

Biological Assessment of

Clewiston WWTP

Hendry County

NPDES #FL 0040665

Sampled July 2001

March 2002

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Comprehensive Quality Assurance Plan No. 870346G

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger:	Clewiston Waste Water Treatment Plant
County:	Hendry
NPDES Number:	FL0040665
Permit Expiration:	23 March 2003

Toxics Sampling Inspection **(XSI)**

Date Sampled: 30 July 2001

Results: Chromium, copper, and iron were detected in the effluent at levels that complied with Class III fresh water quality standards. No organic constituents were detected in the effluent.

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 30 July 2001

Results: The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour acute bioassay.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 30 July 2001

Results: Measures of periphyton community health indicated degradation at the control site compared to the test site. Chlorophyll *a*, algal density, and blue-green algae were all greater at the test site compared to the control site. In the Hester-Dendy macroinvertebrate samples, there was a 48% decline in diversity at the test site (1.2) compared to the control site (2.3) representing a violation of the Biological Integrity Criterion (Rule 62-302.530(11) FAC). Qualitative, SCI ratings went from an overall 'good' characterization at the control site with 21 points, to a 'poor' rating at the test site with 17 points.

Water Quality Inspection **(WQI)**

Date Sampled: 30 July 2001

Results: Dissolved oxygen levels in the test site (3.5 mg/L) and effluent samples (2.3 mg/L) failed to comply with Class III freshwater Water Quality Standards (Rule 62-302.530(31) FAC). Fecal coliforms were above Class III standards at the control site (7,900 #/100 ml) and test site (10,100 #/100ml) failing to comply with Rule 62-302.530(6) FAC. Total coliforms in the effluent (6,3000 #/100ml) failed to comply with the permit limit and Class III standards (Rule 62-302.530(7) FAC). The levels of ammonia, nitrate+nitrite, TKN, and total nitrogen were higher in the test site samples than the control site samples. Ammonia at the test site exceeded 95% of typical Florida streams. Nitrate+nitrite was below the practical quantitation limit at the control site and above the 50th percentile of typical Florida streams at the test site. AGP was above the 5 mg dry wt/L "problem threshold" at both sites but was twice as high at the test site (38.2 mg dry wt/L) compared to the control site (17.5 mg dry wt/L). The effluent AGP value was 35.9 mg dry wt/L.

Biological assessments are prepared by FDEP staff to provide information for review of NPDES permit renewal applications. Biological assessments, in conjunction with other information concerning the subject facility and its receiving-water body, are used to determine appropriate permit conditions.

Introduction

The Clewiston Wastewater Treatment Plant is a municipal, domestic wastewater treatment plant located in Hendry County, Florida (see maps in the Appendix). Wastewater is treated with extended aeration and applied to an isolated sprayfield. Underdrains from the sprayfield discharge into a perimeter canal that is continuously pumped to the Class III freshwaters of an irrigation canal. The canal ultimately discharges to the Class III freshwater of the Caloosahatchee River (see Facility Summary in Appendix). The facility has a design flow of 1.5 MGD, while the mean flow for this facility during the previous month was 1.1 MGD and the flow during this survey was 1.036 MGD. State permit limits for the Clewiston WWTP are listed in Table 1.

According to the facility's monthly operating reports, the plant has had one permit violation and one enforcement action since the last inspection. The permit violation occurred in May 2001, when the level of dissolved oxygen fell below 5.0 mg/L limit (see Facility Summary in Appendix).

Methods

The purpose of this investigation was to determine the effects of the Clewiston WWTP discharge on the receiving waters of the Class III waters of the irrigation canal that subsequently discharges into the Class III freshwaters of the Caloosahatchee River. A comparison of biological community health was made between a control site located approximately 700 meters upstream of the facility's point of discharge (POD) in the irrigation canal and a test site located approximately 200 meters downstream of the POD in the irrigation canal. A habitat assessment was performed *in situ* to establish comparability between the sites.

The effluent was analyzed for nutrients, metals, and organic constituents (base, neutral, and acid extractables, as well as pesticide extractables). Supplemental physical and chemical data were also collected from the effluent and field sites on July 30, 2001.

Acute screening toxicity bioassays were performed on an effluent sample using the invertebrate test species *Ceriodaphnia dubia*, and the fish species, *Cyprinella leedsi*. Bacterial populations were analyzed for total and fecal coliforms.

Benthic macroinvertebrate were quantitatively evaluated at the control and test sites using Hester-Dendy Multi-plate samplers that were incubated for 28 days. Qualitative macroinvertebrate samples were collected from multiple substrates (e.g. snags, leaf packs, vegetation) using discrete dip-net sweeps.

Periphyton was sampled at both the control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days. Chlorophyll *a* was determined for periphyton samples using laboratory spectrophotometer analyses. Algal Growth Potential (AGP) was measured via the response of the unicellular green alga, *Selenastrum capricornutum*. All methods were carried out following the Bureau of Laboratory's Standard Operating Procedures (SOP's), and may be reviewed at the FDEP website, http://www.floridadep.org/labs/sop/index.htm.

Several different measurements of macroinvertebrate and algal community health were used to determine the effects of the discharge. These measurements include algal biomass, community composition, functional feeding groups, habitat assessment, taxa richness, the number of Ephemeroptera-Plecoptera-Trichoptera (EPT) taxa, the Florida Index, and the Shannon-Weaver Diversity Index. For a brief review of each of these measurements, see *Explanation of Measurements of Community Health* in the Appendix.

Albert Walton and Thomas Jackson from the FDEP South District planned and collected the data for this investigation. The Central Laboratory staff in Tallahassee analyzed the samples, interpreted the results, drafted and produced the final report. This report has been reviewed by members of the Point Source Studies Review Committee (Wayne Magley, Michael Tanski, and Chuck Ziegmont), as well as representatives from the FDEP District Office.

Results and Discussion

The control site received 73 points on the habitat assessment scale, placing it at the bottom of the "marginal" category while the test site, with 61 points, was considered "poor" (see Habitat Assessment Field Sheets in Appendix). Both sites scored poorly in terms of water velocity, artificial channelization, and riparian buffer zone width and quality. The main difference between the sites was the high percentage of aquatic vegetation at the control site (64%) compared to the test site (7%).

