Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2019 Monitoring Summary

Excellent

Little Butler Creek at Lauderdale County Road 299 (34.98961/-87.64323)

BACKGROUND

Little Butler Creek is among the least-disturbed watersheds within the Western Highland Rim ecoregion, based on landuse, road density, and population density. The Alabama Department of Environmental Management (ADEM) monitored Little Butler Creek as a candidate "high quality" reference watershed for comparison with other streams within the ecoregion. Data from reference watersheds are used to characterize natural or background conditions expected in different ecoregions throughout the state. Little Butler Creek was sampled in 2019 to provide high-quality reference reach data for Western Highland Rim streams.

Little Butler Creek is within one of 50 Strategic Habitat Units (SHU) 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. Little Butler Creek at LBTL-3, May 1, 2019.

Table 1. Summary of general watershed characteristics: LBTL-3.

Watershed Characteristics	
Basin	Tennessee
Drainage Area (mi²)	3.1
Ecoregion°	71f
Assessment Unit	AL06030005-0507-200
Use Class	F&W
AU Category	3
12-digit Hydrologic Unit Code (HUC)	31502020503
Conservation Status	
Strategic Habitat Unit †	4 Shoal Creek
Landuse Categories (2021 National Land Cover Dataset)	
Wetland, Total (%)	2.7
Wetlands, Woody (%)	2.7
Emergent Herbaceous Wetlands (%)	0.1
Forested, Total (%)	42.9
Forested, Deciduous (%)	42.2
Forested, Evergreen (%)	0.4
Forested, Mixed (%)	0.3
Shrub/Scrub (%)	1.8
Grassland/Herbaceous (%)	8.9
Pasture/Hay (%)	38.4
Developed, Total (%)	5.3
Developed, Open Space (%)	4.4
Developed, Low Intensity (%)	0.6
Developed, Medium Intensity (%)	0.2
Population/km (2020 US Census Data)	54.79

° Weastern Highland Rim

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

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Butler Creek is a *Fish and Wildlife (F&W)* stream located in Lauderdale county near Pruitton, Alabama. According to the 2021 National Land Cover Dataset, the watershed is primarily forested (43%) with pasture (38%) and contains no permitted outfalls. Only 5% of the watershed has been developed. It is located within a Strategic Habitat Unit that supports eight federally listed threatened or endangered aquatic species and five other aquatic species listed to be of the *Highest* or *High Conservation Concern* by the state of Alabama.

Table 2. Physical characteristics of Little Butler Creek at LBTL-3, April 25, 2019.

Physical Characteristics	
Width (ft)	30
Canopy Cover	Mostly Shaded
Depth (ft)	
Riffle	0.5
Run	1.0
Pool	1.5
% of Reach	
Riffle	45
Run	45
Pool	10
% Substrate	
Bedrock	15
Boulder	20
Cobble	28
Gravel	25
Sand	7
Silt	1
Organic Matter	4

REACH CHARACTERISTICS

General observations (Figure 1, 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. Like other streams in ecoregion 71f, Little Butler Creek at LBTL-3 is a medium-high gradient stream characterized predominantly by a bedrock, boulder, cobble and gravel substrate. Overall habitat quality was categorized as *optimal* for supporting the biological communities in this stream type due to the availability and quality of habitat and minimal sediment deposition.

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 *Excellent*, identifying Little Butler Creek at LBTL-3 as a level 2, or near natural site. Located within the Western highland Rim ecoregion, with a drainage area of 3.1 sq mi., taxa richness and diversity are exceptional and among the highest found anywhere in the state, with 93 total taxa, 45 sensitive taxa, and 42 EPTs in 18 families collected. Eighteen of the taxa are only found in the most pristine streams in Alabama. (Table 4).

Table 3. Results of the habitat assessment survey conducted on Little Butler Creek at LBTL-3, April 25, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	85	Optimal (80-100)
Sediment Deposition	79	Sub-optimal/Optimal (75-79.999)
Riffle Frequency	93	Optimal (80-100)
Bank Vegetative Stability	85	Optimal (80-100)
Riparian Zone Measurements	90	Optimal (80-100)
Habitat Assessment Score	**171**	
% Maximum Score	**86**	**Optimal (85-100)**

Table 4. Results of the macroinvertebrate survey conducted on Little Butler Creek at LBTL-3, April 25, 2019.

Macroinvertebrate Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Taxa Count	93	93
# rare and highly sensitive taxa	18	18
# sensitive taxa	45	45
# sensitive EPT taxa	30	30
Percent taxon metrics		
% rare and highly sensitive taxa	19	19
% sensitive taxa	48	48
% sensitive EPT taxa	32	32
% highly tolerant taxa	4	4
Percent individual metrics		
% rare and highly sensitive individuals	6	6
% sensitive individuals	25	25
% sensitive EPT individuals	22	22
% tolerant individuals	18	18
WMB-I Survey Score		**2.0**
WMB-I Survey Rating		**Excellent (2-2.149)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly and semi-monthly (metals), from March through October 2019 to help characterize the reach. In situ parameters were well within ranges to protect "*Fish and Wildlife*" uses. An individual *E. coli* sample exceeded the human health criterion for the *F&W* use classification during the August sampling event. Three individual pH values were slightly higher than expected based off of data collected at reference reaches within the Western Highland Rim ecoregion (71f).

