

2019 Monitoring Summary



TM

Beaverdam Creek at Mt. Lebanon Rd in Madison County (34.87421/-86.60704)

BACKGROUND

Beaverdam Creek was placed on Alabama's 1998 CWA section 303 (d) list for impairment caused by siltation. Sampling was conducted to document conditions following the completion of a non-point source project in 2017 and the subsequent implementation of best management practices.

The Alabama Department of Environmental Management (ADEM) monitored Beaverdam Creek at BVDM-1 in 2019 to document water quality conditions. Habitat and a macroinvertebrate community survey were conducted to assess the health of the biological communities within the creek. Monthly water quality sampling was also conducted from March through July 2019.

In addition, the Beaverdam Creek is within the Flint River Strategic Habitat Unit (SHU), one of 50 identified by the U.S. Fish and Wildlife Service (USFWS) and the Alabama Rivers & Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species.



Figure 1. Beaverdam Creek at BVDM-1, May 28, 2019.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Beaverdam Creek is a *Fish & Wildlife (F&W)* stream located in the Eastern Highland Rim (71g) ecoregion of Madison County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily cultivated crops (45%), pasture (21%) and forest (11%). Approximately 8% of the watershed has been developed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat survey (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. Beaverdam Creek at BVDM-1 (Figure 1) is a low-gradient, cobble and gravel bottomed stream. Habitat quality and availability was rated as *fair* for supporting diverse aquatic macroinvertebrate communities due to sediment deposition and lack of sinuosity.

Table 1. Summary of general watershed characteristics: BVDM-1

Watershed Characteristics	
Basin	Tennessee
Drainage Area (mi ²)	25.5
Ecoregion*	71g
Assessment Unit	AL06030002-0305-100
Use Class	F&W
AU Category	5
12-digit Hydrologic Unit Code (HUC)†	060300020305
Conservation Status	
Strategic Habitat Unit	8 Flint River
HUC Watershed Condition*	
CWP Agriculture and Forestry	61
CWP Urban	70
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	0.3
Wetland, Total (%)	6.6
Wetlands, Woody (%)	6.1
Wetlands, Emergent Herbaceous (%)	0.5
Forested, Total (%)	11.1
Forested, Deciduous (%)	8.4
Forested, Evergreen (%)	1.8
Forested, Mixed (%)	0.9
Shrub/Scrub (%)	6.3
Grassland/Herbaceous (%)	1.7
Pasture/Hay (%)	20.9
Crops, Cultivated (%)	44.8
Developed, Total (%)	8.3
Developed, Open Space (%)	6.7
Developed, Low Intensity (%)	1.3
Developed, Medium Intensity (%)	0.2
Barren Land (Rock, Sand, Clay) (%)	0.1
Population/km (2010 US Census)	66
Roads	
Road Density	2.3
# Road Crossings per Stream km	0.7
Watershed Disturbance Score*	432
Watershed Disturbance Category*	6

* Eastern Highland Rim

† 12-digit HUC located in a Strategic Habitat Unit.

± 12-digit HUC identified as Clean Water Partnership priority watershed.

* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

Table 2. Physical characteristics of Beaverdam Creek at BVDM-1, May 28, 2019.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Estimate 50/50
Depth (ft)	
Run	1.5
Pool	2.0
% of Reach	
Run	5
Pool	95
% Substrate	
Bedrock	3
Boulder	5
Cobble	40
Gravel	30
Sand	5
Silt	15
Organic Matter	2

Table 3. Results of the habitat assessment survey conducted on Beaverdam Creek at BVDM-1, May 28, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	67	Sub-optimal (55-74.999)
Sediment Deposition	45	Marginal (30-49.999)
Sinuosity	33	Marginal (30-49.999)
Bank Vegetative Stability	63	Sub-optimal (55-74.999)
Riparian Zone Measurements	78	Sub-optimal/Optimal (75-79.999)
Habitat Assessment Score	112	
% Maximum Score	62	Sub-optimal (55-69.999)

Table 4. Results of the macroinvertebrate bioassessment conducted on Beaverdam Creek at BVDM-1, May 28, 2019.

