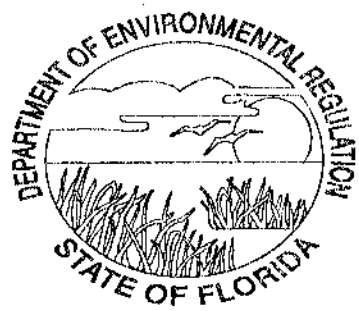


Biological Assessment of

Showell Farms

Walton County

NPDES #FL0002453

Sampled September 1990

December 1990

Biology Section
Division of Administrative and Technical Services

Introduction

Wastewater from the Showell Farms chicken hatchery, processing plant, and protein recovery plant is treated by a process of screening, dissolved air flotation, aerated lagoon clarification, nutrient removal via water hyacinths, pH adjustment, and chlorination. The design capacity of the facility is 1.25 MGD. A portion of the wastewater is spray irrigated. The sludge generated by the process is anaerobically digested prior to land application.

The 0.47 MGD average discharge flow enters Carpenters Branch near its headwaters. Carpenters Branch is a small lowland stream, tannic in color, and fast flowing due only to the Showell Farms discharge. There is a 1100 foot mixing zone for coliform bacteria and unionized ammonia granted for Carpenters Branch. Carpenters Branch is a tributary of Bruce Creek, which is a major tributary of the Choctawhatchee River. The 7Q10 for Carpenters Branch is estimated at 0.72 CFS.

Past FDER surveys have found degraded conditions in Carpenters Branch and poor biological integrity. The creek's bank and bottom, prior to waste treatment upgrades, was black organic ooze composed of chicken parts. Significant improvements to the waste treatment process since 1976 has reportedly resulted in much improved water quality and sediment quality in Carpenters Branch.

Some excursions of the permit limits are as follows: a TKN violation in December 1989 was explained by operators as overloaded treatment

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	32	9
Florida Index	17	1
% Contribution of Dominant Taxon	42.3	26.2
% Hirudinea	0	27.7
% Diptera	73.7	54.8
% Malacostraca	0.8	9.9
% Gastropoda	0	7.6
%Pelecypoda	5.1	0
% Coleoptera	4.2	0
% Other	16.2	0
% Predators	28.6	34.8
% Collector-Gatherers	54.2	51.2
% Collector-Filterers	8.1	0
% Scrapers	2.5	7.7
% Shredders	6.6	6.2
Macroinvertebrate Hester-Dendy		
Number of Taxa	20	18
Florida Index	24	4
Shannon-Weaver Diversity	3.8	1.3
% Oligochaeta	0	0.9
% Diptera	50.8	92.3
% Ephemeroptera	23.8	0
% Malacostraca	0	3.4
% Gastropoda	0	1.7
% Hirudinea	0	0.9
% Other	25.4	0.2
% Predators	52.0	32.2
% Collector-Gatherers	26.5	32.0
% Collector-Filterers	0	3.2
% Scrapers	14.2	1.7
% Shredders	7.3	30.9
Periphyton Algae		
Number of Taxa	26	20
% Contribution of Dominant Taxon	29.9	15.4
Chlorophyll *a* (mg/mm^2)	0.43	0.35
Blue-green/Diatom Abundance Ratio	2.13	0.33
% Blue-green	55.2	16.2
% Green	7.8	32.4
% Diatoms	25.9	48.7
% Other	11.1	2.7
Algal Growth Potential (mg dry wt/l)	Not Sampled	134.2

system after a 13 inch rainfall. A TKN violation in August 1989 was also apparently caused by excessive rainfall in June and July, which overloaded the treatment system. A sludge odor problem on October 17, 1989 was corrected by thinner spreading and lime addition. An offal room spill on April 11, 1989 resulted in approximately 40,000 gallons of raw wastewater entering Carpenters Branch. Lift station failure was the cause of the spill. The lift station was repaired and a back-up pump was installed.

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in Bruce Creek upstream of Carpenters Branch) and a test site (the area down gradient of the discharge). 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. An acute screening toxicity bioassay using *Notropis leedsi* as the test organism was performed on an effluent sample (Peltier and Weber 1985, FDER 1985). A Microtox® test, using the bacterium, *Photobacterium phosphoreum*, to evaluate toxicity, was also performed. The effluent was analyzed for nutrients and metals. Nutrient analyses were also performed on reference and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Collection methods consisted of a timed (one hour per site) multi-substrate (*e.g.*, snags, vegetation, sediment) semi-quantitative effort. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

