ADEM
Alabama Department of Environmental Management

Rivers and Streams Monitoring Program

Use Support Assessment Site

2015 Monitoring Summary

™

Good-Very Good

Barn Creek approximately 100 feet east of Marion County Road 362 (34.14348/-87.79965)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Barn Creek in Marion County for biological and water quality monitoring as part of the 2015 Rivers and Streams Monitoring Project. The objectives of this project were to provide data to fully assess use support at each site and estimate overall water quality statewide using macroinvertebrate and habitat surveys and intensive water quality sampling.

Figure 1. Barn Creek at BARM-83, July 6, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Barn Creek is a *Fish & Wildlife (F&W)* stream in the Dissected Plateau ecoregion (68e) of Marion County. Based on the 2011 National Land Cover Dataset, land use within the watershed is composed of forest (72%), shrub/scrub, grassland and pasture/hay. Population density is low, and less than five percent of the watershed area is developed. As of April 1, 2016, no outfalls are 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. Barn Creek at BARM-83 is a riffle run stream characterized by bedrock, boulder, and cobble substrates (Figure 1). Overall habitat quality was rated as *optimal* for supporting diverse macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tombigbee River
Drainage Area (mi^2)		20
Ecoregion[a]		68E
% Landuse[b]		
Open water		<1%
Wetland	Woody	<1%
Forest	Deciduous	37%
	Evergreen	28%
	Mixed	7%
Shrub/scrub		15%
Grassland/herbaceous		4%
Pasture/hay		4%
Cultivated crops		<1%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		4

a. Dissected Plateau

b. 2011 National Land Cover Dataset

c. 2010 US Census

Table 2. Physical characteristics of Barn Creek at BARM-83, June 17, 2015.

Physical Characteristics	
Width (ft)	25
Canopy Cover	Mostly Shaded
Depth (ft)	
Riffle	0.3
Run	0.7
Pool	1.0
% of Reach	
Riffle	45
Run	50
Pool	5
% Substrate	
Bedrock	40
Boulder	20
Cobble	20
Gravel	5
Sand	5
Silt	5
Organic Matter	5

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, functional feeding group, and community tolerance are 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 in Barn Creek at BARM-83 rated the site as *good-very good*. Relative abundance and numbers of pollution-sensitive taxa were high, with little change in community structure and function (Table 4).

Table 3. Results of the habitat assessment conducted on Barn Creek at BARM-83, June 17, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	80	Optimal (>79)
Sediment Deposition	83	Optimal (>79)
Riffle frequency	87.5	Optimal (>79)
Bank Vegetative Stability	69	Sub-Optimal (58-79)
Riparian Buffer	70	Sub-Optimal (60-84)
Habitat Assessment Score	**154**	
% of Maximum Score	**81**	**Optimal (>80)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Barn Creek at BARM-83, June 17, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness measures	
Total # Taxa	80
# EPT taxa	26
# Highly-sensitive and Specialized Taxa	8
Taxonomic composition measures	
% EPC taxa	35
% Non-insect taxa	4
% Dominant taxon	17
% Individuals in Dominant 5 Taxa	45
Functional feeding group measures	
% Predators	14
Tolerance measures	
# Sensitive EPT	12
% Sensitive taxa	36
% Taxa as Tolerant	19
WMB-I Assessment Score	**3+**
WMB-I Assessment Rating Good-Very Good	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly and semi-monthly (metals) from March through October of 2015 to help identify any stressors to the biological communities. *In situ* parameters suggested Barn Creek at BARM-83 was meeting its *F&W* water use classification. Median concentrations of hardness and chlorides were higher than expected based on the 90th percentile of reference reaches within ecoregion 68e.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Bioassessment results indicated the macroinvertebrate community in Barn Creek at BARM-83 to be in *good-very good* condition. Habitat quality was rated as *optimal* for supporting diverse macroinvertebrate community. However, hardness and chlorides were higher than expected. Monitoring should continue to ensure that water quality and the biological community 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). Median (Med), 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
Physical						
Temperature (°C)	6	13.8	26.0	21.6	21.1	4.6
Turbidity (NTU)	5	3.1	8.6	6.3	6.1	2.0
Total Dissolved Solids (mg/L)	5	12.0	45.0	31.0	29.8	13.5
J Total Suspended Solids (mg/L)	5	1.0	12.0	5.0	5.6	4.2
Specific Conductance (µmhos/cm)	6	21.6	38.4	31.7	30.8	6.0
Hardness (mg/L)	3	7.8	14.5	12.9 G	11.7	3.5
Alkalinity (mg/L)	5	3.4	11.9	7.9	7.5	3.5
Monthly Stream Flow (cfs)	5	3.2	45.7	8.8	20.4	20.5
Measured Stream Flow (cfs)	5	3.2	45.7	8.8	20.4	20.5
Chemical						
Dissolved Oxygen (mg/L)	6	7.3	10.6	8.7	8.7	1.1
pH (SU)	6	6.1	7.2	6.7	6.7	0.4
Ammonia Nitrogen (mg/L)	5	< 0.007	0.042	0.005	0.012	0.017
Nitrate+Nitrite Nitrogen (mg/L)	5	< 0.001	0.170	0.119	0.107	0.063
Total Kjeldahl Nitrogen (mg/L)	5	0.150	0.451	0.280	0.306	0.129
Total Nitrogen (mg/L)	5	< 0.224	0.570	0.412	0.412	0.145
J Dis Reactive Phosphorus (mg/L)	5	< 0.003	0.004	0.003	0.003	0.001
Total Phosphorus (mg/L)	5	0.013	0.016	0.013	0.014	0.001
J CBOD-5 (mg/L)	5	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	5	1.0	1.6	1.3 M	1.3	0.2
Total Metals						
Aluminum (mg/L)	3	< 0.106	1.300	0.053	0.469	0.720
Iron (mg/L)	3	0.758	1.180	0.763	0.900	0.242
J Manganese (mg/L)	3	0.056	0.080	0.067 M	0.068	0.012
Dissolved Metals						
Aluminum (mg/L)	3	< 0.106	< 0.106	0.053	0.053	0.000
Antimony (µg/L)	3	< 0.3	< 0.3	0.2	0.2	0.0
Arsenic (µg/L)	3	< 0.3	< 0.3	0.1	0.1	0.0
Cadmium (µg/L)	3	< 0.311	< 0.311	0.156	0.156	0.000
J Chromium (µg/L)	3	< 0.347	0.409	0.174	0.252	0.136
J Copper (µg/L)	3	0.304	0.479	0.389	0.391	0.088
J Iron (mg/L)	3	0.180	0.598	0.496	0.425	0.218
Lead (µg/L)	3	< 0.4	< 0.4	0.2	0.2	0.0
J Manganese (mg/L)	3	0.043	0.075	0.046	0.055	0.018
Nickel (µg/L)	3	< 0.460	0.912	0.230	0.457	0.394
Selenium (µg/L)	3	< 0.4	< 0.4	0.2	0.2	0.0
Silver (µg/L)	3	< 0.365	< 0.365	0.182	0.182	0.000
Thallium (µg/L)	3	< 0.5	< 0.5	0.2	0.2	0.0
J Zinc (µg/L)	3	0.558	2.540	2.384	1.827	1.102
Biological						
Chlorophyll a (mg/m³)	5	< 0.59	1.07	0.67	0.77	0.25
J E. coli (MPN/DL)	5	28.8	178.5	139.6	121.5	62.9

J=estimate; G=value hogher than median concentration of all verified ecoregional reference reach data collected in the ecoregion (68e0; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion (68e); N= # samples.