Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2015 Monitoring Summary

™

Fair

Hurricane Creek just off Jackson County Road 9 (34.91799/-86.13300)

BACKGROUND

The Paint Rock River 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. Hurricane Creek, a tributary of Paint Rock River, is classified as an Outstanding Alabama Water (*OAW*) from its confluence with Paint Rock River north to the Tennessee state line.

Hurricane Creek is monitored by the Alabama Department of Environmental Management (ADEM) as a "best attainable condition" reference watershed for comparison with streams throughout the *Southwestern Appalachians* ecoregion.

Figure 1. Hurricane Creek at HURR-1, June 17, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hurricane Creek is an *Outstanding Alabama Water/Fish and Wildlife* (*OAW/F&W*) stream that drains approximately 44 square miles in Jackson County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (92%). Population density is low, as is the percentage of developed land (<3%). As of April 1, 2016, no NPDES outfalls were active in this 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. Hurricane Creek at HURR-1 is a low-gradient, glide-pool stream located in the Plateau Escarpment ecoregion (68C) (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting the macroinvertebrate community. This is primarily due to low channel sinuosity, along with a marginal riparian buffer.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was 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. The final score indicated the biological community at HURR-1 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi²)		44
Ecoregion[a]		68C
% Landuse[b]		
Open water		<1%
Wetland	Woody	<1%
Forest	Deciduous	92%
	Evergreen	<1%
	Mixed	1%
Shrub/scrub		1%
Grassland/herbaceous		<1%
Pasture/hay		3%
Cultivated crops		<1%
Development	Open space	<1%
	Low intensity	<1%
	Moderate intensity	<1%
Barren		<1%
Population/km²[c]		1

a. Plateau Escarpment

b. 2011 National Land Cover Dataset

c. 2010 US Census

Table 2. Physical characteristics of Hurricane Creek at HURR-1, June 17, 2015.

Physical Characteristics	
Width (ft)	30
Canopy Cover	Mostly Open
Depth (ft)	
Run	1.0
Pool	4.5
% of Reach	
Run	80
Pool	20
% Substrate	
Boulder	10
Cobble	40
Gravel	25
Sand	16
Silt	5
Organic Matter	4

Table 3. Results of the habitat assessment conducted on Hurricane Creek at HURR-1, June 17, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	69	Sub-optimal (55-79)
Sediment Deposition	68	Sub-optimal (55-79)
Sinuosity	43	Marginal (31-54)
Bank and Vegetative Stability	66	Sub-optimal (58-79)
Riparian Buffer	34	Marginal (31- 59)
Habitat Assessment Score	**104**	
% Maximum Score	**58**	**Sub-optimal (57-80)**

Table 4. Results of macroinvertebrate assessment conducted in Hurricane Creek at HURR-1, June 17, 2015.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	12	35
Taxonomic composition measures		
% Non-insect taxa	12	53
% Dominant taxon	12	99
% EPC	31	59
Functional feeding group measures		
% Predators	8	28
Tolerance measures		
% Taxa as Tolerant	31	52
WMB-I Assessment Score	**---**	**54**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly, March through October 2015, to help identify any stressors to the biological community. Values for total dissolved solids, alkalinity, specific conductivity and hardness, were higher than expected based on reference reach data for streams in ecoregion 68. Total dissolved arsenic concentrations exceeded the human-health criterion for *F&W* streams during the August, and October sampling dates; however, the ADEM criterion is based on dissolved trivalent arsenic. Additionally, daily maximum concentrations of *E. coli* exceeded the *OAW* human health criterion during six out of eight sampling events. No organic samples were collected.

SUMMARY

ADEM monitored Hurricane Creek at HURR-1 in 2015 to provide data to fully assess its use support as an *OAW/F&W* stream and to determine its continued suitability as a "best attainable" condition reference watershed. Results of the macroinvertebrate survey indicate the macroinvertebrate community to be in *fair* condition. Habitat condition was rated as *sub-optimal*. Conductivity, alkalinity, hardness, and E. coli were elevated at the site.