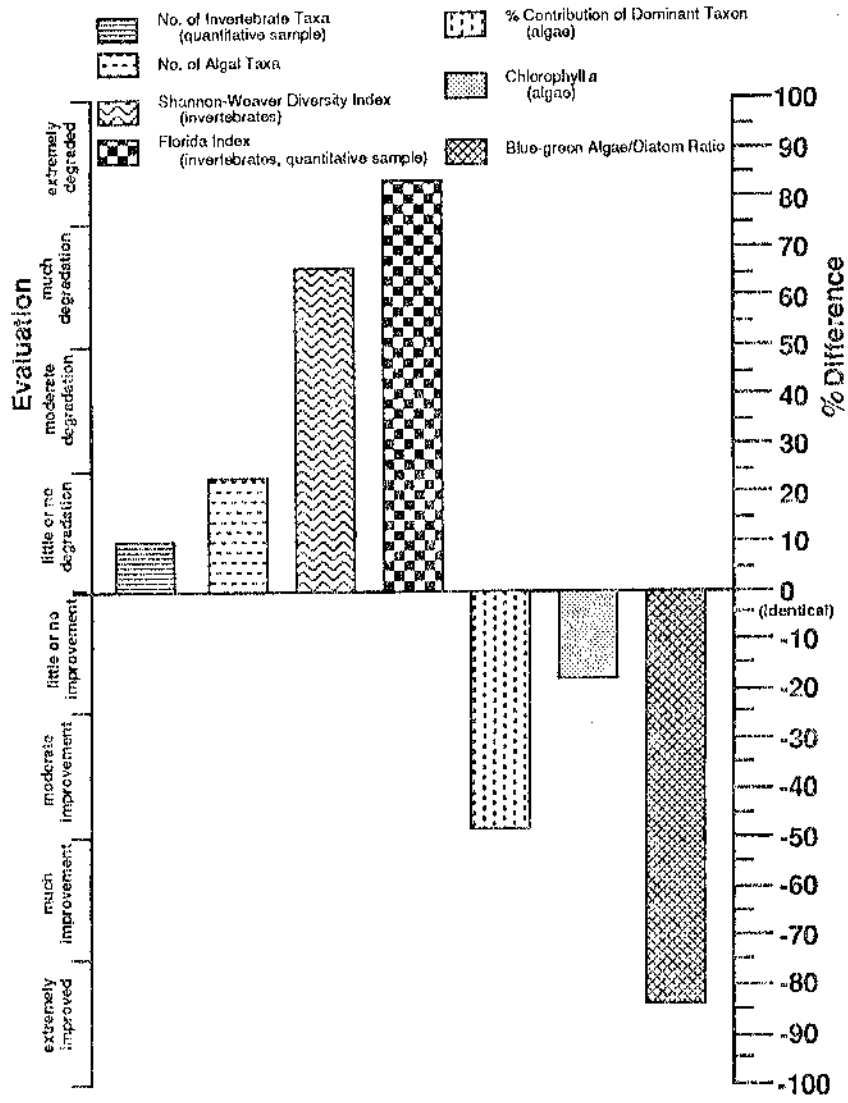
Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The 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 (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. An elevated blue-green algae to diatom ratio (calculated by dividing the number of individuals in the Cyanophyta by the number of individuals in the Bacillariophyta) is often indicative of nutrient enriched conditions. Czekanowski's Similarity Index is a multivariate ordination procedure which compares organism abundance and taxonomic structure between sites. The determination of the Quantitative Similarity 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 (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the refer-

Showell Farms nutrient concentrations.

Parameter (mg/l)	Reference Site	Test Site	Showell Farms Effluent
Nitrate-Nitrite	undetected	9.4	25.0
Total Nitrogen	0.89	10.9	26.9
Total Phosphorus	0.28	0.77	1.4



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

ence and test sites involving the number of taxa, the diversity index, and the Florida Index are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, blue-green algae to diatom ratio, 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: Glenn Butts (DER Northwest District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandra McClure (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality at the test site (Habitat Score = 65) was comparable to that of the reference site (Habitat Score = 63) (Appendix). Both sites can be characterized as moderately small, surficial aquifer fed streams. Velocity was significantly higher at the test site (velocity = 0.25 m/sec) than at the reference site (velocity < 0.1 m/sec) (Appendix). Both sites had slightly acidic water (test site pH = 6.7; reference site pH = 5.6) and adequate (above 5.0 mg/l) dissolved oxygen concentrations. Conductivity was higher at the test site (test site = 385 µmhos/cm^2; reference site = 31 µmhos/cm^2).

The effluent was not toxic to the fish, *Notropis leedsi*, in a 48 hour acute static bioassay. The discharge was stimulatory to *Photobacterium phosphoreum* in a Microtox® test. With the exception of small amounts of aluminum and iron, metals were not above detection limits in the effluent or at the test and reference sites (Appendix).

However, extraordinarily high nutrient concentrations were detected in the effluent and in water from the test site (see Table, p. 2). This severe nutrient enrichment was responsible for the very high algal growth potential of 134.2 mg algal dry weight/l measured at the test site. AGP values above 5.0 mg algal dry weight/l are considered undesirable (Raschke and Schultz 1987).