Physical/chemical measurements were similar between the study sites (Table 1). With the exception of dissolved oxygen, the values were typical for Florida waters and comply with Class III freshwater water quality standards. Dissolved oxygen levels were dramatically different between the control site (10.8 mg/L) and the test site (3.5 mg/L). The test site level was below the Class III freshwater water quality standards of 5.0 mg/L (Rule 62-302.530 (31) FAC). The control site dissolved oxygen value suggests super-saturated conditions perhaps in response to excessive growth of the exotic water lettuce (*Pistia* sp.) (A. Walton, DEP South District, personal communication). Effluent dissolved oxygen was 2.3 mg/L and failed to meet the permit limit and Class III water quality standards (Rule 62-302.530 (31) FAC).

Table 1. Effluent limits and summary of chemistry data.

Clewiston WWTP	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)				
None Detected	-	-	-	-
Metals (µg/L)				
Aluminum	≤1500 **	75 U	-	-
Arsenic	≤50 **	3.0 U	-	-
Cadmium	≤2.33 *b	0.025 U	-	-
Chromium	≤438.68 *b	1.4 I	-	-
Copper	≤25.89 *b	0.98 I	-	-
Iron	≤1000 **	157	-	-
Lead	≤10.23 *b	0.25 U	-	-
Nickel	≤230.55 *b	1.5 U	-	-
Selenium	≤5.0 **	0.50 U	-	-
Silver	≤0.07 **	0.025 U	-	-
Zinc	<342.54 **b	4.0 U	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	0.18 JQ	0.52 JQ	0.37 JQ
Total phosphorus	≤2.5 *	0.28	0.79	0.54
Ammonia	-	0.72	0.019 I	0.86
Un-ionized Ammonia	0.02	0.005	-	-
Nitrate+Nitrite	-	0.16	0.004 I	0.12
TKN	-	2.2	2.7	3.0
Organic Nitrogen	-	1.48	2.681	2.704
Total Nitrogen	≤10 *	2.36	2.704	3.12
General Phys-Chem Parameters				
Habitat Assessment	-	-	73	61
DO (mg/L)	≥5.0 *	2.3	10.8	3.5
pH (SU)	6.0 - 8.5 *	6.9	7.7	7.0
Conductivity (µmhos/cm)	**	8430	917	880
Temperature (°C)	-	27.6	31.3	29.8
CBOD, 5 day (mg/L)	≤60	2.0	4.6	3.4
Flow (MGD)	1.5 *a	1.1	-	-
Hardness (mg $CaCO_3$)	-	250.2	-	-
AGP (mg dry wt/L)	-	35.9 J	17.5 J	38.2 J
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	NOEC	Not Detected	-	-
Bioassay - Invertebrate	NOEC	Not Detected	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	800 **	270	7,900	10,100 B
Total Coliforms	2,400 **	6,300	1400 B	1,100 B

* Permit limit

** Class III water quality standard

a - Annual average

b - Hardness based

B - Based on colony counts outside the acceptable range

I - Value reported is < the PQL, and ≥ the MDL

U - Not detected; value is the MDL

NOEC - A No Observed Effect Concentration < 100% effluent will constitute a violation

J - Estimated value

Q - Sample held beyond normal holding time

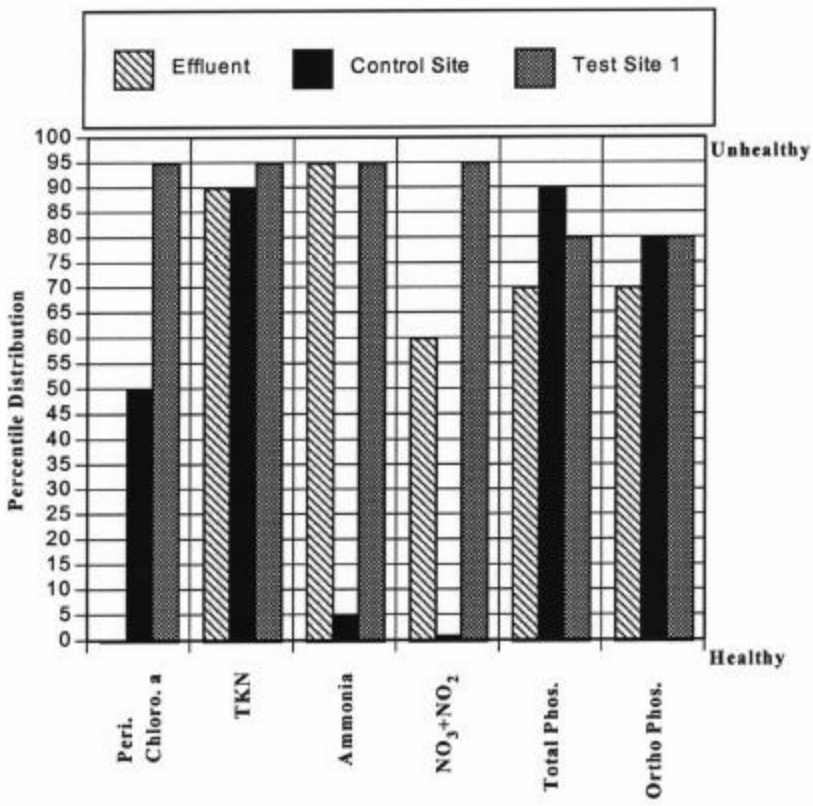
Microorganisms such as bacteria are responsible for decomposing organic waste in a water supply using up much of the available dissolved oxygen and depriving other aquatic organisms of needed oxygen. Carbonaceous Biological Oxygen Demand ($CBOD_5$) is a measure of the oxygen used by microorganisms to decompose this waste. If there is a large quantity of organic waste in the water supply, the demand for oxygen will be high and so will the $CBOD_5$ level. The $CBOD_5$ was higher at the control site (4.6 mg/L) compared to the test site (3.4 mg/L) but both fell within the "moderately clean" range.

Chromium (1.40 µg/L), copper (0.98 µg/L), and iron (157.0 µg/L) were detected in the effluent sample at levels that complied with Class III freshwater water quality standards (Table 1). No priority organic constituents were detected in the effluent sample.

No acute toxicity was indicated during the 48-hour acute screening bioassays using the invertebrate, *Ceriodaphnia dubia*, or the fish, *Cyprinella leedsi* (see Bioassay Data Sheets in Appendix).