Macroinvertebrate Assessment	Scores
Taxonomic richness and diversity metrics	
Taxa Count	49
# rare and highly sensitive taxa	1
# sensitive taxa	6
# sensitive EPT taxa	3
Percent taxon metrics	
% rare and highly sensitive taxa	2
% sensitive taxa	12
% sensitive EPT taxa	6
% highly tolerant taxa	14
Percent individual metrics	
% rare and highly sensitive individuals	0
% sensitive individuals	7
% sensitive EPT individuals	4
% tolerant individuals	26
WMB-I Survey Score	4.3
WMB-I Survey Rating	Fair-poor (4.15-4.499)

Table 5. Summary of water quality data collected March-July, 2019. 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.

BVDM-1 AL06030002-0305-100	N	Min	Max	Med	Avg	SD	10thP	90thP
Physical								
Temperature (°C)	6	13.7	25.8	24.2	21.6	4.9	13.7	25.8
Turbidity (NTU)	6	2.5	10.3	3.6	5.1	3.1	2.5	10.3
Total Dissolved Solids (mg/L)	4	70.0	78.0	73.0	73.5	3.4	70.0	78.0
Total Suspended Solids (mg/L)	4	1.0	3.0	2.5	2.2	1.0	1.0	3.0
Specific Conductance (µmhos/cm)	6	79.0	119.0	112.7	105.1	16.5	79.0	119.0
Alkalinity (mg/L)	5	17.5	77.0	34.2	41.3	23.6	17.5	77.0
Monthly Stream Flow (cfs)	3	0	0	0	0	0	0	0
Measured Stream Flow (cfs)	6	0.4	27.9	1.2	8.4	12.0	0.4	27.9
Chemical								
Dissolved Oxygen (mg/L)	6	6.6	11.4	7.9	8.4	1.7	6.6	11.4
pH (SU)	6	6.8 ^D	7.4	7.3	7.2	0.2	6.8	7.4
Ammonia Nitrogen (mg/L)	5	<0.004	0.067 ^D	0.002	0.019	0.028	0.002	0.067
Nitrate+Nitrite Nitrogen (mg/L)	5	0.115	2.520	1.640 ^M	1.535	0.878	0.115	2.520
Total Kjeldahl Nitrogen (mg/L)	5	0.139	0.539	0.359	0.353	0.186	0.139	0.539
Total Nitrogen (mg/L)	5	0.254	2.879	2.179 ^M	1.888	0.996	0.254	2.879
Dis Reactive Phosphorus (mg/L)	5	<0.006	0.011	0.006	0.006	0.003	0.003	0.011
Total Phosphorus (mg/L)	5	0.011	0.057	0.016	0.024	0.019	0.011	0.057
CBOD-5 (mg/L)	5	<2.0	<2.0	1.0	1.0	0.0	1.0	1.0
Chlorides (mg/L)	5	2.2	5.3	4.1 ^M	3.9	1.1	2.2	5.3
Sulfate (mg/L)	5	0.60	5.58	1.87	2.75	2.02	0.60	5.58
Biological								
Chlorophyll a (mg/m³)	5	<0.80	2.85	0.80	1.21	0.99	0.50	2.85
E. coli (MPN/DL)	5	47.1	210.5	93.4	104.5	66.0	47.1	210.5

D=an individual value >90% of all verified ecoregional reference reach data collected in the ecoregion 71g; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 71g; N=# samples.

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 pollution 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 condition of the macroinvertebrate community has been rated as *fair-poor*, identifying Beaverdam Creek at BVDM-1 as a level 4- site. During the sampling period, Beaverdam Creek was characterized by minimal flow and numerous fresh beaver sticks were observed in the area. Results of the survey suggest a slight improvement in biological conditions since 2013, with 49 total taxa, 6 sensitive taxa, and three sensitive EPT.

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly from March to July of 2019 to help identify any stressors to the biological communities.

Median nitrate-nitrite nitrogen, total nitrogen and chloride values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 71g. Values for pH and ammonia nitrogen were >90% of all verified ecoregional reference reach data collected in the ecoregion 71g.

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 to be in *fair-poor* condition. Overall habitat quality was categorized as *fair* for supporting diverse aquatic macroinvertebrate communities due to sediment deposition and lack of sinuosity. Results from water quality sampling indicated that median nitrate-nitrite nitrogen, total nitrogen and chloride values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 71g. Values for pH and ammonia nitrogen were >90% of all verified ecoregional reference reach data collected in the ecoregion 71g. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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