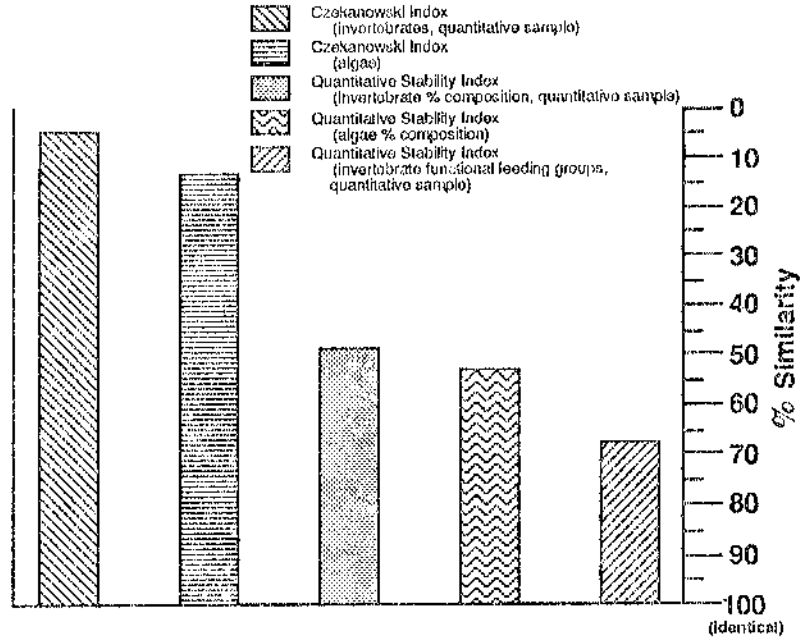
Both total and fecal coliform bacteria standards were violated at the test site (TC = 4200 org/100 ml; FC = 2400 org/100 ml). In contrast, these bacterial populations occurred at low to moderate levels at the reference site (TC = 900 org/100 ml; FC = 140 org/100 ml).

Quantitative measures of benthic macroinvertebrate community health indicated that the test site was very degraded (see Table, p. 1, and Figures). The upper left figure 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 below summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

The Florida Index decreased by 83% between the control and test site. This may be interpreted as a violation of 17-2.121(9)FAC, "Imbalances in Aquatic Fauna." Shannon-Weaver diversity decreased by 66% between the control and test site. This is a violation of the biological integrity criterion, 17-3.061(3)(p) FAC. Czekanowski's Similarity Index and the Quantitative Stability Indices for % composition and functional feeding groups further emphasized that stressed conditions occurred in Carpenters Branch below the Showell Farm mixing zone.

Measurements of periphyton community structure did not, in this case, reflect the elevated nutrient and AGP values. High water velocity at the test site was probably responsible for this apparent anomaly, masking eutrophication effects. It is likely that the algal populations located farther downstream, in areas where velocity decreases, would be affected by the very high nutrients in the Showell Farm discharge.



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

Conclusions

The Showell Farm discharge was harmful to the receiving water macroinvertebrate community. Violations of "Biological Integrity" and "Imbalances of Aquatic Fauna" were attributed to the discharge. Violations of the total and fecal coliform standards also occurred in Carpenters Branch, at the edge of the Showell Farm mixing zone. Although the effluent was not toxic to the fish, *Notropis leedsi*, it did contain high concentrations of nutrients, especially bioreactive nitrogen. As such, the algal growth potential downstream of this discharge was extremely elevated. This suggests that eutrophication may be a problem farther downstream in Bruce Creek or Choctawhatchee River/Bay, where water velocities are lowered, and conditions, therefore, become more favorable for algal growth.