Fecal coliform counts were above the permit limits and Class III freshwater water quality standards at both the control site (7,900 counts/100 ml) and the test site (10,100 counts/100 ml) (Rule 62-302.530 (6) FAC). The test site results were based on colony counts outside the acceptable range; however, the counts were almost certainly above the one-time 800 counts/100 ml water quality limit. Fecal coliform levels in the effluent sample (270 counts/100 ml) were below the facility's permit limit. High fecal coliforms at both the control and test sites appear to be due to high background levels and not a result of the effluent. However, effluent levels of total coliforms (6,300 counts/100 ml) failed to comply with the Class III freshwater water quality standard and the permit limit of 2,400 counts/100 ml (Rule 62-302.530 (7) FAC). The control and test site total coliform levels were below the

Figure 1. Selected Nutrient Parameters for Florida Waters.



Class III water quality standard for freshwaters (Table 1).

Nutrient levels at both the control and test sites were high; ammonia, nitrate+nitrite, and total nitrogen were considerably higher at the test site compared to the control site (Table 1 and Figure 1). Ammonia at the control site (0.019 mg/L) was below the 5th percentile compared to other typical Florida streams, while the test site concentration (0.86 mg/L) was greater than the 95th percentile (see *Typical Values for Selected Parameters in Florida Waters* in Appendix). Nitrate+nitrite was below the minimum quantitaion limit at the control site (0.004 mg/L) but was greater than the 50th percentile of typical Florida streams at the test site (0.12 mg/L). TKN was above the 95th percentile of typical Florida streams at the test site (3.0 mg/L), and the control site (2.7 mg/L) was above the 90th percentile. Ortho-phosphate (test = 0.37 mg/L and control = 0.52 mg/L) and total phosphorus (test = 0.54 mg/L and control = 0.79 mg/L) were high at both study sites (Table 1). Increased ammonia and nitrate+nitrite values at the test site are likely attributable to the Clewiston WWTP effluent. Total nitrogen was somewhat lower at the control site (2.70 mg/L) compared to the test site (3.12 mg/L); both were greater than the effluent value (2.36 mg/L).

Algal Growth Potential (AGP) measures the bioavailable nutrients in a water sample. Raschke and Shultz (1987) found that AGP values above 5.0 mg dry wt/L represent a "problem threshold" for freshwater systems and indicate nutrient enrichment. The test site AGP sample (38.2 mg dry wt/L) more than doubled that of the control site sample (17.5 mg dry wt/L), both exceeded the "problem threshold", indicating non-point sources of nutrients in addition to those added by the discharge. The effluent AGP value was 35.9 mg dry wt/L.

There were differences in the periphyton communities that suggest further nutrient enrichment at the test site compared to the control site (Table 2). Chlorophyll *a*, algal density, and percentage of blue-green algae were all substantially higher in the test site samples compared to the control site samples. Chlorophyll *a* was over a magnitude higher at the test site (70.0 mg/m²) compared to the control site (3.2 mg/m²). Algal density was more than twice as high in the test site sample (617,809 organisms/ ml) compared to the control site sample (295,626 organisms/ ml). The percentage of blue-green algae nearly doubled from the control site (9.4% contribution) to the test site (17.6% contribution). As a result of the increase in the number of individuals, it is not surprising to have greater taxa richness in the test site samples (47) compared to the control site samples (39) and

Table 2. Community structure of control and test sites.

Clewiston WWTP	Control Site	Test Site
Periphyton Algae		
Number of Taxa	39	47
Shannon-Weaver diversity	2.89	4.3
Chlorophyll *a* (mg/m2)	3.2	70.0
Algal Density (#/cm2)	295,626	617,809
Diatom/Diatom + B-G Ratio	0.90	0.80
%Blue-green	9.4	17.6
% Diatoms	80.51	72.74
AGP (mg dry wt/L)	17.5	38.2

an increase in the Shannon-Weaver Diversity Index (test = 4.3, control = 2.89).

The qualitative macroinvertebrate samples indicate declines in the health of the invertebrate community at the test site compared to the control site and a significant shift in the community structure (Table 3). The control site was strongly dominated by the snail *Pyrogophorus platyrachis* (64% contribution) and other scraper organisms (70%) while the test site was dominated by the pollution tolerant chironomid *Goeldichironomus haloprasinus* (22% contribution) and other surface deposit feeders. The number of taxa (38 at control vs. 24 at test) and the number of EPT taxa (3 at control vs. 1 at test) showed increased perturbation at the test site compared to the control site. The Stream Condition Index scored just into the "good" category at the control site with 21 points, while the test site was in the "poor" category with 17 points (see SCI worksheet in Appendix).

Quantitative measures of macroinvertebrate health showed severe impairment at both the control and test sites (Table 3 and Figure 3). There were no EPT taxa recovered from either site, the Florida Index scores were also low (control site = 0; test site = 2), and diversity values were between the 5th and 20th percentiles compared to other typical Florida streams (Table 3). The Shannon-Weaver diversity was 48% lower at the test site (1.2) compared to the control site (2.3) and is a violation of the Biological Integrity Criterion (Rule 62-302.530(11) FAC).

Although nutrients were high at the control site due to extensive farming and agricultural practices in the immediate watershed, the Clewiston WWTP appears to be of contributing additional nutrients that may be causing further impairment to the algal and invertebrate communities downstream of the facility.

Table 3. Community structure of control and test sites.

Clewiston WWTP	Control Site	Test Site
Macroinvertebrate Dip Net Samples		
Stream Condition Index	21	17
% Dominant Taxon	64.0	21.6
EPT Index	3	1
Florida Index	0	1
Number of Taxa	38	24
Community Composition		
% Amphipoda	3.1	18.7
% Coleoptera	0.4	5.8
% Diptera	15.3	42.5
% Ephemeroptera	1.5	0.7
% Gastropoda	69.7	9.4
% Odonata	2.1	5.0
% Oligochaeta	1.3	14.4
% Pelecypoda	4.3	1.4
% Plecoptera	0.0	0.0
% Trichoptera	0.3	0.0
% Other	2.1	2.2
Functional Feeding Groups		
% Burrowing Deposit Feeders	1.1	13.7
% Predators	3.5	9.7
% Surface Deposit Feeders	14.7	50.0
% Suspension Feeders/Filtere	4.9	1.4
% Scrapers	70.4	9.4
% Shredders	1.7	9.7
Macroinvertebrate Hester-Dendy Samples		
Shannon-Weaver Diversity	2.3	1.2
Number of Taxa	15	15
Florida Index	0	2
EPT Taxa	0	0
Community Composition		
% Diptera	82.7	90.0
% Ephemeroptera	0.0	0.0
% Gastropoda	11.1	1.5
% Trichoptera	0.0	0.0
% Other	6.2	8.8
Functional Feeding Groups		
% Predators	2.8	3.1
% Surface Deposit Feeders	79.3	87.7
% Suspension Feeders	0.9	0.4
% Scrapers	10.2	1.2
% Shredders	1.9	1.2