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

Parameter	N	Min	Max	Med	Avg	SD	Q	E
Physical								
Temperature (°C)	9	11.8	24.3	16.6	16.9	3.9		
Turbidity (NTU)	9	2.4	21.9	6.6	7.6	5.7		
Total Dissolved Solids (mg/L)	8	134.0	183.0	161.0 M	159.9	18.2		
Total Suspended Solids (mg/L)	8	< 1.0	5.0	2.5	2.8	2.0		
Specific Conductance (µmhos/cm)	9	213.0	295.0	265.0 G	259.8	25.9		
Hardness (mg/L)	4	47.1	174.0	153.0 G	131.8	57.3		
Alkalinity (mg/L)	8	89.6	135.0	112.5 M	113.7	15.9		
Monthly Stream Flow (cfs)	8	4.3	89.2	12.1	26.2	29.7		
Measured Stream Flow (cfs)	8	4.3	89.2	12.1	26.2	29.7		
Chemical								
Dissolved Oxygen (mg/L)	9	6.5	10.7	8.3	8.7	1.6		
pH (SU)	9	7.4	7.8	7.7	7.6	0.2		
J Ammonia Nitrogen (mg/L)	8	< 0.007	0.060	0.011	0.017	0.019		
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.037	0.147	0.104	0.095	0.040		
J Total Kjeldahl Nitrogen (mg/L)	8	0.091	0.681	0.317	0.390	0.196		
J Total Nitrogen (mg/L)	8	0.149	0.791	0.448	0.485	0.205		
J Dis Reactive Phosphorus (mg/L)	8	< 0.005	0.022	0.004	0.006	0.006		
J Total Phosphorus (mg/L)	8	< 0.007	0.023	0.014	0.014	0.007		
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
J COD (mg/L)	7	4.7	14.8	7.6	8.6	3.6		
J TOC (mg/L)	8	1.0	4.3	2.8	2.6	1.3		
J Chlorides (mg/L)	8	1.0	3.7	2.0	2.1	0.8		
Total Metals								
J Aluminum (mg/L)	4	< 0.014	0.162	0.032	0.058	0.073		
J Iron (mg/L)	4	< 0.015	0.305	0.192	0.174	0.124		
J Manganese (mg/L)	4	< 0.006	0.044	0.038	0.031	0.019		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.014	< 0.014	0.007	0.007	0.000		
J Antimony (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0		
J Arsenic (µg/L)	4	< 0.1	0.4 H	0.3	0.3	0.1	2	
J Cadmium (µg/L)	4	< 0.118	< 0.118	0.059	0.059	0.000		
J Chromium (µg/L)	4	0.299	0.425	0.388	0.375	0.055		
J Copper (µg/L)	4	< 0.180	0.567	0.255	0.292	0.240		
J Iron (mg/L)	4	< 0.015	0.137	0.116	0.094	0.059		
Lead (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0		
J Manganese (mg/L)	4	0.009	0.042	0.036	0.031	0.015		
J Nickel (µg/L)	4	< 0.232	0.700	0.180	0.294	0.277		
J Selenium (µg/L)	4	< 0.3	< 0.3	0.2	0.2	0.0		
J Silver (µg/L)	4	< 0.208	< 0.208	0.104	0.104	0.000		
Thallium (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0		
J Zinc (µg/L)	4	< 0.857	< 0.857	0.428	0.428	0.000		
Biological								
Chlorophyll a (mg/m³)	8	< 1.00	5.34	0.50	1.21	1.69		
E. coli (MPN/DL)	8	79.0	461.1 H	344.8	297.1	138.6	6	

E=# samples that exceeded criteria; G=value higher than median of all verified ecoregional reference reach data collected in ecoregion 68; H=OAW/*F&W* human health criterion exceeded; J=estimate; N=# samples; Q=# of uncertain exceedances; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 68;

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