2014 Monitoring Summary

ADEM
Alabama Department of Environmental Management
Use Support Assessment

Poor

Silas Creek at Escambia County Road 4 (31.079337/-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 Basin-wide Screening Assessment of the Southeast Alabama (SEAL) River Basins. A previous survey of Silas Creek at SSCE-1 indicated the fish community to be in *poor* condition. Data collected during the 2014 study will be used to provide additional data to fully assess the biological, chemical, and physical conditions within the reach, and determine use support status of Silas Creek for the 2016 Integrated Water Quality Report.

Figure 1. Silas Creek at SSCE-1, June 9, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Silas Creek is a *Fish & Wildlife (F&W)* stream within the Southern Pine Plains & Hills ecoregion near the town of Roberts, AL. According to the 2011 National Land Cover Dataset, land use within the watershed is primarily forest (73%). As of April 1, 2016 ADEM one NPDES outfall is present in the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community 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 glide-pool stream reach characterized by a sandy substrate mixed with gravel and organic matter (Figure 1). Overall habitat quality was categorized as *marginal* for supporting fish communities due to sedimentation, bank erosion and a lack of instream habitat.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh 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, May 13, 2013.

Table 2. Physical Characteristics of Silas Creek at SSCE-1, July 1, 2014.

Physical Characteristics		
Width (ft)		50
Canopy cover		Mostly Open
Depth (ft)	Run	3.5
	Pool	5.0
% of Reach	Run	50
	Pool	50
% Substrate	Clay	5
	Gravel	25
	Sand	50
	Organic Matter	20

BIOASSESSMENT RESULTS

The fish community in Silas Creek at SSCE-1 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for wadeable streams and rivers across the State. The data collected during this survey were used to score the overall health of the fish community, based on conditions expected for wadeable streams and rivers in the Southern Plains Ichthyoregion. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, and abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Silas Creek at SSCE-1 was 26, indicating the fish community to be in *poor* condition.

Table 3. Results of the habitat assessment conducted on Silas Ck at SSCE-1, Jul 01, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	46	Marginal (31-<55)
Sediment Deposition	35	Marginal (31-<55)
Sinuosity	68	Sub-Optimal (55-79)
Bank Vegetative Stability	41	Marginal (31-<58)
Riparian Buffer	83	Sub-Optimal (60-84)
Habitat Assessment Score	**98**	
% of Maximum Score	**54**	**Marginal (31-<57)**

Table 4. Results of the fish community assessment conducted in Silas Creek at SSCE-1, July 1, 2014.

Fish Community Assessment	Results	Score
Species Richness & Diversity		
Total native species	10	1
Number shiner species	0	1
Number of sucker species	1	3
Number of centrarchid species	4	3
Number of darter+madtom species	1	1
Tolerance & Intolerance Measures		
Percent of tolerant species	75	1
Percent Green Sunfish & Yellow Bullhead	5	1
Trophic Measures		
Percent insectivorous cyprinids	0	1
Percent invertivores	65	5
Percent top carnivores	2.5	3
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	5	1
IBI Assessment Score		**26**
Condition		**Poor**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. Water samples and in situ parameters were collected from Silas Creek at SSCE-1 during March through October 2014 to help identify any stressors to the biological communities. The low stream pH was typical of streams within the Southern Plains and Hills ecoregion. Dissolved zinc also exceeded *F&W* criteria for hardness-adjusted metals during three sampling events. Median dissolved aluminum concentrations were higher than 90% of all verified ecoregional reference reach data collected in the 65f ecoregion. Median specific conductance was higher than median concentration of all verified ecoregional reference reach data collected in the 65f ecoregion.

SUMMARY

The 2008 bioassessment results indicated the macroinvertebrate community in Silas Creek at SSCE-1 to be in *poor* condition and the fish community to be in *very poor* condition. The 2014 fish community results were slightly better than the previous assessment. Water quality data collected during 2014 suggest low pH concentrations to be potential causes for the deteriorated biological conditions in the stream. Additionally, sediment deposition, lack of suitable habitat, and weak bank/vegetative stability may also have affected the fish community. As part of the assessment process, ADEM will review the information in this report along with all other available data.