Literature Cited

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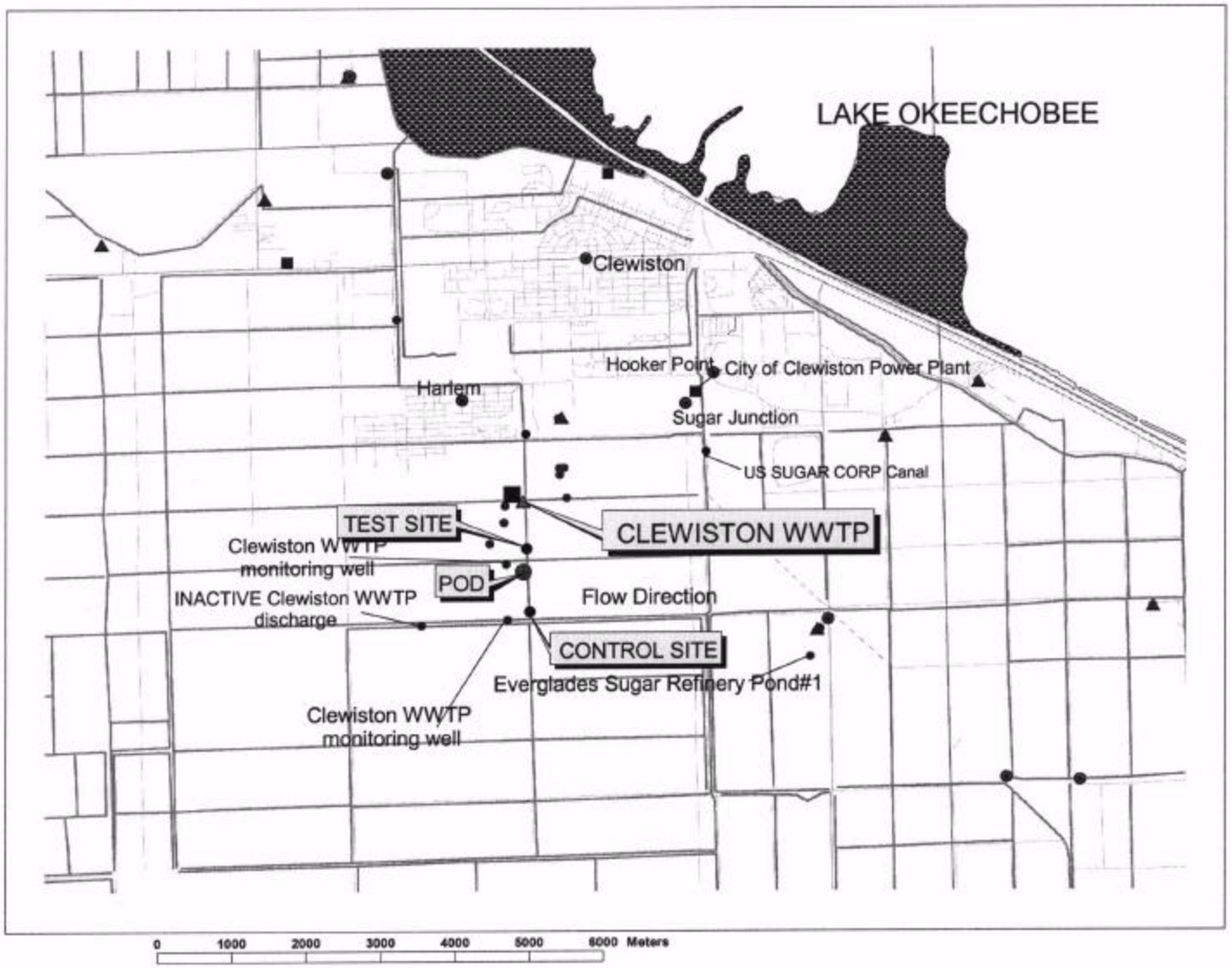
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Clewiston WWTP





Populated Place Names
WAFR Sites
WAFR Facilities
NPDES (National) Facility
State or Local Facility
PWS Plants
TIGER Roads
Primary road with limited access
Primary road
Secondary and connecting road
Local road
Road, major and minor categories unknown
Ferry crossing
Water Lines
Wetlands
Boundary/Florida Counties with Shoreline

N
W E
S

FDEP - Bureau of Laboratories
Fifth Year Inspection Program
Created by: Julie Riley
Created on: March 13, 2002

Typical Values for Selected Parameters in Florida Waters

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

Clewiston WWTP

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Control Site												
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.6	3.02	4.63	6.72	9.87	14.68	**27.35**	**48.7**	**46**
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	**2.94**	**6.45**	10.51	17	39.51	60.85	**3.2**
H-D Diversity	0.84	**2.12**	**2.48**	2.74	2.88	3.09	3.25	3.4	3.52	3.76	3.9	**2.3**
Qualitative Taxa Richness	9	12	17	20	22	24.5	26	28	31	**37**	**53**	**38**
H-D Taxa	6	6.5	9	11.5	13	**15**	17	21.5	26	29	32	**15**
TKN	0.3	0.39	0.56	0.73	0.87	1	1.11	1.26	1.49	**1.93**	**2.8**	**2.7**
Ammonia	**0.02**	**0.02**	0.04	0.05	0.06	0.08	0.11	0.14	0.2	0.34	0.6	**0.019**
NO2-NO3	0.01	0.01	**0.03**	**0.05**	0.07	0.1	0.14	0.2	0.32	0.64	1.05	**0.004**
Total Phosphorus	0.02	0.03	0.05	0.06	0.1	0.13	0.18	0.25	0.39	**0.74**	**1.51**	**0.79**
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	**0.27**	**0.59**	1.37	**0.52**

