ADEM
Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2008 Monitoring Summary

Good ™

Silas Creek at Escambia County Road 4 downstream of bridge (31.07934/-86.88759)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Silas Creek watershed for biological and water quality monitoring as part of the 2008 Assessment of the Southeast Alabama River Basins. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. The 2008 water quality data will be used to evaluate the use support of Silas Creek.

Figure 1. Silas Creek at SSCE-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Silas Creek at SSCE-1 is a *Fish & Wildlife (F&W)* stream reach located within the Southern Pine Plains and Hills ecoregion in Escambia County. It is a tributary of the Conecuh River. Based on the 2000 National Land Cover Dataset, landuse within the watershed is composed primarily of evergreen forest. As of February 23, 2011, ADEM's NPDES Management System database shows one permitted discharge within the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Silas Creek at SSCE-1 is a low-gradient stream. Instream substrates were dominated by sand (Figure 1). Habitat quality and availability within the reach were rated *suboptimal* for supporting macroinvertebrate communities. A lack of instream habitat and a relatively straight channel, which leads to habitat destruction during high flow events, were noted in the habitat assessment.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be characterized by pollution-intolerant taxa groups, indicating *good* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Perdido-Escambia River
Drainage Area (mi^2)		25
Ecoregion[a]		65f
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	4
	Evergreen	59
	Mixed	10
Shrub/scrub		15
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		5
Development	Open space	2
	Low intensity	<1
Population/km^2[b]		1
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a. Southern Pine Plains & Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Silas Creek at SSCE-1, May 20, 2008.

Physical Characteristics		
Width (ft)		83
Canopy Cover		Mostly Open
Depth (ft)		
	Run	0.6
	Pool	1.5
% of Reach		
	Run	95
	Pool	5
% Substrate		
	Bedrock	5
	Cobble	1
	Mud/Muck	1
	Gravel	10
	Sand	78
	Silt	2
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Silas Creek at SSCE-1, May 20, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	61	Sub-optimal (53-65)
Sinuosity	48	Marginal (45-64)
Bank and Vegetative Stability	61	Sub-optimal (60-74)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**126**	
% Maximum Score	**57**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Silas Creek at SSCE-1, May 20, 2008.

Macroinvertebrate Assessment			
	Result	Scores	Rating
Taxa richness measures			
# EPT genera	4	16	Very Poor (<19)
Taxonomic composition			
% Non-insect taxa	10	75	Fair (61.9-92.7)
% Plecoptera	12	60	Excellent (>52.8)
% Dominant taxa	12	95	Excellent (>85.2)
Functional composition measures			
% Predators	50	100	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance	3	14	Poor (10.6-21.2)
% Nutrient tolerant organisms	19	85	Good (76.3-88.1)
WMB-I Assessment Score	--	**63**	**Good (57-78)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected May, July, and September 2008. Silas Creek at SSCE-1 met *F&W* use classification criterion for temperature, pathogens, and dissolved oxygen. The acidic stream pH values measured in 2008 are not unusual for this ecoregion. Median specific conductance and median total and dissolved manganese concentrations were higher than expected based on reference data collected in the Southern Pine Plains & Hills ecoregion. Most dissolved metals were below detection limits. No pesticides, atrazine, or semivolatile organic samples were collected.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. SSCE-1 met *F&W* use classification criteria for temperature, pathogens, and dissolved oxygen. Overall bioassessment results indicated the macroinvertebrate community to be in good condition.

Table 5. Summary of water quality data collected during 2008. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N		Min		Max	Med	Avg	SD	E
Physical									
Temperature (°C)	4		23.3		28.5	26.6	26.3	2.2	
Turbidity (NTU)	4		2.3		3.2	2.5	2.6	0.4	
Total Dissolved Solids (mg/L)	3		2.0		10.0	10.0	7.3	4.6	
Total Suspended Solids (mg/L)	3		1.0		3.0	2.0	2.0	1.0	
Specific Conductance (µmhos)	4		36.2		79.5	43.6 G	50.7	19.5	
Hardness (mg/L)	3		3.0		7.7	5.0	5.2	2.4	
Alkalinity (mg/L)	3	<	1.0	<	1.0	0.5	0.5	0.0	
Stream Flow (cfs)	4		19.7		34.1	25.2	26.1	6.5	
Chemical									
Dissolved Oxygen (mg/L)	4		7.6		8.2	7.9	7.9	0.3	
pH (su)	4		4.0 C		4.2 C	4.2	4.2	0.1	4
Ammonia Nitrogen (mg/L)	3	<	0.015	<	0.015	0.008	0.008	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	3		0.107		0.123	0.109	0.113	0.009	
Total Kjeldahl Nitrogen (mg/L)	3	<	0.150	<	0.150	0.075	0.075	0.000	
Total Nitrogen (mg/L)	3	<	0.182	<	0.198	0.184	0.188	0.009	
Dissolved Reactive Phosphorus (mg/L)	3		0.010		0.014	0.013	0.012	0.002	
J Total Phosphorus (mg/L)	2	<	0.013		0.022	0.017	0.018	0.006	
CBOD-5 (mg/L)	3	<	1.0	<	1.0	0.5	0.5	0.0	
Chlorides (mg/L)	3		2.3		3.2	2.4	2.6	0.5	
Total Metals									
Aluminum (mg/L)	3		0.273		0.626	0.319	0.406	0.192	
Iron (mg/L)	3		0.557		0.693	0.645	0.632	0.069	
Manganese (mg/L)	3		0.022		0.059	0.046 M	0.042	0.019	
Dissolved Metals									
Aluminum (mg/L)	3		0.129		0.529	0.215	0.291	0.211	
Antimony (µg/L)	3	<	2.0	<	2.0	1.0	1.0	0.0	
Arsenic (µg/L)	3	<	2.2	<	2.2	1.1	1.1	0.0	
Cadmium (mg/L)	3	<	0.003	<	0.005	0.002	0.002	0.001	
Chromium (mg/L)	3	<	0.004	<	0.013	0.002	0.004	0.003	
Copper (mg/L)	3	<	0.005	<	0.013	0.002	0.004	0.002	
Iron (mg/L)	3		0.194		0.484	0.219	0.299	0.161	
Lead (µg/L)	3	<	1.5	<	1.5	0.7	0.7	0.0	
Manganese (mg/L)	3		0.022		0.058	0.045 M	0.042	0.018	
Mercury (µg/L)	3	<	0.0	<	0.0	0.0	0.0	0.0	
Nickel (mg/L)	3	<	0.004	<	0.006	0.003	0.003	0.001	
Selenium (µg/L)	3	<	1.5	<	1.6	0.8	0.8	0.0	
Silver (mg/L)	3	<	0.002	<	0.003	0.002	0.001	0.000	
Thallium (µg/L)	3	<	0.6	<	0.6	0.3	0.3	0.0	
Zinc (mg/L)	3	<	0.003	<	0.006	0.003	0.002	0.001	
Biological									
Chlorophyll a (ug/L)	3	<	0.10		1.60	0.53	0.73	0.79	
J Fecal Coliform (col/100 mL)	3		1		31	2	11	17	

C=value exceeds criteria for *F&W* use classification; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples.