017 Sample Salinity: _____ ppt

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

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

Benthic macroinvertebrate taxa list for Ft, Myers South WWTP, collected via Ponar grab samples in the Caloosahatchee River, on 23 February, 1993. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Crustacea			
Cirripedia			
Undetermined cirriped	12.5	–	–
Amphipoda			
Ampelisca sp.	1472.1	7734.5	9481.0
Grandidierella bonnieroides	8932.1	1671.7	4441.1
Cumacea			
Cyclaspis varians	299.4	–	349.3
Decapoda			
Rhithropanopeus harrisii	12.5	–	74.9
Isopoda			
Cyathura polita	636.2	673.7	661.2
Edotea montosa	25.0	25.0	87.3
Mysidacea			
Bowmaniella sp.	62.4	–	12.5
Mysidopsis sp.	12.5	12.5	12.5
Diptera			
Coelotanypus sp.	–	12.5	–
Cryptochironomus sp.	–	37.4	–
Palpomyia/Bezzia grp.	–	12.5	–
Polypedilum scalaenum grp.	–	49.9	–
Undetermined dipteran pupa	–	–	12.5
Gastropoda			
Acteocina canaliculata	–	25.0	49.9
Odostomia impressa	25.0	12.5	62.4
Undetermined gastropod	37.4	–	12.5
Nemertina			
Undetermined nemertean	99.8	137.2	112.3
Oligochaeta			
Undetermined oligochaete	12.5	–	–
Pelecypoda			
Amygdalum papyrium	262.0	149.7	573.9
Geukensia demissa ?	286.9	37.4	112.3
Macoma mitchilli ?	411.7	586.3	499.0
Polymesoda caroliniana ?	1235.0	224.6	474.1
Undetermined Dreissenidae	286.9	349.3	262.0
Undetermined Mactridae	12.5	12.5	–
Undetermined pelecypod	–	–	25.0

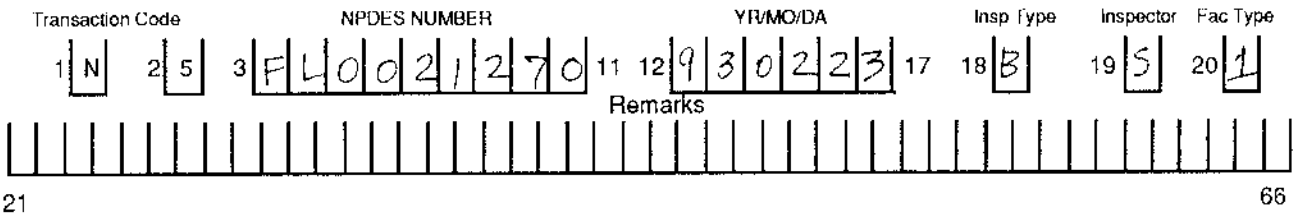
Platyhelminthes			
Undetermined Turbellaria	37.4	62.4	112.3
Polychaeta			
Capitella sp.	12.5	25.0	–
Cistena gouldii	–	–	12.5
Eteone heteropoda	12.5	–	–
Nereis cf. *succinea*	–	12.5	12.5
Polydora ligni	12.5	37.4	25.0
Streblospio benedicti	399.2	736.0	474.1
Undetermined Ampharetidae	–	37.4	37.4
Undetermined polychaete	–	12.5	–
Total	14,608.5	12,687.4	17,989.5

Phytoplankton taxa list and densities (#/mL) for Ft. Myers South Wastewater Treatment Plant, collected via subsurface grabs in the Caloosahatchee River, on 23 February, 1993.

	Reference Site	Test Site 1	Test Site 2
Diatoms			
Chaetoceros sp.	293	346	577
Cocconeis sp.	469	–	115
Coscinodiscus sp.	117	58	–
Cyclotella sp.	1758	1443	1500
Eunotia sp.	59	–	–
Gyrosigma sp.	–	58	58
Melosira sp.	1699	2020	1212
Navicula sp.	–	58	–
Nitzschia sp.	176	115	58
N. closterium	59	–	58
Operophora sp.	59	–	58
Skeletonema sp.	1582	1443	1212
S. costatum	6210	9753	8022
Synedra sp.	–	58	–
Thalassiosira sp.	59	–	–
Unidentified pennate diatom	–	–	115
Chlorophyta			
Arthrodesmus sp.	59	–	–
Crucigenia sp.	–	–	58
Franceia sp.	–	58	58
Gloeocystis sp.	59	–	58
Golenkinia sp.	–	–	58
Mougeotia sp.	59	173	–
Scenedesmus sp.	820	115	289
Staurastrum sp.	–	58	–
Tetraedron sp.	176	–	231
Tetrastrum sp.	293	58	–
Cyanophyta			
Anabaena sp.	117	–	58
Aphanocapsa sp.	117	173	231
Chroococcus sp.	1465	519	289
Cylindrocystis sp.	293	–	–
Dactylococcopsis sp.	996	231	346
Gloeocapsa sp.	–	173	58
Lyngbya sp.	117	–	–
Merismopedia sp.	469	231	173
Microcystis sp.	293	–	–
Oscillatoria sp.	176	58	173

Pyrrhophyta			
Peridinium sp.	59	58	115
Prorocentrum minimum	59	58	58
Total	18,167	17,315	15,238

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



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