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Test Site												
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.6	3.02	4.63	6.72	9.87	**14.68**	**27.35**	48.7	**18**
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17	39.51	**60.85**	**70**
H-D Diversity	**0.84**	**2.12**	2.48	2.74	2.88	3.09	3.25	3.4	3.52	3.76	3.9	**1.2**
Qualitative Taxa Richness	9	12	17	20	**22**	**24.5**	26	28	31	37	53	**24**
H-D Taxa	6	6.5	9	11.5	13	**15**	17	21.5	26	29	32	**15**
TKN	0.3	0.39	0.56	0.73	0.87	1	1.11	1.26	1.49	1.93	**2.8**	**3**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.2	0.34	**0.6**	**0.86**
NO2-NO3	0.01	0.01	0.03	0.05	0.07	**0.1**	**0.14**	0.2	0.32	0.64	1.05	**0.12**
Total Phosphorus	0.02	0.03	0.05	0.06	0.1	0.13	0.18	0.25	**0.39**	**0.74**	1.51	**0.54**
Ortho Phosphate	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	**0.27**	**0.59**	1.37	**0.37**

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

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health may 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, to the exclusion of other taxa.

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. 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.

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 control 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.

Functional Feeding Groups: 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): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996) developed for Florida. The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected control condition (see SCI calculation table in Appendix).

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION.

FACILITY SUMMARY

Facility Name: CITY OF CLEWISTON WWTP		Date Summary Prepared: 7/3/01
Location (attach detailed map): FEED LOT ROAD, CLEWISTON, FL	County: HENDRY COUNTY	District: SOUTH
Federal Permit # and expiration date: FL0040665	State GMS # and State expiration date: N/A	Facility Type: Industrial (Municipal) Federal Agricultural Other (list): DOMESTIC WASTEWATER

Function of facility: DOMESTIC WASTEWATER TO ISOLATED SPRAYFIELD → UNDERDRAIN DISCHARGE TO PARIMETER DITCH THAT IS PUMPED TO IRRIGATION CANAL THAT DISCHARGES TO THE CALOOSAHATCHEE RIVER.

Description of treatment process: EXTENDED AERATION DOMESTIC WASTEWATER TREATMENT WITH EFFLUENT TO ISOLATED SPRAYFIELD. UNDERDRAINS FROM SPRAYFIELD FLOW TO PARIMETER DITCH THAT DISCHARGES TO THE CALOOSHATCHEE RIVER. SEE ATTACHED JANUARY 2000 C.E.I. REPORT

Receiving waters: IRRIGATION CANAL TO THE CALOOSAHATCHEE RIVER	Classification: I II (III) FRESH	
Design Flow: 1.5 MGD	Mean Flow: 1.1 MGD (Month Aug.)	Flow during survey: -1.036 (MB)

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 MIXING ZONES

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

Parameter	Limit (units)
FLOW	1.5 MGD
CBOD5	60 MG/L SINGLE SAMPLE
TSS	60 MG/L SINGLE SAMPLES
TOTAL RESIDUAL CHLORINE	0.5 MG/L MINIMUM
TOTAL PHOSPHORUS	2.5 MG/L SINGLE SAMPLE
TOTAL NITROGEN	10.0 MG/L SINGLE SAMPLE
DISSOLVED OXYGEN	5.0 MG/L MINIMUM

Describe special permit conditions and permit modifications:

SEE ATTACHED PERMIT

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

City of Clewiston
(Facility)

Description of permitted outfall(s): SPRAYFIELD PARIMETER DITCH IS PUMPED AT OUTFALL D002 TO AN IRRIGATION DITCH THAT DISCHARGES TO THE CALOOSAHATCHEE RIVER

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: DISSOLVED OXYGEN <5.0 mg/L MAY 2001. BACKGROUND D.O. (PARIMETER DITCH) 0.2 mg/L. D.O. REPORTED DURING SITE INSPECTION ≈ 4.1 mg/L

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: 12/2/99 SHORT FORM CONSENT ORDER FOR A BROKEN FORCE MAIN. FORCE MAIN REPAIRED CIVIL PENALTY OF $250.00 PAID. THE BREAK AND C/O WAS THE RESULT OF A GUARD RAIL CONTRACTOR NOT THE CITY OF CLEWISTON

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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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-00)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		7-30-01	1430	L. OKEECHOBEE

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
N 26° 42' 42.6" W 80° 56' 33.9"	HENDRY	CLEWISTON WWTP CONTROL SITE	DW-073001-3

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)
			~~Hay~~ 95			5	

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: 5

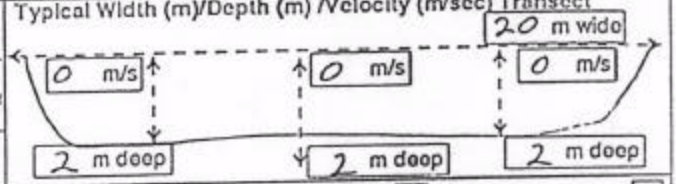
List & map dominant vegetation on back

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

Artificially Impounded ☑ yes

High Water Mark: 0 (m above present water level) + 2.0 (present depth in m) = 2.0 (m above bed)

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



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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	4.5	~~5~~ 5 IIII		Sand	~~60~~ 28	5 IIII	
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation	64	~~5~~ 5 IIII		Other:			
Rock or Shell Rubble	3	5 IIII		Other:			
Undercut banks/Roots				Draw aerial view sketch of habitats found in 100 m section			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.3	31.33	7.66	10.75	917			0.6
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions/Notes:
VERY HOT

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

SAMPLING TEAM: WALTON / JACKSON

SIGNATURE: Albert S Walton Jr

DATE: 7-30-01

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		7-30-01	L. OKEECHOBEE

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	HENDRY	CLEWISTON WWTP CONTROL SITE	DW-073001-3

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity [11]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 (11)	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [20]	Greater than 30% productive habitat present at site. (20) 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [2]	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
Habitat Smothering [20]	Less than 20% of habitats affected by sand or silt accumulation	20%-50% of habitats affected by sand or silt accumulation	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent
Primary Score [53]	(20) 19 18 17 16 15 14 13 12 11		10 9 8 7 6	5 4 3 2 1
Secondary Habitat Components Artificial Channelization [2]	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
Bank Stability Right Bank [7] Left Bank [7]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 (7) 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [1] Left Bank [1]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 (1)
Riparian Zone Vegetation Quality Right Bank [1] Left Bank [1]	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. 10 9	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. 8 7 6	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. 5 4	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. 3 2 (1)
Secondary Score [20]				