Table 5. Summary of water quality data collected March-October, 2014. 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	Q
Physical								
Temperature (°C)	8	15.0	26.7	22.8	21.6	4.1		
Turbidity (NTU)	8	2.2	17.4	5.6	7.3	5.3		
Total Dissolved Solids (mg/L)	7	15.0	61.0	43.0	41.4	14.4		
Total Suspended Solids (mg/L)	7	5.0	26.0	9.0	11.3	7.6		
Specific Conductance (µmhos)	8	19.6	90.5	28.9 G	40.6	26.9		
Hardness (mg/L)	4	3.0	6.8	3.6	4.3	1.7		
Alkalinity (mg/L)	7	< 0.9	< 1.09	0.5	0.5	0.0		
Stream Flow (cfs)	7	19.7	104.3	36.0	49.4	35.1		
Chemical								
Dissolved Oxygen (mg/L)	8	7.7	10.1	8.0	8.4	0.8		
pH (su)	8	4.0 C	5.0 C	4.4	4.5	0.4	8	
Ammonia Nitrogen (mg/L)	7	< 0.006	< 0.01	0.003	0.004	0.001		
Nitrate+Nitrite Nitrogen (mg/L)	7	0.043	0.165	0.061	0.097	0.053		
J Total Kjeldahl Nitrogen (mg/L)	7	< 0.054	0.383	0.226	0.220	0.148		
J Total Nitrogen (mg/L)	7	< 0.125	0.479	0.300	0.318	0.135		
J Dissolved Reactive Phosphorus (mg/L)	7	< 0.002	0.005	0.002	0.003	0.001		
J Total Phosphorus (mg/L)	7	0.007	0.019	0.010	0.010	0.004		
J CBOD-5 (mg/L)	7	< 2.0	< 2	1.0	1.0	0.0		
Chlorides (mg/L)	7	1.9	2.9	2.7	2.6	0.4		
Total Metals								
Aluminum (mg/L)	4	0.292	0.649	0.329	0.400	0.169		
Iron (mg/L)	4	0.349	0.771	0.484	0.522	0.179		
J Manganese (mg/L)	4	0.021	0.046	0.028	0.031	0.012		
Dissolved Metals								
J Aluminum (mg/L)	4	0.159	0.389	0.257 M	0.266	0.104		
J Antimony (µg/L)	4	< 0.2	2.8	0.1	0.8	1.4		
Arsenic (µg/L)	4	< 0.2	< 0.3	0.1	0.1	0.0		
Cadmium (µg/L)	4	< 0.246	< 0.39	0.123	0.141	0.036		
J Chromium (µg/L)	4	< 0.429	0.594	0.460	0.432	0.160		
J Copper (mg/L)	4	< 0.0003	< 0.001	0.001	0.001	0.000		1
J Iron (mg/L)	4	0.177	0.363	0.274	0.272	0.082		
Lead (µg/L)	4	< 0.2	< 0.5	0.1	0.2	0.1		
J Manganese (mg/L)	4	0.020	0.039	0.026	0.028	0.010		
J Nickel (mg/L)	4	0.001	0.004	0.002	0.002	0.001		
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0		
Silver (µg/L)	4	< 0.252	< 0.5	0.126	0.152	0.052		
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1		
J Zinc (mg/L)	4	0.005	0.030	B 0.0139	0.015	0.011		3
Biological								
Chlorophyll a (ug/L)	7	< 0.10	3.20	1.07	0.94	1.12		
E. coli (col/100mL)	7	8	980	31	193	357		

C=*F&W* criterion exceeded; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in subecoregion 65f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in subecoregion 65f; N=# samples; Q=# of uncertain exceedences; S=*F&W* hardness-adjusted