Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Fair

Slab Creek at Welcome Home Church Road in Marshall County (34.18304/-86.38111)

BACKGROUND

The Locust Fork watershed was identified as a Strategic Habitat Unit (SHU) by the Alabama Rivers and Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species. The Alabama Department of Environmental Management (ADEM) monitored Slab Creek in 2015 to provide additional biological, chemical, and physical data to fully assess its use support status.

Figure 1. Slab Creek at SLAM-3, May 27, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Slab Creek is a *Fish & Wildlife (F&W)* stream located in southern Marshall County near the city of Snead. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily pastureland with some forest (24%) and development (19%). As of April 1, 2016, a total of sixty-three outfalls were active in this watershed, most of which were industrial.

Table 2. Physical characteristics of Slab Creek at SLAM-3, May 27, 2015.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Mostly Open
Depth (ft)		
	Riffle	0.3
	Run	2.5
	Pool	2.5
% of Reach		
	Riffle	5
	Run	60
	Pool	35
% Substrate		
	Bedrock	10
	Boulder	10
	Clay	2
	Cobble	3
	Gravel	2
	Sand	50
	Silt	10
	Organic Matter	13

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior R
Drainage Area (mi^2)		55
Ecoregion[a]		68D
% Landuse[b]		
Open water		<1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	11%
	Evergreen	5%
	Mixed	8%
Shrub/scrub		3%
Grassland/herbaceous		1%
Pasture/hay		45%
Cultivated crops		7%
Development	Open space	9%
	Low intensity	7%
	Moderate intensity	2%
	High intensity	<1%
Barren		<1%
Population/km^2[c]		84
# NPDES Permits[d]	**TOTAL**	63
Construction		7
Industrial General		44
Municipal		8
No Exposure		1
Underground Injection Control		3

a.Southern Table Plateaus

b.2011 National Land Cover Dataset

c.2010 US Census

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

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. Slab Creek at SLAM-3 is a riffle-run stream reach characterized primarily by sand substrate (Figure 1). Overall habitat quality was categorized as *sub-optimal* for supporting a diverse aquatic macroinvertebrate community.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted at SLAM-3 rated the site as a *4*, or *fair*. Relative abundance and numbers of pollution-sensitive taxa were lower than expected, and a few taxa appeared to dominate the macroinvertebrate community (Table 4).

Table 3. Results of the habitat assessment conducted in Slab Creek at SLAM-3, May 27, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	60	Sub-Optimal (55-79)
Sediment Deposition	33	Marginal (31-<55)
Riffle Frequency	70	Sub-Optimal (55-79)
Bank Vegetative Stability	64	Sub-Optimal (58-79)
Riparian Buffer	80	Sub-Optimal (60-84)
Habitat Assessment Score	**121**	
% Maximum Score	**60**	**Sub-Optimal (57-80)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Slab Creek at SLAM-3, May 27, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness measures	
Total # Taxa	57
# EPT taxa	11
# Highly-sensitive and Specialized Taxa	0
Taxonomic composition measures	
% EPC taxa	19
% Non-insect taxa	14
% Dominant taxon	28
% Individuals in Dominant 5 Taxa	55
Functional feeding group measures	
% Predators	5
Tolerance measures	
# Sensitive EPT	3
% Sensitive taxa	18
% Taxa as Tolerant	37
WMB-I Assessment Score	**4**
WMB-I Assessment Rating	**Fair**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly during March through October 2015 to help identify any stressors to the biological community. Atrazine was above the minimum detection limit (MDL) on April 1, 2015; flow was measured due to hazardous flow conditions. *E. coli* counts exceeded single sample human health criterion in one summer sample collected in June. Stream flow was 55.1 cfs. Total dissolved solids (TDS), conductivity, hardness, alkalinity, total nitrogen, nitrate-nitrite nitrogen, dissolved reactive phosphorus, total phosphorus, chlorides, and dissolved iron concentrations were higher than expected based on comparison with reference reach data for streams in the Southern Table Plateaus ecoregion (68d). Turbidity was also greater than 50 NTU above the 90th percentile of reference reach data from this ecoregion during the high flows experienced in April and June.

