Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Poor

Bughall Creek at Bullock County Road 177 (32.16144/-85.83485)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bughall Creek at BGHM-1 for biological and water quality monitoring as part of the 2015 Rivers and Streams Monitoring Project. The objectives of the project were to fully assess the each site and to estimate overall water quality within Alabama using habitat and macroinvertebrate surveys and intensive water quality data.

Figure 1. Bughall Creek at BGHM-1, April 8, 2015.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tallapoosa R
Drainage Area (mi^2)		32
Ecoregion[a]		65A
Landuse[b]		
Open water		2%
Wetland	Woody	7%
	Emergent herbaceous	<1%
Forest	Deciduous	19%
	Evergreen	30%
	Mixed	18%
Shrub/scrub		12%
Grassland/herbaceous		<1%
Pasture/hay		6%
Cultivated crops		2%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^2[c]		3

a. Blackland Prairie

b. 2011 National Land Cover Dataset

c. 2010 US Census

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bughall Creek at BGHM-1 is a *Fish and Wildlife* (*F&W*) stream located in the Blackland Prairie (65a) ecoregion of Bullock County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (67%). Less than five percent of the area is developed, and population density is low. As of April 1, 2016, there are no active outfalls in this watershed.

Table 2. Physical characteristics of Bughall Creek at BGHM-1, June 23, 2015.

Physical Characteristics		
Width (ft)		8
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	0.2
	Pool	1.0
% of Reach		
	Run	80
	Pool	20
% Substrate		
	Sand	79
	Silt	10
	Organic Matter	11

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. Bughall Creek at BGHM-1 is a light tannic, mostly-shaded, glide-pool stream (Figure 1). Benthic substrate in the reach consists primarily of sand, with some silt and snags/woody debris. Water levels were low, exposing much of the rootbank habitat throughout the reach. Overall habitat quality was rated as *marginal* for supporting macroinvertebrate 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. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. The metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Bughall Creek at BGHM-1, June 23, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	28	Poor (<31)
Sediment Deposition	43	Marginal (31-<55)
Sinuosity	88	Optimal (>79)
Bank Vegetative Stability	19	Poor (<31)
Riparian Buffer	75	Sub-Optimal (60-84)
Habitat Assessment Score	***81***	
% of Maximum Score	***47***	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Bughall Creek at BGHM-1, June 23, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	9
Taxonomic composition measures	
% Non-insect taxa	8
% Plecoptera	0
% Dominant taxon	24
Functional feeding group	
% Predators	4
Community tolerance	
Becks community tolerance index	0
% Nutrient tolerant individuals	55
WMB-I Assessment Score	**33**
WMB-I Assessment Rating	**Poor (19-37)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were scheduled for collection, March through October 2015, to help identify any stressors to the biological communities. However, the reach was dry, August through October and no samples could be collected during those months. Organics collected in April were below the minimum detection limits. E. coli counts exceeded *F&W* the summer single sample criterion during June following a rain event. Median concentrations of total iron, dissolved aluminum, dissolved iron, and dissolved manganese were higher than expected based on reference reach data for streams located in ecoregion 65a.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Bughall Creek at BGHM-1 to be in *poor* condition. Overall habitat quality was categorized as *marginal* for supporting biological communities due to limited instream habitat. Concentrations of some metals were higher than expected for the Blackland Prairie ecoregion. Monitoring should continue to ensure that water quality and biological conditions meet current standards.

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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)	7	17.2	26.0	19.7	20.9	3.5		
Turbidity (NTU)	7	19.4	26.6	22.6	22.5	2.5		
Total Dissolved Solids (mg/L)	5	84.0	101.0	91.0	92.2	6.5		
Total Suspended Solids (mg/L)	5	13.0	18.0	13.0	14.0	2.2		
Specific Conductance (µmhos/cm@25C)	7	98.0	134.9	107.6	110.6	13.1		
Hardness (mg/L)	2	50.6	57.7	54.2	54.2	5.0		
Alkalinity (mg/L)	5	28.2	53.0	35.7	39.2	9.7		
Monthly Stream Flow (cfs)	10	0.0	16.4	0.4	4.4	6.7		
Stream Flow during Sample Collection (cfs)	7	0.1	16.4	3.9	6.3	6.7		
Chemical								
Dissolved Oxygen (mg/L)	7	5.5	8.8	7.8	7.5	1.5		
pH (SU)	7	6.6	7.4	7.0	6.9	0.2		
Ammonia Nitrogen (mg/L)	5	< 0.010	0.074	0.005	0.025	0.030		
Nitrate+Nitrite Nitrogen (mg/L)	5	0.027	0.168	0.069	0.082	0.053		
Total Kjeldahl Nitrogen (mg/L)	5	0.315	0.850	0.741	0.650	0.225		
Total Nitrogen (mg/L)	5	0.483	0.935	0.801	0.732	0.185		
Dissolved Reactive Phosphorus (mg/L)	5	0.011	0.026	0.015	0.017	0.006		
Total Phosphorus (mg/L)	5	0.053	0.124	0.076	0.079	0.028		
CBOD-5 (mg/L)	5	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	5	3.4	5.1	4.7	4.3	0.8		
Atrazine (µg/L)	1				< 0.10			
Total Metals								
Aluminum (mg/L)	2	0.675	1.520	1.098	1.098	0.598		
Iron (mg/L)	2	1.900	2.840	2.370 M	2.370	0.665		
J Manganese (mg/L)	2	0.018	0.293	0.156	0.156	0.194		
Dissolved Metals								
Aluminum (mg/L)	2	< 0.106	0.225	0.139 M	0.139	0.122		
Antimony (µg/L)	2	< 0.3	< 0.3	0.2	0.2	0.0		
J Arsenic (µg/L)	2	1.0	2.7 H	1.8	1.8	1.2	2	
Cadmium (µg/L)	2	< 0.311	< 0.311	0.156	0.156	0.000		
J Chromium (µg/L)	2	0.430	0.673	0.552	0.552	0.172		
J Copper (µg/L)	2	0.506	0.526	0.516	0.516	0.014		
Iron (mg/L)	2	0.796	0.886	0.841 M	0.841	0.064		
Lead (µg/L)	2	< 0.4	< 0.4	0.2	0.2	0.0		
Manganese (mg/L)	2	< 0.004	0.248	0.125 M	0.125	0.174		
J Nickel (µg/L)	2	0.600	0.843	0.722	0.722	0.172		
Selenium (µg/L)	2	< 0.4	< 0.4	0.2	0.2	0.0		
Silver (µg/L)	2	< 0.365	< 0.365	0.182	0.182	0.000		
Thallium (µg/L)	2	< 0.5	< 0.5	0.2	0.2	0.0		
J Zinc (µg/L)	2	1.087	1.819	1.453	1.453	0.518		
Biological								
Chlorophyll a (mg/m³)	5	< 1.00	2.40	0.50	1.10	0.87		
J E. coli (MPN/DL)	5	159.7	579.4 H	248.9	307.5	166.7	1	

E=# samples that exceeded criteria; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65a; N=# samples; Q=# of uncertain exceedances;