Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Good-Fair™

Sizemore Creek at Bell Fork Road in Escambia County (31.08913/-87.43064)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Sizemore Creek in Escambia County for biological and water quality monitoring as part of the 2015 Rivers and Streams Monitoring Project. The purpose of this project was to provide biological, chemical, and physical data to fully assess the use support status of each monitoring site and to estimate overall water quality statewide using habitat and macroinvertebrate surveys and intensive water quality data.

Figure 1. Sizemore Creek at SECE-1, May 6, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Sizemore Creek is a *Swimming/Fish & Wildlife (S/F&W)* stream located in Escambia County, southeast of Martinville, Alabama, within the Southern Pine Plains and Hills (65f) ecoregion. Based on the 2011 National Land Cover Dataset, landuse within the watershed is predominantly cultivated cropland with some pasture/hay and shrub/scrub areas. As of April 1, 2016, there are 25 active outfalls within this watershed, including industrial and mining.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate 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. Sizemore Creek at SECE-1 is a low-gradient, glide-pool stream with substrate composed primarily of sand with some gravel and snags/ woody debris (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic communities.

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 in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Sizemore Creek at SECE-1 to be in *good-fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Escambia R
Drainage Area (mi^2)		23
Ecoregion[a]		65F
Landuse[b]		
Open water		2%
Wetland	Woody	9%
	Emergent herbaceous	<1%
Forest	Deciduous	1%
	Evergreen	7%
	Mixed	3%
Shrub/scrub		16%
Grassland/herbaceous		6%
Pasture/hay		13%
Cultivated crops		34%
Development	Open space	4%
	Low intensity	2%
	Moderate intensity	<1%
	High intensity	<1%
Barren		2%
Population/km^2[c]		28
# NPDES Permits[d]	**TOTAL**	25
Construction		9
Industrial General		6
Mining		6
Small Mining		4

a. Southern Pine Plains & Hills

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Sizemore Creek at SECE-1, May 5, 2015.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	1.0
	Pool	2.5
% of Reach		
	Run	70
	Pool	30
% Substrate		
	Mud/Muck	2
	Gravel	10
	Sand	71
	Silt	2
	Organic Matter	15

Table 3. Results of the habitat assessment conducted on Sizemore Creek at SECE-1, May 5, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	51	Marginal (31-<55)
Sediment Deposition	40	Marginal (31-<55)
Sinuosity	48	Marginal (31-<55)
Bank Vegetative Stability	65	Sub-Optimal (58-79)
Riparian Buffer	63	Sub-Optimal (60-84)
Habitat Assessment Score	***99***	
% of Maximum Score	***58***	**Sub-Optimal (57-80)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Sizemore Creek at SECE-1, May 5, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	52
# EPT taxa	13
# Highly-sensitive and Specialized Taxa	2
Taxonomic composition measures	
% EPC taxa	33
% Trichoptera & Chironomidae Taxa	33
% EP Individuals	6
% Chironomidae Individuals	72
% Individuals in Dominant 5 Taxa	56
Functional feeding group	
% Collector-Filterer Individuals	23
% Tolerant Filterer Taxa	14
Community tolerance	
# Sensitive EPT	6
% Sensitive taxa	27
% Nutrient Tolerant individuals	39
WMB-I Assessment Score	**3-**
WMB-I Assessment Rating	Good-Fair

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2015 to help identify any stressors to the biological communities.

Stream pH measurements within Sizemore Creek at SECE-1 was typical of streams located in ecoregion 65f. E. coli exceeded the single sample summer criterion for *S/F&W* water use criterion during a high flow event in April and during more normal flow conditions in October.

Median specific conductance and hardness values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 65f. Nutrients were greater than 90% of all verified ecoregional reference reach data collected in the Southern Pine Plains & Hills ecoregion.