SUMMARY

The ADEM monitors Little Butler Creek at LBTL-3 as a "high-quality" reference reach for comparison with other Western Highland Rim streams. Little Butler Creek at LBTL-3 is a medium-high gradient stream characterized predominantly by a bedrock, boulder, cobble and gravel substrate. Located in a Strategic Habitat Unit, the watershed is of exceptional quality, containing no permitted outfalls and is primarily forested with little development. Water quality conditions are very high, exhibiting low water temperatures, and low concentrations of sediment, nutrients, and metals. The condition of the macroinvertebrate community has been rated as *Excellent*, identifying Little Butler Creek at LBTL-3 as a level 2, or near natural site. Taxonomic richness and diversity within the macroinvertebrate community is exceptional and among the highest found anywhere in the state, with 93 total taxa, 45 sensitive taxa, and 42 EPTs in 18 families collected. Eighteen of the taxa are only found in the most pristine streams in Alabama.

Table 5. Summary of water quality data collected March through October, 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.

	LBTL-3 AL06030005-0507-200	N	Min	Max	Med	Avg	SD	E	10thP	90thP
	Physical									
	Temperature (°C)	9	10.2	21.9	18.1	17.6	3.7		10.2	21.9
	Turbidity (NTU)	9	1.1	3.2	2.1	2.1	0.6		1.1	3.2
	Total Dissolved Solids (mg/L)	7	35.0	61.0	55.0	52.4	8.8		35.0	61.0
	Total Suspended Solids (mg/L)	7	1.0	7.0	2.0	2.4	2.1		1.0	7.0
	Specific Conductance (µmhos/cm)	9	51.0	90.0	80.0	76.2	12.8		51.0	90.0
	Hardness (mg/L)	4	22.2	43.7	35.1	34.0	9.0		22.2	43.7
	Alkalinity (mg/L)	8	18.1	41.2	35.0	34.5	7.3		18.1	41.2
	Measured Stream Flow (cfs)	8	1.9	11.2	4.1	5.2	3.1		1.9	11.2
	Chemical									
	Dissolved Oxygen (mg/L)	9	8.8	11.7	10.0	9.9	0.9		8.8	11.7
	pH (SU)	9	7.4	8.0[D]	7.7	7.7	0.2		7.4	8.0
J	Ammonia Nitrogen (mg/L)	8	<0.004	0.021	0.006	0.007	0.006		0.002	0.021
	Nitrate+Nitrite Nitrogen (mg/L)	8	0.092	0.329	0.190	0.196	0.086		0.092	0.329
	Total Kjeldahl Nitrogen (mg/L)	8	<0.075	2.830	0.038	0.460	0.968		0.038	2.830
	Total Nitrogen (mg/L)	8	<0.146	3.016	0.342	0.656	0.962		0.146	3.016
J	Dis Reactive Phosphorus (mg/L)	8	<0.006	0.019	0.004	0.006	0.005		0.003	0.019
J	Total Phosphorus (mg/L)	8	0.008	0.031	0.010	0.014	0.008		0.008	0.031
J	TOC (mg/L)	8	0.8	1.3	0.9	0.9	0.2		0.8	1.3
	CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0		1.0	1.0
J	COD (mg/L)	6	<1.2	9.0	3.0	3.5	3.2		0.6	9.0
J	Chlorides (mg/L)	8	<0.6	1.6	1.1	1.0	0.4		0.3	1.6
J	Sulfate (mg/L)	8	0.58	2.45	1.41	1.36	0.55		0.58	2.45
	Total Metals									
J	Aluminum (T) (mg/L)	4	<0.023	0.067	0.044	0.042	0.023		0.012	0.067
	Iron (T) (mg/L)	4	<0.063	<0.063	0.032	0.032	0.000		0.032	0.032
	Manganese (T) (mg/L)	4	<0.004	<0.004	0.002	0.002	0.000		0.002	0.002
	Dissolved Metals									
J	Aluminum (mg/L)	4	<0.023	0.026	0.012	0.015	0.007		0.012	0.026
	Antimony (µg/L)	4	<1.480	<1.480	0.740	0.740	0.000		0.740	0.740
	Arsenic (µg/L)	4	<0.689	<0.689	0.344	0.344	0.000		0.344	0.344
	Cadmium (µg/L)	4	<0.726	<0.726	0.363	0.363	0.000		0.363	0.363
	Chromium (µg/L)	4	<0.793	<0.793	0.396	0.396	0.000		0.396	0.396
	Copper (µg/L)	4	<1.190	<1.190	0.595	0.595	0.000		0.595	0.595
	Iron (mg/L)	4	<0.063	<0.063	0.032	0.032	0.000		0.032	0.032
	Lead (µg/L)	4	<0.697	<0.697	0.348	0.348	0.000		0.348	0.348
	Manganese (mg/L)	4	<0.004	<0.004	0.002	0.002	0.000		0.002	0.002
	Nickel (µg/L)	4	<1.960	<1.960	0.980	0.980	0.000		0.980	0.980
	Selenium (µg/L)	4	<1.900	<1.900	0.950	0.950	0.000		0.950	0.950
	Silver (µg/L)	4	<1.350	<1.350	0.675	0.675	0.000		0.675	0.675
	Thallium (µg/L)	4	<0.641	<0.641	0.320	0.320	0.000		0.320	0.320
	Zinc (µg/L)	4	<2.340	<2.340	1.170	1.170	0.000		1.170	1.170
	Biological									
	Chlorophyll a (mg/m³)	8	<0.53	<1.00	0.50	0.50	0.01		0.50	0.53
	E. coli (MPN/DL)	8	27.2	648.8[H]	141.6	191.0	200.3	1	27.2	648.8

D=an individual value >90% of all verified ecoregional reference reach data collected in the ecoregion 68E; E=# samples that exceeded criteria; H=*F&W* human health criterion exceeded; J=estimate; N=# samples.

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