

2015 Monitoring Summary



Buttahatchee Creek at Alabama Highway 253 (Marion County) (31.13299/-87.81820)

BACKGROUND

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



Figure 1. Buttahatchee Creek at BUTL-3B, May 5, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Buttahatchee Creek is a *Fish and Wildlife (F&W)* stream located in the Dissected Plateau ecoregion (65e). It is a large watershed, draining approximately 105 square miles of land in Alabama and Mississippi. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (60%), with some shrub/scrub and pasture/hay. As of April 1, 2016, 46 outfalls were active within the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate community bioassessment. 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. Buttahatchee Creek at BUTL-3B is a wide, riffle-run stream. The bottom substrate is dominated by bedrock (Figure 1). Overall habitat quality and availability was rated as *optimal* for supporting diverse 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. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tombigbee R
Drainage Area (mi²)		105
Ecoregion^a		68E
Landuse^b		
Open water		<1%
Wetland	Woody	2%
	Emergent herbaceous	<1%
Forest	Deciduous	29%
	Evergreen	24%
	Mixed	7%
Shrub/scrub		14%
Grassland/herbaceous		6%
Pasture/hay		11%
Cultivated crops		1%
Development	Open space	4%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		14
# NPDES Permits^d	TOTAL	46
	Construction	6
	Industrial General	13
	Mining	27

a. Dissected Plateau

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Buttahatchee Creek at BUTL-3B, July 9, 2015.

Physical Characteristics		
Width (ft)		65
Canopy Cover		Estimate 50/50
Depth (ft)	Riffle	0.7
	Run	1.5
	Pool	1.0
% of Reach	Riffle	10
	Run	80
	Pool	10
% Substrate	Bedrock	82
	Boulder	5
	Cobble	1
	Gravel	1
	Sand	5
	Silt	3
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Buttahatchee Creek at BUTL-3B, June 9, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	73	Sub-Optimal (55-79)
Sediment Deposition	86	Optimal (>79)
Sinuosity	60	Sub-Optimal (55-79)
Bank Vegetative Stability	88	Optimal (>79)
Riparian Buffer	90	Optimal (>84)
Habitat Assessment Score	161	
% Maximum Score	85	Optimal (>80)

Table 4. Results of the macroinvertebrate community bioassessment conducted in Buttahatchee Creek at BUTL-3B, June 9, 2015.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		(0-100)
# EPT taxa	24	87
Taxonomic composition measures		
% Non-insect taxa	10	64
% Dominant taxon	31	46
% EPC	17	30
Functional feeding group measures		
% Predators	6	20
Tolerance measures		
% Taxa as Tolerant	25	70
WMB-I Assessment Score	---	53
WMB-I Assessment Rating		Fair (39-58)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2015 to help identify any stressors to the biological communities. Median specific conductance and hardness were higher than expected, based on data collected at least-impaired reference reaches in ecoregion 68e. Median chlorides, total manganese and aluminum, and dissolved manganese were also above concentrations expected in streams in this region of Alabama.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Buttahatchee Creek at BUTL-3B to be in *fair* condition. While overall habitat quality and availability was rated as *optimal*, specific conductance, hardness, chlorides, and some metals were elevated for a stream in this sub-ecoregion. Monitoring should continue to ensure that conditions remain stable.

FOR MONITORING INFORMATION, CONTACT:
James Worley ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 394-4343 jworley@adem.alabama.gov

Table 5. Summary of water quality data collected March-October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	Q
Physical							
Temperature (°C)	9	14.2	26.0	19.4	19.4	4.1	
Turbidity (NTU)	8	3.6	46.0	7.9	12.3	13.8	
J Total Dissolved Solids (mg/L)	8	14.0	50.0	32.5	33.6	11.4	
Total Suspended Solids (mg/L)	8	3.0	19.0	6.0	7.6	5.3	
Specific Conductance (µmhos/cm)	9	31.4	51.3	41.9 ^G	40.8	7.1	
Hardness (mg/L)	4	11.4	17.0	14.8 ^G	14.5	2.6	
Alkalinity (mg/L)	8	5.6	14.4	9.4	9.8	3.5	
Monthly Stream Flow (cfs)	8	17.4	293.4	67.0	114.1	105.3	
Chemical							
Dissolved Oxygen (mg/L)	9	6.1	10.2	8.6	8.6	1.2	
pH (SU)	9	6.3	7.2	7.0	6.9	0.3	
J Ammonia Nitrogen (mg/L)	8	< 0.007	0.051	0.005	0.015	0.017	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.203	0.319	0.272	0.267	0.043	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.064	0.550	0.248	0.275	0.202	
Total Nitrogen (mg/L)	8	< 0.346	0.830	0.464	0.542	0.188	
J Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.007	0.006	0.006	0.001	
Total Phosphorus (mg/L)	8	0.018	0.041	0.026	0.028	0.007	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	1.4	3.0	1.9 ^M	2.0	0.5	
Total Metals							
Aluminum (mg/L)	4	< 0.106	1.560	0.353 ^M	0.580	0.712	
Iron (mg/L)	4	0.614	1.540	0.774	0.926	0.426	
J Manganese (mg/L)	4	0.006	0.111	0.094	0.076	0.049	
Dissolved Metals							
J Aluminum (mg/L)	4	< 0.106	0.164	0.053	0.081	0.056	
Antimony (µg/L)	4	< 0.342	< 0.342	0.171	0.171	0.000	
J Arsenic (µg/L)	4	< 0.276 ^H	0.380 ^H	0.316	0.287	0.105	3
Cadmium (µg/L)	4	< 0.311	< 0.311	0.156	0.156	0.000	
J Chromium (µg/L)	4	0.454	0.904	0.501	0.590	0.213	
J Copper (µg/L)	4	0.406	1.263	0.596	0.715	0.378	
Iron (mg/L)	4	0.240	0.442	0.380	0.361	0.099	
Lead (µg/L)	4	< 0.428	< 0.428	0.214	0.214	0.000	
J Manganese (mg/L)	4	< 0.004	0.105	0.062 ^M	0.058	0.045	
J Nickel (µg/L)	4	< 0.460	0.836	0.466	0.499	0.250	
Selenium (µg/L)	4	< 0.395	< 0.395	0.198	0.198	0.000	
Silver (µg/L)	4	< 0.365	< 0.365	0.182	0.182	0.000	
Thallium (µg/L)	4	< 0.514	< 0.514	0.257	0.257	0.000	
J Zinc (µg/L)	4	0.624	2.142	1.094	1.238	0.673	
Biological							
Chlorophyll a (mg/m ³)	8	< 0.10	7.12	0.50	1.89	2.60	
J E. coli (MPN/DL)	8	56.5	613.1	213.6	241.0	175.2	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68e; H=F&W human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68e; N=# samples Q=# samples with uncertain exceedances.