Literature Cited

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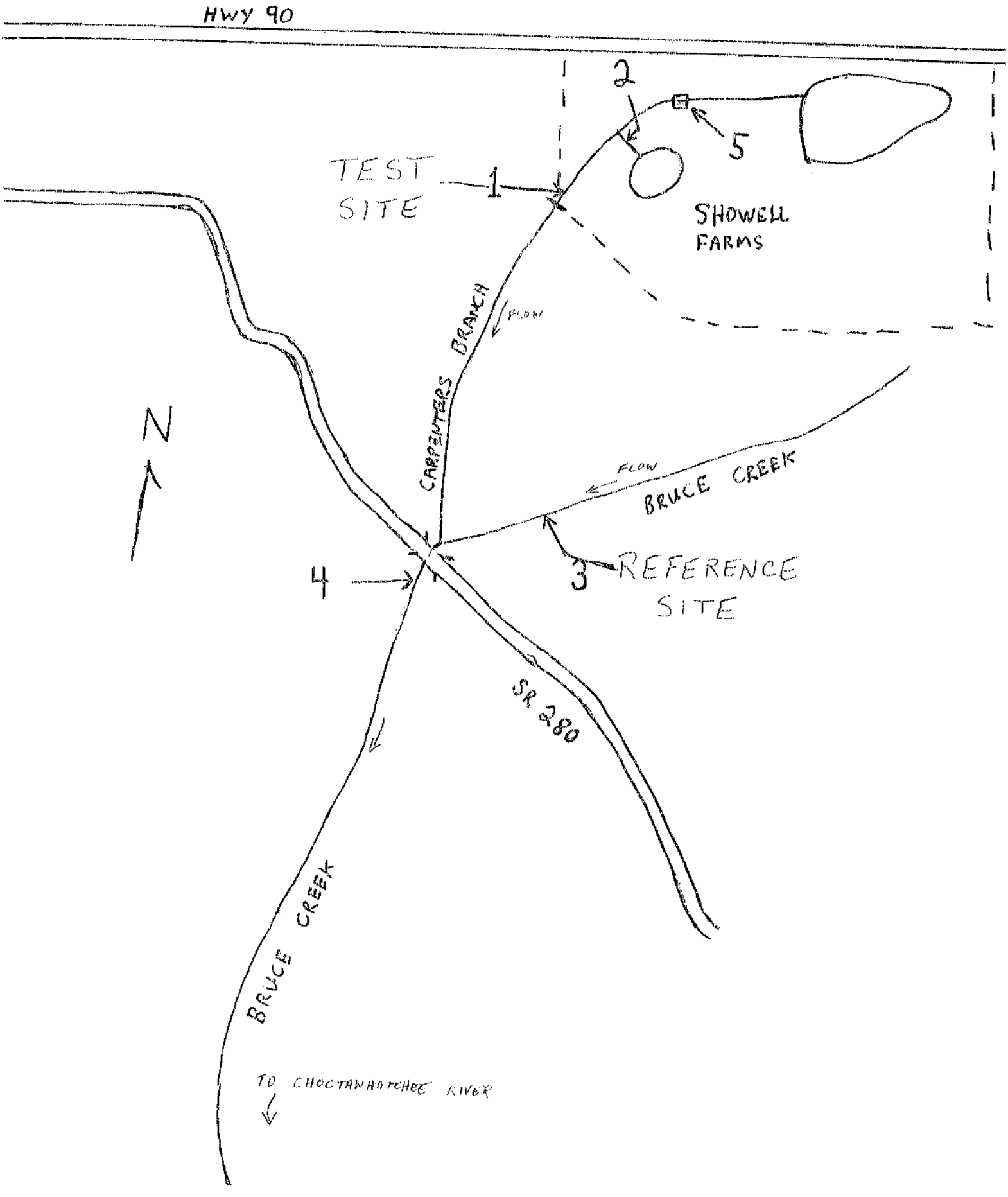
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SHOWELL FARMS MAP



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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 32.02.0029	DATE (M/D/Y): 09-06-90	RECEIVING BODY OF WATER: CARPENTERS CREEK

REMARKS:	LOCATION: DeFuniak Springs	FIELD ID/NAME: Showell Farms

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 18	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 19	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 8	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 6	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 9	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

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

TOTAL SCORE 60 (65 RAF)

COMMENTS: IMPOUNDED HEADWATERS; 1100 ft of mixing zone area appears natural w/ leaf packs, roots, fallen logs, CPOM areas. BIO reflects eff. conditions not lack of habitat

ANALYSIS DATE: 09-06-90	YST: G. Butts	SIGNATURE: Glenn L Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8016 / SUBMITTING AGENCY NAME: NW FDGR	STORET STATION NUMBER: 32.02.0029	DATE (M/D/Y): 6-6-90	RECEIVING BODY OF WATER: CHIPOLA TERS CREEK
REMARKS:	LOCATION: TENMILE SPRINGS	FIELD ID/NAME: SHOWELL FARMS	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
25	75	5	5	0	40	

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

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

Point-Source Pollution (list location and describe):

FIELDS MANURE AGRICULTURAL SOME UNPAVED RUNOFF

Estimated Stream Width (range, m): 3	Estimated Stream Depth (range, m): .5		yes
High Water Mark (m above bed): 1	Velocity (range, m/s): 0.25	Impounded [X] / Channelized [X]	

Canopy Cover % (check box): Open: [ ] Lightly Shaded: [ ] Moderately Shaded: [X] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [X] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	20
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	10
Sand:	60	Mud/Muck (organic):	10

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	27.73	5.1	Secchi Depth (m):	
Mid-depth	NA	NA	pH (SU):	6.7
Bottom	NA	NA	Conductivity (µmho/cm):	385
			Other Parameters:	

Stream Type (check box): Blackwater: [ ] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [X] Alluvial: [ ] Other: [ ]