73 TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7-30-01	A.S. WALTON	Albert S Walton, Jr.

Copy

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-99)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		7-30-01	1230	L. OKEECHOBEE

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
N 26° 43' 10.9" W 80° 56' 34.5"	HENDRY	CLEWISTON WWTP TEST SITE	DW-073001-2

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)
			95			5	

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: 5

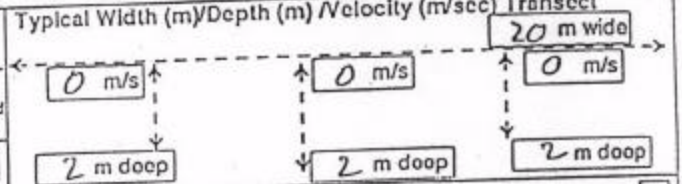
List & map dominant vegetation on back

Artificially Channelized ☐ no ☐ ☐ ☐ ☐ yes — recent, severe / some recovery / mostly recovered / more sinuous

Artificially Impounded ☐ yes

High Water Mark: ____ (m above present water level) + ____ (present depth in m) = ____ (m above bed)

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



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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	1.5	5 HH		Sand	89	5 HH	
Leaf Packs or Mats		0		Mud/Muck/Silt			
Aquatic Vegetation	6.5	5 HH		Other:			
Rock or Shell Rubble	3	5 HH		Other:			
Undercut banks/Roots							

Draw aerial view sketch of habitats found in 100 m section

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	(Cond. µmho/cm) or Salinity (ppt):			Secchi (m)
Top	0.3	29.81	7.02	3.51	880			0.6
Mid-depth								
Bottom								

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

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

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

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

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

Weather Conditions/Notes:

VERY HOT

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

SAMPLING TEAM: WALTON / JACKSON

SIGNATURE: Albert L Walton Jr

DATE: 7-30

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		7-30-01	L. OKEECHOBEE

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	HENDRY	CLEWISTON WWTP TEST SITE	DW-073001-2

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity [11]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 (11)	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [8]	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 (8) 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [2]	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
Habitat Smothering [20]	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
Primary Score [41]				
Secondary Habitat Components Artificial Channelization [2]	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
Bank Stability Right Bank [7] Left Bank [7]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 (7) 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [1] Left Bank [1]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 (1)
Riparian Zone Vegetation Quality Right Bank [1] Left Bank [1]	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. 10 9	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. 8 7 6	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. 5 4	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. 3 2 (1)
Secondary Score [20]				

[61] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7-30-01	A. S. WALTON	Albert S Walton, Jr.

Clewiston WWTP Control Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	36	≥26	25-14	<14	**5**
EPT Index	3	≥4	3-2	<2	**3**
# Chironomid Taxa	8	≥7	6-4	<4	**5**
% Contribution of Dominant Taxon	64	≤29	30-64	>64	**3**
% Diptera	15	-	≤37	>37	**3**
Florida Index	0	≥7	6-4	<4	**1**
% Suspension feeders/Filterers	5	-	≥7	<7	**1**
Total Score		**Peninsula**			**21**
Interpretation of Scores		**Excellent**			26-32
		Good			**20-25**
		Poor			13-19
		Severely Degraded			7-12

Summer Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

Clewiston WWTP Test Site

Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	5	3	1	Score
Total Number of Taxa	24	≥26	25-14	<14	**3**
EPT Index	1	≥4	3-2	<2	**1**
# Chironomid Taxa	6	≥7	6-4	<4	**5**
% Contribution of Dominant Taxon	22	≤29	30-64	>64	**5**
% Diptera	43	-	≤37	>37	**1**
Florida Index	1	≥7	6-4	<4	**1**
% Suspension feeders/Filterers	1	-	≥7	<7	**1**
Total Score		**Peninsula**			**17**
Interpretation of Scores		**Excellent**			26-32
		Good			20-25
		Poor			**13-19**
		Severely Degraded			7-12

Summer Index Period: Stream Condition Index (SCI) for Florida Peninsula (April 1996)

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Clewiston
County: Hindry
Contact / District: T. Jackson / South
NPDES Permit #: FL0040665
LIMS Sample #: 537560 **LIMS Job #:** TLH-2001-07-31-11
sample log 8/3/01 mf
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 1 of 2

Remarks:

Sample Collection: Date 7/30/01 Time 12:35 DPH 7/31/01
Test Beginning: Date 7/31/01 Time ~~10:37~~ Water Addition Time 13:05
Test Ending: Date 8/2/01 Time 1325
Organism Batch #: 4 **Diluent Batch #:** well
Organism Age: 10 days SRT toxicant batch #: —
Test organism: C. dubia

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
CTRL A	A1	5	5	5	8.0	8.4	8.5	24.7	26.0	24.7	7.5	7.4	7.5	270	290	280
B	A2	5	5	5	7.9	8.4	8.6	24.6	25.5	24.7	7.6	7.4	7.5	270	280	280
C	A3	5	5	5	8.0	8.4	8.5	24.6	25.5	24.5	7.6	7.4	7.7	270	280	280
D	A4	5	5	5	8.0	8.6	8.5	24.6	25.3	24.4	7.6	7.5	7.7	270	280	275
100% A	A5	5	5	5	8.6	8.6	8.6	24.5	25.9	24.7	7.5	6.2	7.4	790	820	805
B	A6	5	5	5	8.6	8.6	8.6	24.3	25.7	24.7	7.7	6.3	7.4	785	825	815
C	A7	5	5	5	8.6	8.6	8.7	24.3	25.8	24.6	7.8	6.3	7.5	790	835	820
D	A8	5	5	5	8.6	8.6	8.7	24.3	25.3	24.5	7.8	6.6	7.4	790	820	815
measured by:		JA	JA	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG	SG
recorded by:		DPH	JA	JA	JA	JA	JA	JA	JA	JA	JA	JA	JA	JA	JA	JA

The sample's dissolved oxygen measured 4.4 mg/L. The sample was aerated before test initiation for 45 minutes to increase the DO to 7.8 mg/L, before fish were loaded. - DPH 7/31/01

Investigators' Signatures
Della Parker-Hanson
John Clyo
Shannon Gerardi
Marshall Faircloth