SUMMARY

The overall habitat quality for Sizemore Creek at SECE-1 was categorized as *sub-optimal* for this stream type. Bioassessment results indicated the macroinvertebrate community to be in *good-fair* condition. Water quality sampling indicated higher than expected conductivity and nutrient concentrations. Monitoring should continue to ensure that conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2015. 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)	10	17.2		23.4		19.9		20.4	2.3		
	Turbidity (NTU)	10	1.7		39.3		4.4		8.5	11.3		
	Total Dissolved Solids (mg/L)	8	29.0		40.0		34.0		34.2	4.9		
	Total Suspended Solids (mg/L)	8	< 1.0		20.0		3.0		5.1	6.4		
	Specific Conductance (µmhos/cm)	10	46.8		49.2		47.5	G	47.7	0.8		
	Hardness (mg/L)	4	13.0		14.6		14.4	G	14.1	0.7		
	Alkalinity (mg/L)	8	4.6		7.9		5.6		5.8	0.9		
	Monthly Stream Flow (cfs)	8	20.4		35.4		28.9		28.2	5.4		
	Measured Stream Flow (cfs)	8	20.4		35.4		28.9		28.2	5.4		
	Chemical											
	Dissolved Oxygen (mg/L)	10	7.7		8.9		8.1		8.2	0.4		
	pH (SU)	10	5.5	C	6.4		5.9		5.9	0.2	6	
	Ammonia Nitrogen (mg/L)	8	< 0.007		0.087		0.005		0.015	0.029		
	Nitrate+Nitrite Nitrogen (mg/L)	8	0.729		1.774		1.370	M	1.360	0.298		
J	Total Kjeldahl Nitrogen (mg/L)	8	< 0.064		0.801		0.304		0.329	0.254		
J	Total Nitrogen (mg/L)	8	< 1.366		2.307		1.597	M	1.689	0.315		
J	Dis Reactive Phosphorus (mg/L)	8	< 0.004		0.048		0.004		0.011	0.016		
	Total Phosphorus (mg/L)	8	0.012		0.134		0.018		0.032	0.041		
	CBOD-5 (mg/L)	8	< 2.0	<	2.0		1.0		1.0	0.0		
	Chlorides (mg/L)	8	4.3		6.3		6.1		5.9	0.7		
	Atrazine (µg/L)	1						<	0.10			
	Total Metals											
	Aluminum (mg/L)	4	< 0.106		1.660		0.053		0.455	0.804		
J	Iron (mg/L)	4	0.169		1.460		0.536		0.675	0.551		
J	Manganese (mg/L)	4	0.032		0.076		0.035		0.044	0.021		
	Dissolved Metals											
	Aluminum (mg/L)	4	< 0.106		0.808		0.053		0.242	0.378		
	Antimony (µg/L)	4	< 0.3	<	0.3		0.2		0.2	0.0		
J	Arsenic (µg/L)	4	< 0.3		0.6	H	0.1		0.3	0.2		1
	Cadmium (µg/L)	4	< 0.311	<	0.311		0.156		0.156	0.000		
J	Chromium (µg/L)	4	< 0.347		0.896		0.174		0.354	0.361		
J	Copper (µg/L)	4	< 0.218		1.097		0.238		0.421	0.467		
J	Iron (mg/L)	4	0.088		0.737		0.306		0.359	0.273		
	Lead (µg/L)	4	< 0.4	<	0.4		0.2		0.2	0.0		
J	Manganese (mg/L)	4	0.019		0.043		0.022		0.026	0.011		
J	Nickel (µg/L)	4	< 0.460		0.852		0.513		0.527	0.256		
	Selenium (µg/L)	4	< 0.4	<	0.4		0.2		0.2	0.0		
	Silver (µg/L)	4	< 0.365	<	0.365		0.182		0.182	0.000		
	Thallium (µg/L)	4	< 0.5	<	0.5		0.2		0.2	0.0		
J	Zinc (µg/L)	4	1.034		5.061		2.590		2.819	1.814		
	Biological											
	Chlorophyll a (mg/m³)	8	< 0.10		3.74		0.50		0.88	1.18		
J	E. coli (MPN/DL)	8	34.1		1732.9	H	108.1		326.2	573.9	2	

C=*S/F&W* criterion exceeded.; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H=*S/F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N= # of samples; Q= # of uncertain exceedances .

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