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

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

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

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

Weather Conditions:
STABLE RAINFALL
PAST 4-6 WEEKS

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

ANALYSIS(DATE): 06-6-90	TEAM: G. GUTTS	SIGNATURE: Glenn F. Gutts

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

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 32.02.0058	DATE (M/D/Y): 09-06-90	RECEIVING BODY OF WATER: BRUCE CREEK CONTROL
REMARKS:	LOCATION: UPSTREAM FROM CONFLUENCE W/ RECEIVING STREAM		FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover — 21	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity — 6	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration — 12	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability — 10	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality — 9	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
5	Add 5 **points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	58 (63 adj)

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09-06-90	G. Butts	Glenn L. Butts

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8010 / SUBMITTING AGENCY NAME: NW FDER	STORET STATION NUMBER: 32.02.0058	DATE (MM/YY): 09-06-90	RECEIVING BODY OF WATER: UPSTREAM OF BRUCE CREEK AT US 280
R: MAHKS:	LOCATION: BACKGROUND UPSTREAM FROM CONFLUENCE W/ RECEIVING STREAM	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
85	5	5				5

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

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

Point-Source Pollution (list location and describe):

SR 280 SOME AGRICULTURAL

Estimated Stream Width (range, m): 5	Estimated Stream Depth (range, m): .6		yes
High Water Mark (m above bed): 1	Velocity (range, m/s): < 0.1	Impounded [ ] / Channelized [ ]	

Canopy Cover % (check box): Open: [ ] Lightly Shaded: [ ] Moderately Shaded: [X] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

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

Sediment Oils: Absent: [X] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposits: Sludge: [ ] Paper Fiber: [ ] Mud: [X] Sand: [X] Shell: [ ] Other: [ ]

Substrate Types (estimated % surface coverage):

Limestone:	0	Sand/Silt/Clay Mix:	40
Consolidated Clay:	0	Clay/Silt (inorganic):	20
Gravel/Shell		Coarse Organic Debris:	10
Sand:	20	Mud/Muck (organic):	10

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):
Top	28.31	5.94
Mid-depth	NA	NA
Bottom	NA	NA

Secchi Depth (m):

pH (SU): 5.59

Conductivity (umho/cm): 31

Other Parameters:

Stream Type (check box): Blackwater: [X] Deep Aquifer Fed: [ ] Surficial Aquifer Fed: [X] Alluvial: [ ] Other: [ ]

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

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

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

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

Weather Conditions:

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

ANALYSIS DATE: 9-6-90	ANALYST: C. Burnett	SIGNATURE:

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Showell Farms
Address/City:
County: Sussex
Contact/District:
NPDES Permit #: _____ **Outfall #:** _____

Sample Collection: Date 9-11-90 Time 1000
Test Beginning: Date 9-12-90 Time 1110
Test Ending: Date 9-14-90 Time 1000
Test Organism: N. ledsi
Life Stage/Age: 17 days

Test Number: 2 of 2 **Test Type:** Screening | Definitive
Static | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

		Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	16	5	5	5	7.7	8.4	8.3	7.8	8.2	8.3	23.3	22.8	22.9			
"	5	5	5	5	7.7	8.5	8.3	7.8	8.2	8.3				238		310
100%	20	5	5	5	8.6	8.2	8.3	7.1	7.3	8.1	21.0	21.0	22.9			
"	36	5	5	5	8.1	8.5	8.1	7.1	7.8	8.1				614		610
Feeding																
Measured/Loaded by:		BNF	MF	MF	SMC	AWM	JME	SMC	AWM	JME KML	SMC	AWM	JME	SMC	AWM	JME KML
Recorded by:		MF	MF	MF	LB	LB	KML	LB	LB	KML	LB	LB	KML	LB	LB	KML

Investigators' Signatures

K Allwarding

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

Ammonia meter slope: _____

MICROTOX™ Data Reduction Sheet

SOURCE: Slocum Fasun EFF

GRAPH CALC EC _____ (_____ MIN, _____ ° C) = _____ %SAMPLE mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 9/12/90 TIME:

VISUAL COLOR: CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS (DRY NaCl) OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: Mark Cunyus REAGENT VIAL LOT NO. M-

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	T5	T15	NOTES
A1	0	113	94	X	X	151
B1		114	93			150
C1		110	91			151
A2	12.38	108	90		.101	145
B2		111	95			153
C2		118	96			158
A3	24.75	120	96		-.110	147
B3		115	103			150
C3		129	117			161
A4	49.5	124	110		-.11	157
B4		120	105			153
C4		115	103			147
A5	99	141	115		-.22	166
B5		139	126			165
C5		141	124			165
EC_{50} (MIN, ° C)				Stimulatory		

REVIEWED BY:

