Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2013 Monitoring Summary

Good

Lick Fork at Jackson County Road 3 (34.85242/-86.24377)

BACKGROUND

Lick Fork at LICK-1 is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a "best attainable" condition reference watershed for comparison with streams throughout the Plateau Escarpment ecoregion.

The ADEM also selected the Lick Fork watershed for biological and water quality monitoring as part of the 2013 assessment of the Tennessee (TN) River Basin. The objectives of the TN River Basin assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin group. A habitat and a macroinvertebrate assessment were conducted on Lick Fork at LICK-1 on June 26, 2013.

Figure 1. Lick Fork at LICK-1, June 26, 2013.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi^2)		15
Ecoregion[a]		68c
% Landuse		
Wetland	Woody	<1
Forest	Deciduous	90
	Evergreen	1
	Mixed	1
Shrub/scrub		2
Grassland/herbaceous		1
Pasture/hay		3
Cultivated crops		1
Development	Open space	1
Population/km^2[b]		1
# NPDES Permits[c]	**TOTAL**	1
Municipal Individual		1

a.Plateau Escarpment

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Lick Fork at LICK-1 is a *Fish and Wildlife* (*F&W*) stream located in Jackson County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (92%). About one percent of the area is developed, and population density is very low. As of May 13, 2013, only one NPDES permit has been issued in the watershed.

Table 2. Physical characteristics of Lick Fork at LICK-1, June 26, 2013.

Physical Characteristics		
Width (ft)		**40**
Canopy Cover		**Estimate 50/50**
Depth (ft)		
	Riffle	**0.2**
	Run	**1.0**
	Pool	**2.0**
% of Reach		
	Riffle	**5**
	Run	**65**
	Pool	**30**
% Substrate		
	Clay	**1**
	Cobble	**10**
	Gravel	**34**
	Sand	**15**
	Silt	**10**
	Organic Matter	**30**

REACH CHARACTRISTICS

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. Lick Fork at LICK-1 is a riffle-run stream located in the Plateau Escarpment ecoregion (68c) (Figure 1). Benthic substrate in the reach consists primarily of gravel and organic matter. Overall habitat quality was rated as *sub-optimal* for supporting the macroinvertebrate community.

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 north Alabama streams and rivers. Each score is based on a 6-point scale, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted in Lick Fork at LICK-1 rated the macroinvertebrate community to be in *good* condition Table 4).

Table 3. Results of the habitat assessment conducted on Lick Fork at LICK-1, June 26, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	70	Sub-optimal (59-70)
Sediment Deposition	73	Optimal (>70)
Sinuosity	25	Poor (<45)
Bank and Vegetative Stability	53	Marginal (35-59)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**156**	
% Maximum Score	**65**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Lick Fork at LICK-1, June 26, 2013.

Macroinvertebrate Assessment	Results
Taxa richness measures	
Total # Taxa	74
# EPT taxa	20
# Sensitive EPT	12
# Highly-sensitive and Specialized Taxa	3
Taxonomic composition measures	
% EPC taxa	28
% Non-insect taxa	15
% Dominant taxon	17
Functional feeding group measures	
% Predators	7
Tolerance measures	
% Sensitive taxa	36
% Taxa as Tolerant	28
WMB-I Assessment Score	**3**
WMB-I Assessment Rating	**Good**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected in April, June, August, and October 2013 to help identify any stressors to the biological communities. Dissolved arsenic concentrations were higher than expected for *F&W* streams in one sample collected on October 16, 2013. Flow conditions were categorized as "visible but not measureable" at the time of sampling. Dissolved chromium concentrations were also higher than expected for *F&W* streams in three of the four samples collected. Median conductivity and concentrations of total dissolved solids, hardness, and alkalinity were higher than expected based on reference reach data for streams located in ecoregion 68.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Lick Fork at LICK-1 to be in *good* condition. Overall habitat quality was categorized as *sub-optimal* for supporting biological communities. Median conductivity and concentrations of total dissolved solids, hardness, and alkalinity were higher than expected for the ecoregion. Monitoring should continue to ensure that water quality and biological conditions meet current standards.

Table 5. Summary of water quality data collected April-October, 2013. 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)	5	11.4	21.4	20.6	18.3	4.3	
Turbidity (NTU)	4	1.9	3.9	3.8	3.4	1.0	
Total Dissolved Solids (mg/L)	4	128.0	162.0	143.0 M	144.0	17.5	
Total Suspended Solids (mg/L)	4	< 1.0	13.0	1.0	3.9	6.1	
Specific Conductance (µmhos)	5	225.3	311.7	282.2 G	275.6	31.3	
Hardness (mg/L)	4	122.0	163.0	139.5 G	141.0	18.2	
Alkalinity (mg/L)	4	111.0	155.0	139.0 M	136.0	18.3	
Stream Flow (cfs)	3	2.7	40.5	3.3	15.5	21.7	
Chemical							
Dissolved Oxygen (mg/L)	4	5.8	11.2	7.4	7.9	2.3	
pH (su)	5	7.5	8.0	7.6	7.6	0.2	
Ammonia Nitrogen (mg/L)	4	< 0.004	< 0.018	0.006	0.006	0.004	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.142	0.290	0.183	0.200	0.071	
Total Kjeldahl Nitrogen (mg/L)	4	0.221	0.265	0.235	0.239	0.018	
Total Nitrogen (mg/L)	4	0.377	0.511	0.433	0.438	0.058	
J Dissolved Reactive Phosphorus (mg/L)	4	< 0.004	0.008	0.006	0.006	0.002	
J Total Phosphorus (mg/L)	4	0.005	0.016	0.010	0.010	0.004	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	1.1	1.7	1.2	1.3	0.3	
Total Metals							
J Aluminum (mg/L)	4	< 0.076	0.085	0.060	0.061	0.026	
J Iron (mg/L)	4	0.055	0.179	0.113	0.115	0.051	
J Manganese (mg/L)	4	< 0.009	0.036	0.022	0.021	0.013	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.076	< 0.076	0.038	0.038	0.000	
Antimony (µg/L)	4	< 0.1	< 2.6	0.0	0.4	0.6	
J Arsenic (µg/L)	4	0.2	< 1.4 H	0.3	0.4	0.2	1
Cadmium (µg/L)	4	< 0.046	< 0.170	0.085	0.070	0.031	
J Chromium (mg/L)	4	0.691	< 32.000 S	0.878	4.612	7.594	
J Copper (mg/L)	4	< 0.0003	< 0.031	0.001	0.004	0.007	
J Iron (mg/L)	4	< 0.018	0.055	0.038	0.035	0.020	
Lead (µg/L)	4	< 0.1	< 1.1	0.0	0.2	0.2	
J Manganese (mg/L)	4	< 0.009	0.030	0.019	0.018	0.010	
Mercury (µg/L)	1			<	0.057		
J Nickel (mg/L)	4	< 0.0002	< 0.016	0.0003	0.004	0.008	
Selenium (µg/L)	4	< 0.2	< 1.4	0.1	0.3	0.3	
Silver (µg/L)	4	< 0.215	< 2.120	1.060	0.822	0.478	
Thallium (µg/L)	4	< 0.1	< 1.1	0.0	0.2	0.2	
J Zinc (mg/L)	4	< 0.002	< 0.017	0.002	0.004	0.003	
Biological							
Chlorophyll a (ug/L)	4	0.27	0.27	0.27	0.27	0.00	
E. coli (col/100mL)	4	46	435	174	207	165	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68; H=*F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68; N=# samples; Q=# of uncertain exceedances; S=*F&W* hardness-adjusted aquatic life use criteria exceeded.

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