Temperature Range °C
Incubator # 3 24.5°-25.0°C
Room B246 24.5°-26.0°C

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			—	—	—	—
Lab Total Residual Cl2 (mg/L):	<0.03		<0.03	Hach	DPH	DPH
Alkalinity (mg/L as $CaCO_3$):	142		258	Hach	JA	DPH
Hardness (mg/L as $CaCO_3$):	135		250	Hach	JA	DPH
Total ammonia (mg/L as N):	<0.017		<0.017	Demon	SG	DPH
Salinity:	<1		<1	451	JA	DPH

reviewer form updated 3/3/99

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Clewiston
County: Hendry
Contact / District: T Jackson / South
NPDES Permit #: FL00 40645
LIMS Sample #: 237560 **LIMS Job #:** TLH-2001-07-31-11
sample log 8/1/01 mf
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Test Number: 2 of 2

Sample Collection: Date 7/30/01 Time 12:35
Test Beginning: Date 7/31/01 Time 13:05
Test Ending: Date 8/2/01 Time 13:25
Organism Batch #: 34 **Diluent Batch #:** 21
Organism Age: <24 hrs SRT toxicant batch #: —

Test organism: C dubia

Remarks:

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
CTRL A	/	5	5	5	8.2	—	8.2	24.0	—	23.8	8.0	—	8.2	170	—	175
B	/	5	5	5	—	—	8.3	—	—	23.7	—	—	8.2	—	—	180
C	/	5	5	5	—	—	8.3	—	—	23.6	—	—	8.2	—	—	180
D	/	5	5	5	—	—	8.3	—	—	23.7	—	—	8.2	—	—	200
100% A	/	5	5	5	8.6	—	8.8	24.1	—	23.9	8.0	—	8.2	760	—	800
B	/	5	5	5	—	—	8.8	—	—	23.8	—	—	8.2	—	—	820
C	/	5	5	5	—	—	8.8	—	—	23.7	—	—	8.2	—	—	850
D	/	5	5	5	—	—	8.8	—	—	23.8	—	—	8.2	—	—	890
measured by:		SG	SG	SG	SG	—	SG	SG	—	SG	SG	—	SG	SG	—	SG
recorded by:		DPH	SG	JA	JA	—	JA	JA	—	JA	JA	—	JA	JA	—	JA

The sample's dissolved oxygen measurement was 4.4 mg/L. The sample was aerated for 45 minutes to raise the DO to 7.7 mg/L prior to test initiation. DPH 7/31/01

Investigators' Signatures
Dilla Parker Howse
John Ogas
Shannon Gerardi
Marshall Faircloth

Temperature Range °C
Incubator # 2 24.5 - 25.0 °C
Room B244 24.5 - 26.0 °C

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			—	—	—	—
Lab Total Residual Cl2 (mg/L):		<0.03	<0.03	Hach	DPH	DPH
Alkalinity (mg/L as $CaCO_3$):		78	253	Hach	JA	DPH
Hardness (mg/L as $CaCO_3$):		79	250	Hach	JA	DPH
Total ammonia (mg/L as N):		<0.017	<0.017	Nessler	SG	DPH
Salinity:		<1	<1	451	DPH	DPH

reviewer

form updated 3/3/99

Periphyton taxa list and densities (#/cm^2) for Clewiston WWTP, collected via glass microscope slides in unnamed canal, on 30 July 2001.

Scientific Name	Control Site	Test Site
Bacillariophyceae		
Achnanthes exigua	-	30
Achnanthes hungarica	2	6
Aulacoseira granulata	6	-
Cocconeis placentula	6	2
Cyclotella sp.	118	-
Cyclotella meneghiniana	240	54
Eunotia sp.	41	90
Eunotia lunaris	2	2
Fragilariaceae	4	-
Fragilaria tenera	4	12
Gomphonema parvulum	10	16
Navicula capitata hungarica	-	4
Navicula constans	4	-
Navicula cryptocephala	-	12
Navicula cryptotenella	-	2
Navicula minima	-	12
Navicula pupula	2	28
Navicula viridula rostellata	-	14
Nitzschia amphibia	17	10
Nitzschia gracilis	21	10
Nitzschia nana	-	2
Nitzschia palea	21	143
Nitzschia reversa	-	18
Nitzschia scalaris	2	-
Pinnularia sp.	2	-
Pinnularia interrupta	-	6
Pinnularia viridis	-	2
Stauroneis sp.	2	-
Synedra sp.	-	14
Synedra ulna	-	10

Periphyton taxa list and densities (#/cm^2) for Clewiston WWTP, collected via glass microscope slides in unnamed canal, on 30 July 2001. Continued.

Scientific Name	Control Site	Test Site
Chlorophyceae		
Ankistrodesmus falcatus	3	-
Bulbochaete sp.	-	1
Characium sp.	-	3
Chlamydomonas	1	1
Chlorella sp.	12	12
Chlorococcum sp.	-	3
Chlorogonium sp.	-	4
Chlorophyceae	1	7
Coelastrum sp.	-	1
Crucigenia sp.	8	-
Micractinium sp.	1	-
Mougeotia sp.	-	1
Pediastrum sp.	1	-
Scenedesmus sp.	2	3
Scenedesmus bijuga	1	4
Scenedesmus incrassatulus	1	-
Scenedesmus quadricauda	11	6
Schroederia setigera	2	-
Selenastrum sp.	12	10
Stigeoclonium sp.	-	2
Tetraedron caudatum	1	-
Ulothrix sp.	-	3
Chrysophyceae		
Mallomonas sp.	1	-
Ophiocytium sp.	5	2
Cyanophyceae		
Anabaena sp.	2	8
Anabaenopsis sp.	-	1
Chroococcaceae	1	-
Chroococcus sp.	-	1
Cyanobium parvum	19	51
Cyanobium plancticum	10	2

Periphyton taxa list and densities (#/cm^2) for Clewiston WWTP, collected via glass microscope slides in unnamed canal, on 30 July 2001. Continued.