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	10.2	25.8	16.5	17.7	4.8		
Turbidity (NTU)	10	1.1	343.0[T]	5.3	48.0	105.9		
Total Dissolved Solids (mg/L)	8	56.0	147.0	66.0[M]	81.5	31.3		
Total Suspended Solids (mg/L)	8	< 1.0	294.0	3.5	39.4	102.9		
Specific Conductance (µmhos/cm@25C)	10	90.9	261.9	112.3[G]	132.8	55.1		
Hardness (mg/L)	4	37.2	70.4	50.2[G]	52.0	14.3		
Alkalinity (mg/L)	8	17.5	72.5	29.9[M]	36.6	19.4		
Monthly Stream Flow (cfs)	9	1.3	117.5	13.5	37.0	43.3		
Chemical								
Dissolved Oxygen (mg/L)	10	5.7	11.9	8.7	9.0	1.9		
pH (su)	10	6.8	8.2	7.4	7.4	0.4		
[J] Ammonia Nitrogen (mg/L)	8	< 0.007	0.201	0.005	0.035	0.068		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.345	2.190	1.392[M]	1.267	0.670		
Total Kjeldahl Nitrogen (mg/L)	8	0.206	1.850	0.446	0.589	0.526		
Total Nitrogen	8	0.793	3.357	1.917[M]	1.856	0.850		
Dissolved Reactive Phosphorus (mg/L)	8	0.021	0.226	0.127[M]	0.120	0.079		
Total Phosphorus (mg/L)	8	0.048	0.515	0.175[M]	0.188	0.147		
[J] CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	8	5.0	26.0	6.2[M]	9.8	7.6		
Atrazine (µg/L)	1				1.07			
Total Metals								
[J] Aluminum (mg/L)	4	< 0.106	0.265	0.118	0.139	0.104		
[J] Iron (mg/L)	4	0.121	0.430	0.368	0.322	0.144		
[J] Manganese (mg/L)	4	< 0.004	0.082	0.043	0.042	0.033		
Dissolved Metals								
Aluminum (mg/L)	4	< 0.106	< 0.106	0.053	0.053	0.000		
Antimony (µg/L)	4	< 0.3	< 0.3	0.2	0.2	0.0		
[J] Arsenic (µg/L)	4	< 0.3	0.7[H]	0.5	0.5	0.3		3
Cadmium (µg/L)	4	< 0.311	< 0.311	0.156	0.156	0.000		
[J] Chromium (µg/L)	4	< 0.347	0.768	0.174	0.322	0.297		
[J] Copper (µg/L)	4	< 0.218	0.930	0.830	0.674	0.385		
[J] Iron (mg/L)	4	0.086	0.267	0.210[M]	0.193	0.076		
Lead (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0		
[J] Manganese (mg/L)	4	< 0.004	0.300	0.056	0.104	0.134		
[J] Nickel (µg/L)	4	< 0.460	1.335	0.433	0.608	0.521		
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	< 0.522	1.546	0.714	0.808	0.651		
Biological								
Chlorophyll a (ug/L)	8	< 0.10	2.40	0.50	0.77	0.94		
[J] E. coli (MPN/DL)	8	52.9	4839.2[H]	110.6	711.5	1668.9	1	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68d; H=*F&W*human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68d; N=# samples; Q=# of uncertain exceedances; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 68d.

SUMMARY

The habitat assessment conducted in Slab Creek at SLAM-3 indicated the reach to be *sub-optimal* for supporting a diverse biological community. Bioassessment results indicated the macroinvertebrate community in the reach to be in *fair* condition. However, the concentrations of multiple physical parameters and nutrients were higher than expected for ecoregion 68d. Atrazine was above MDL during a high flow event in April. *E. coli* exceeded the single sample human health criterion during a high flow event in June. Turbidity was also higher than expected during the April and June sampling events.

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