DATE: 12/12/90

Sample Number: 90-SEP-08-02-01 Sample Status: Authorized by Tim Fitzpatrick
Sample location: Carpenter's Creek below Showell Farms Matrix: Fresh Surf Water
Field ID: #1 TEST SITE Storet Station Number:
Date/Time Collected: 5-SEP-1990 10:39:09.39
Comments:

Sample Number: 90-SEP-08-02-01 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	lead	3 U	ug/L

Sample Number: 90-SEP-08-02-01 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 U	ug/L

Sample Number: 90-SEP-08-02-01 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	138	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	435	ug/L
01051	lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L

Continued

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Cont.. from previous page for Sample Number: 90-SEP-08-02-01 Analysis id: W-ICP-23

01087	Vanadium	NR	ug/L
01092	Zinc	8 T	ug/L

Sample Number: 90-SEP-08-02-02 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: Carpenter's Creek below Showell Farms Matrix: Effluent
Field ID: #2 Storet Station Number:
Date/Time Collected: 5-SEP-1990 10:39:09.39
Comments:

Sample Number: 90-SEP-08-02-02 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	3 U	ug/L

Sample Number: 90-SEP-08-02-02 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 K	ug/L

Sample Number: 90-SEP-08-02-02 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	100 U	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	148	ug/L
01051	Lead	NR	ug/L

Continued

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantitation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-08-02-02 Analysis id: W-ICP-23

00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	7 T	ug/L

Sample Number: 90-SEP-08-02-03 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: Bruce Creek above Showell off.background Matrix: Fresh Surf Water
Field ID: #3 REFERENCE SITE Storet Station Number:
Date/Time Collected: 5-SEP-1990 13:05:09.39
Comments:

Sample Number: 90-SEP-08-02-03 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	lead	3 U	ug/L

Sample Number: 90-SEP-08-02-03 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 U	ug/L

Sample Number: 90-SEP-08-02-03 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	247	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L

Continued

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-08-02-03 Analysis id: W-ICP-23

01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	964	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	5 U	ug/L

Sample Number: 90-SEP-08-02-04
Sample Location: Bruce Creek at SR 280
Field ID: #4
Date/Time Collected: 5-SEP-1990 10:39:09.39
Comments:

Sample Status: Authorized by Tim Fitzpatrick
Matrix: Fresh Surf Water
Storet Station Number:

Sample Number: 90-SEP-08-02-04
Analysis Id: PB-G-W

Test status: Authorized by Jack Merritt
Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	3 U	ug/L

Sample Number: 90-SEP-08-02-04
Analysis Id: CD-G-W

Test status: Authorized by Jack Merritt
Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 K	ug/L

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
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L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimm detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-08-02-04 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	216	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	702 A	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	5 U	ug/L

Sample Number: 90-SEP-08-02-05 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: NW District Chem Lab.DI Water Matrix: Field Blank
Field ID: Field Blank Storet Station Number:
ate/Time Collected: 5-SEP-1990 10:39:09.39
Comments:

Sample Number: 90-SEP-08-02-05 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	6 A	ug/L

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
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L - Actual value is known to be greater than value given
N - Not analyzed for this compound
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U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-08-02-05 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water saple

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 U	ug/L

Sample Number: 90-SEP-08-02-05 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	100 U	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	3 U	ug/L
01051	Lead	NR	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	40	ug/L
	COMMENT	Zn, Pb results confirmed	

End of Report

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-OCT-11-08-01 Sample Status: Authorized by Yuh-Hsu Pan
Sample Location: Showell Farms Eff Matrix: Effluent
Field ID: 1 Storet Station Number:
Date/Time Collected: 3-OCT-1990 10:35:03.53
Comments:

Sample Number: 90-OCT-11-08-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NH3 Analysis Description: Analysis for ammonia in water

Storet Number	Analyte	Result	Units
00610	Ammonia-N	0.41 A	mg N/L

Sample Number: 90-OCT-11-08-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NO2NO3 Analysis Description: Analysis for nitrite+nitrate in water

Storet Number	Analyte	Result	Units
00630	NO2NO3-N	25 A	mg N/L

Sample Number: 90-OCT-11-08-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TKN Analysis Description: TKN for water sample

Storet Number	Analyte	Result	Units
00625	N_KJEL_TOT	1.9 A	mg N/L

Sample Number: 90-OCT-11-08-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TOC Analysis Description: Total organic carbon

Storet Number	Analyte	Result	Units
00680	TOC	6	mg C/L

Sample Number: 90-OCT-11-08-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TP Analysis Description: Analysis for total phosphorus in water

Storet Number	Analyte	Result	Units
00665	Total-P	1.4 A	mg P/L

A – Value reported is the mean of two or more determinations
E – Scientific notation
J – Estimated value
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L – Actual value is known to be greater than value given
N – Not analyzed for this compound
T – Value reported is less than the practice quantiation limit
U – Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A – Not applicable NR – Not requested