Scientific Name	**Control Site**	**Test Site**
Cyanothece aeruginosa	1	7
Lyngbya sp.	1	2
Merismopedia tenuissima	1	-
Oedogonium sp.	-	2
Oscillatoria sp.	13	43
Rhabdogloea sp.	10	5
Romeria sp.	1	-
Spirulina subsalsa	-	1
Euglenophyceae		
Trachelomonas sp.	-	1

Phytoplankton taxa list and densities (#/mL) for Clewiston WWTP, collected via water bottle grabs from an unnamed canal on 30 July 2001. Phytoplankton continued

Scientific Name	Control Site	Test Site
Bacillariophyceae		
Achnanthes exigua	35	148
Achnanthes hungarica	69	-
Aulacoseira granulata	278	37
Aulacoseira sp.	-	37
Cocconeis placentula	69	-
Cyclotella gamma	104	-
Cyclotella meneghiniana	1494	-
Cyclotella sp.	5384	6790
Diploneis ovalis	-	37
Eunotia sp.	-	445
Fragilariaceae	35	-
Fragilaria tenera	35	-
Gomphonema parvulum	35	148
Navicula constans	35	-
Navicula cryptocephala	-	37
Navicula cryptotenella	35	-
Navicula cuspidate	-	37
Navicula pupula	35	371
Navicula radiosa	-	37
Navicula viridula rostellata	-	186
Nitzschia amphibia	278	74
Nitzschia gracilis	-	74
Nitzschia longissima	-	37
Nitzschia palea	764	668
Nitzschia reversa	174	-
Nitzschia sp.	35	-
Synedra ulna	-	111
Unknown Bacillariophyceae	11637	1967
Chlorophyceae		
Ankistrodesmus falcatus	69	37
Actinastrum sp.	35	-
Carteria sp.	35	37

Benthic macroinvertebrate taxa list for Clewiston WWTP, collected via Hester-Dendy artificial substrates in un-named canal on 30 July 2001. Densities, in number/m^2, represent the mean of three replicates.

Scientific Name	Control Site	Test Site
Amphipoda		
Hyalella azteca	16	24
Unknown Amphipoda	4	-
Diptera		
Asheum beckae	4	-
Chironomidae	32	36
Chironomus sp.	56	151
Glyptotendipes sp.	4	-
Goeldichironomus sp.	56	71
Goeldichironomus carus	317	663
Goeldichironomus holoprasinus	56	8
Parachironomus directus	4	-
Tanytarsus sp. O Epler	4	-
Gastropoda		
Ancylidae	-	4
Elimia sp.	-	4
Hydrobiidae	4	-
Laevapex sp.	4	-
Laevapex peninsulae	4	-
Planorbella sp.	36	-
Pyrogophorus platyrachis	-	4
Unknown Gastropoda	24	-
Hirudinea		
Gloiobdella elongata	-	4
Helobdella stagnalis	4	20
Helobdella triserialis	-	4
Odonata		
Coenagrionidae	8	-
Ischnura sp.	4	-
Somatochlora sp.	-	8
Oligochaeta		
Haemonais waldvogeli	-	20
Tubificidae	-	8
Pelecypoda		
Unknown Pelecypoda	4	4

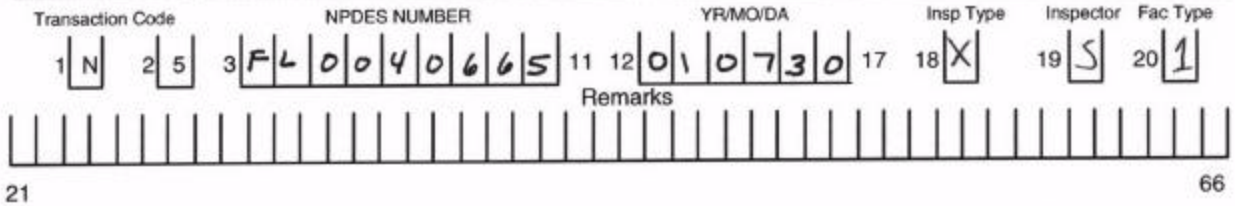
Benthic macroinvertebrate taxa list for Clewiston WWTP, collected via 20 discrete dip net sweeps in un-named canal on 30 July 2001.

Scientific Name	Control Site	Test Site
Acarina		
Arrenurus sp.	1	-
Amphipoda		
Hyalella azteca	22	26
Coleoptera		
Berosus sp.	1	1
Desmopachria sp.	1	-
Hydrophilidae	1	-
Suphisellus insularis	-	6
Tropisternus sp.	-	1
Decapoda		
Unknown Decapoda	5	-
Diptera		
Asheum beckae	4	-
Ceratopogonidae	-	1
Chironomidae	2	3
Chironomus sp.	-	2
Cladotanytarsus sp.	1	-
Culicidae	2	-
Goeldichironomus sp.	5	14
Goeldichironomus carus	7	13
Goeldichironomus holoprasinus	62	22
Goeldichironomus natans	-	2
Goeldichironomus amazonicus	14	-
Odontomyia sp.	7	-
Parachironomus sp.	1	-
Parachironomus directus	1	1
Polypedilum illinoense grp.	-	1
Tanytarsus sp.	1	-
Tanytarsus sp. F Epler	2	-
Tanytarsus sp. O Epler	1	-
Ephemeroptera		
Callibaetis floridanus	-	1
Callibaetis sp.	1	-
Caenis sp.	9	-

Benthic macroinvertebrate taxa list for Clewiston WWTP, collected via 20 discrete dip net Sweeps in un-named canal on 30 July 2001. Continued.

Scientific Name	Control Site	Test Site
Unknown Ephemeroptera	1	-
Gastropoda		
Biomphalaria havanensis	4	-
Ferrissia sp.	1	1
Hydrobiidae	22	1
Melanoides sp.	11	-
Micromenetus sp.	1	-
Physella sp.	1	1
Planorbella sp.	14	-
Planorbidae	9	-
Pyrogophorus platyrachis	433	10
Unknown Gastropoda	5	-
Heteroptera		
Mesovelia sp.	3	1
Pelocoris sp.	2	-
Ranatra sp.	-	1
Unknown Heteroptera	1	-
Hirudinea		
Desserobdella phalera	1	-
Unknown Hirudinea	2	-
Lepidoptera		
Cossidae	-	1
Unknown Lepidoptera	1	-
Odonata		
Aeshnidae	1	-
Coenagrionidae	8	4
Enallagma sp.	1	3
Ischnura sp.	2	-
Libellulidae	2	-
Zygoptera	1	-
Oligochaeta		
Limnodrilus hoffmeisteri	7	17
Haber speciosus	-	1
Dero vaga	-	1
Haemonais waldvogeli	1	1

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)