Sample Number: 90-OCT-11-08-02 Sample Status: Authorized by Yuh-Hsu Pan
Sample Location: Snowell Farms Mixing Zone Matrix: Fresh Surf Water
Field ID: 2 TEST SITE Storet Station Number:
e/Time Collected: 3-OCT-1990 12:00:03.53
Comments:

Sample Number: 90-OCT-11-08-02 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NH3 Analysis Description: Analysis for ammonia in water

Storet Number	Analyte	Result	Units
00610	Ammonia-N	0.21 A	mg N/L

Sample Number: 90-OCT-11-08-02 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NO2NO3 Analysis Description: Analysis for nitrite+nitrate in water

Storet Number	Analyte	Result	Units
00630	NO2NO3-N	9.4 A	mg N/L

Sample Number: 90-OCT-11-08-02 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TKN Analysis Description: TKN for water sample

Storet Number	Analyte	Result	Units
00625	N_KJEL_TOT	1.5 A	mg N/L

Sample Number: 90-OCT-11-08-02 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TOC Analysis Description: Total organic carbon

Storet Number	Analyte	Result	Units
00680	TOC	3	mg C/L

Sample Number: 90-OCT-11-08-02 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TP Analysis Description: Analysis for total phosphorus in water

Storet Number	Analyte	Result	Units
00665	Total-P	0.77 A	mg P/L

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-OCT-11-08-03 Sample Status: Authorized by Yuh-Hsu Pan
Sample Location: Bruce Creek Background for Showell Farms Matrix: Fresh Surf Water
Field ID: 3 Storet Station Number:
e/Time Collected: 3-OCT-1990 12:50:03.53
Comments:

Sample Number: 90-OCT-11-08-03 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NH3 Analysis Description: Analysis for ammonia in water

Storet Number	Analyte	Result	Units
00610	Ammonia-N	0.011 T	mg N/L

Sample Number: 90-OCT-11-08-03 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-NO2NO3 Analysis Description: Analysis for nitrite+nitrate in water

Storet Number	Analyte	Result	Units
00630	NO2NO3-N	0.020 U	mg N/L

Sample Number: 90-OCT-11-08-03 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TKN Analysis Description: TKN for water sample

Storet Number	Analyte	Result	Units
00625	N KJEL, TOT	0.89 A	mg N/L

Sample Number: 90-OCT-11-08-03 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TOC Analysis Description: Total organic carbon

Storet Number	Analyte	Result	Units
00680	TOC	4	mg C/L

Sample Number: 90-OCT-11-08-03 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TP Analysis Description: Analysis for total phosphorus in water

Storet Number	Analyte	Result	Units
00665	Total-P	0.28 A	mg P/L

A – Value reported is the mean of two or more determinations
E – Scientific notation
J – Estimated value
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L – Actual value is known to be greater than value given
N – Not analyzed for this compound
T – Value reported is less than the practice quantiation limit
U – Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A – Not applicable NR – Not requested

Macroinvertebrate taxa list for Showell Farms Inc., Walton County, Florida, collected via Hester-Dendy samplers at a reference station (Bruce Creek upstream of Carpenter's Creek) and a test site (downstream of the outfall in Carpenter's Creek) on 3 October, 1990.

	Reference Site	Test Site
Coleoptera		
Ancyronyx variagata	+	–
Diptera		
Ablabesmyia mallochi	+	–
Corynoneura sp.	+	–
Dicrotendipes sp.	–	+
Glyptotendipes lobiferus	–	+
Goeldichironomus holoprasinus	–	+
Helopelopia sp.	+	–
Meropelopia sp.	+	–
Nanocladius distinctus	–	+
Polypedilum fallax grp.	+	–
Polypedilum illinoense	+	+
Polypedilum scalaenum	+	–
Undetermined dipteran pupae	–	+
Rheocricotopus robacki	+	–
Tanypus sp.	+	–
Tribelos jucundum	+	–
Ephemeroptera		
Stenonema mexicanum integrum	+	–
Stenonema smithae	+	–
Stenacron floridense	+	–
Gastropoda		
Elimia floridensis	–	+
Ferrissia sp.	–	+
Physella heterostropha pomila	–	+
Hirudinea		
Helobdella sp.	–	+
Mooreobdella tetragon	–	+
Lepidoptera		
Undetermined lepidopteran	–	+
Malacostraca		
Hyalella azteca	–	+
Odonata		
Argia fumipennis	+	–
Argia sedula	+	–
Boyeria vinosa	+	–
Calopteryx maculata	+	–
Enallagma sp.	–	+
Macromia taeniolata	+	–
Oligochaeta		
Limnodrilus hoffmeisteri	–	+
Nais elinguis	–	+

Pristina leidyi	–	+
Trichoptera		
Cheumatopsyche sp.	–	+
Total	20	18

Macroinvertebrate taxa list for Showell Farms Inc., Walton County, Florida, collected via timed qualitative methods (dip net, ponar, etc.) at a reference station (Bruce Creek upstream of Carpenter's Creek) and a test site (downstream of the outfall in Carpenter's Creek) on 6 September, 1990.

	Reference Site	Test Site
Coleoptera		
Stenelmis sp.	+	–
Diptera		
Ablabesmyia mallochi	+	–
Ablabesmyia parajanta	+	–
Chironomus sp.	+	+
Cryptochironomus fulvus grp.	+	–
Dicrotendipes modestus	+	–
Dicrotendipes neomodestus	+	–
Glyptotendipes lobiferus	–	+
Goeldichironomus holoprasinus	–	+
Microtendipes sp.	+	–
Natarsia sp.	–	+
Palpomyia grp. sp.	+	–
Polypedilum halterale grp.	+	–
Polypedilum illinoense	–	+
Polypedilum scalaenum	+	–
Procladius bellus	+	–
Stenochironomus hilaris	+	–
Stelechomyia perpulchra	+	–
Tanytarsus sp.	+	–
Tribelos jucundum	+	–
Ephemeroptera		
Hexagenia limbata	+	–
Stenonema mexicanum integrum	+	–
Gastropoda		
Physella heterostropha pomila	–	+
Hirudinea		
Helobdella sp.	–	+
Mooreobdella tetragon	–	+
Malacostraca		
Hyalella azteca	–	+
Procambarus sp.	+	–
Megaloptera		
Nigronia serricornis	+	–
Odonata		
Argia sedula	+	–
Argia sp.	+	–
Calopteryx maculata	+	–
Epitheca princeps	+	–
Neurocordulia alabamensis	+	–

Oligochaeta		
Eclipidrilus palustris	+	–
Undetermined tubificid w/o capilliform setae	+	+
Pelecypoda		
Sphaerium occidentale	+	–
Plecoptera		
Leuctra sp.	+	–
Trichoptera		
Anisocentropus pyraliodes	+	–
Nyctiophalax sp.	+	–
Oecetis sp.	+	–
Total	32	9

Periphyton taxa list for Showell Farms, Walton County, Florida, collected October 3, 1990.

	Control Site	Test Site
Diatoms		
Achnanthes exigua	–	+
Achnanthes lanceolata	–	+
Achnanthes linearis	–	+
Achnanthes microcephala	+	+
Actinella punctata	+	–
Cyclotella meneghiniana	–	+
Eunotia curvata	+	–
Eunotia flexuosa	+	–
Eunotia glacialis	+	–
Eunotia maior	+	–
Eunotia pectinalis	+	–
Eunotia pectinalis v. *ventricosa*	–	+
Eunotia tenella	+	–
Frustulia rhomboides	+	–
Gomphonema parvulum	–	+
Navicula radiosa	+	+
Navicula sp.1	+	–
Nitzschia acicularis	+	–
Nitzschia fonticola	–	+
Synedra ulna	–	+
Tabellaria fenestrata	+	–
Chlorophyta		
Characium sp.	–	+
Cosmarium sp.	+	–
Oocystis sp.	+	–
Protoderma sp.	–	+
Scenedesmus sp.	–	+
Scenedesmus perforatus	–	+
Schroederia sp.	–	+
Spondylosium sp.	+	–
Staurastrum sp.	+	–
Chyrsophyta		
Stipitococcus Sp.	+	–
Unknown Chrysophyte sp.	+	–
Cyanophyta		
Aphanocapsa sp.	+	–
Aphanothece sp.	+	+
Chroococcus sp.	+	+
Gloeocapsa sp.	+	–
Microcystis sp.	+	+
Oscillatoria sp.	–	+
Phormidium sp.	+	–
Rhabdoderma sp.	+	–
Euglenophyta		
Phacus sp.	–	+
Trachelomonas sp.	+	–
Total	**27**	**20**

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger:	Showell Farms
County:	Walton
NPDES Number:	FL0002453
State Permit Expiration Date:	December 1990 ?

Toxics Sampling Inspection (XSI)	
Date Sampled:	8 September 1990
Results:	No deleterious levels of metals in effluent. Organics analyses not performed due to samples being delayed in transit (samples arrived warm).

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	11 September 1990
Results:	Not toxic to the fish, *Notropis leedsi*.

Impact Bioassessment Inspection (IBI)	
Date Sampled:	6 September 1990 and 3 October 1990
Results:	Macroinvertebrate community very degraded. Violations of Biological Integrity Criteria and Imbalances of Aquatic Fauna attributed to the discharge. Total and fecal coliform violations. Very high nutrients, especially bioreactive nitrogen, resulting in elevated Algal Growth Potential downstream of discharge.

Water Quality Inspection (WQI)	
Date Sampled:	
Results:	

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide specific recommendations for renewal.