Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2015 Monitoring Summary

Fair-Good™

Buck Creek at Covington County Road 23 (31.39294/-86.55237)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Buck Creek at BUKC-1 in Covington 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 to estimate overall water quality statewide using macroinvertebrate and habitat surveys and intensive water quality sampling.

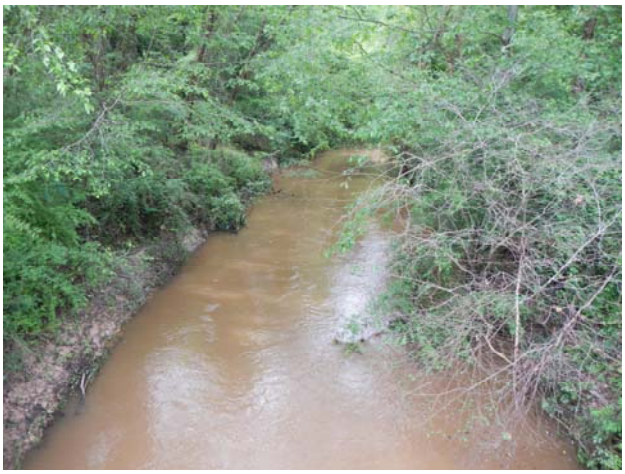

Figure 1. Buck Creek at BUKC-1, April 15, 2015.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh R
Drainage Area (mi^2)		21
Ecoregion[a]		65F
% Landuse[b]		
Open water		<1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	15%
	Evergreen	31%
	Mixed	13%
Shrub/scrub		12%
Grassland/herbaceous		3%
Pasture/hay		15%
Cultivated crops		5%
Development	Open space	5%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		13

a. Southern Pine Plains & Hills

b. 2011 National Land Cover Dataset

c. 2010 US Census

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Buck Creek is a *Fish & Wildlife (F&W)* stream located in the Conecuh River Basin. Buck Creek at BUKC -1 is a low gradient stream that drains a 21 square mile watershed through Covington County in the Southern Pine Plains & Hills ecoregion (65f). Based on the 2011 National Land Cover Dataset, land use within the watershed is composed of forest (59%), with some shrub/scrub and pasture/hay. Approximately 5% of the watershed area is developed. As of April 1, 2016, there were no permitted outfalls 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. Buck Creek at BUKC-1 is a relatively shallow reach dominated by a uniform run habitats and sand substrate (Figure 1). Overall habitat quality was rated as *marginal* due to a lack of in-stream habitat.

Table 2. Physical characteristics of Buck Creek at BUKC-1, May 6, 2015.

Physical Characteristics	
Width (ft)	27.0
Canopy Cover	Mostly Shaded
Depth (ft)	
Run	1.5
Pool	1.0
% of Reach	
Run	95
Pool	5
% Substrate	
Sand	90
Silt	5
Organic Matter	5

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 in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Buck Creek at BUKC-1 to be in *fair-good* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Buck Creek at BUKC-1, May 6, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	27	Poor (<31)
Sediment Deposition	33	Marginal (31-<55)
Sinuosity	35	Marginal (31-<55)
Bank Vegetative Stability	41	Marginal (31-<58)
Riparian Buffer	63	Sub-Optimal (60-84)
Habitat Assessment Score	***71***	
% of Maximum Score	***42***	**Marginal (31-<57)**

Table 4. Results of the macroinvertebrate bioassessment of Buck Creek at BUKC-1, May 6, 2015.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	41
# EPT taxa	10
# Highly-sensitive and Specialized Taxa	4
Taxonomic composition measures	
% EPC taxa	32
% Trichoptera & Chironomidae Taxa	32
% EP Individuals	22
% Chironomidae Individuals	45
% Individuals in Dominant 5 Taxa	69
Functional feeding group	
% Collector-Filterer Individuals	22
% Tolerant Filterer Taxa	10
Community tolerance	
# Sensitive EPT	5
% Sensitive taxa	30
% Nutrient Tolerant individuals	34
WMB-I Assessment Score	**4+**
WMB-I Assessment Rating	**Fair-Good**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly or semi-monthly (metals) from March through October of 2015 to help identify any stressors to the biological communities. Median concentrations of conductivity, hardness, alkalinity, nitrate+nitrite nitrogen and total nitrogen were higher than expected based on data collected from reference reaches within ecoregion 65f.

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 Buck Creek at BUKC-1 to be in *fair-good* condition. Habitat quality was rated as *marginal.* Specific conductivity, hardness, and alkalinity were higher than expected. Some nutrients concentrations were elevated as well. Monitoring should continue to ensure that water quality and the biological community remain stable.

FOR MORE INFORMATION, CONTACT:
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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). 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	Med	Avg	SD	Q
Physical						
Temperature (°C)	10	15.2	19.0	20.5	3.9	
Turbidity (NTU)	10	9.7	15.3	19.9	12.9	
Total Dissolved Solids (mg/L)	9	11.0	37.0	33.9	14.4	
Total Suspended Solids (mg/L)	9	8.0	11.0	13.8	10.6	
Specific Conductance (µmhos/cm@25C)	10	36.2	47.8 G	46.6	4.2	
Hardness (mg/L)	4	14.1	18.2 G	17.5	2.5	
Alkalinity (mg/L)	9	3.4	13.2 M	12.2	3.7	
Monthly Stream Flow (cfs)	9	10.2	15.5	22.2	19.1	
Stream Flow during Sample Collection (cfs)	9	10.2	15.5	22.2	19.1	
Chemical						
Dissolved Oxygen (mg/L)	10	7.7	8.7	8.7	0.7	
pH (SU)	10	6.1	6.9	6.8	0.4	
J Ammonia Nitrogen (mg/L)	9	< 0.007	0.017	0.030	0.031	
J Nitrate+Nitrite Nitrogen (mg/L)	9	0.013	0.559 M	0.483	0.226	
J Total Kjeldahl Nitrogen (mg/L)	9	< 0.064	0.343	0.405	0.404	
J Total Nitrogen (mg/L)	9	< 0.356	0.709 M	0.888	0.482	
J Dissolved Reactive Phosphorus (mg/L)	9	< 0.002	0.004	0.004	0.002	
Total Phosphorus (mg/L)	9	0.014	0.016	0.019	0.010	
CBOD-5 (mg/L)	9	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	9	1.7	3.4	3.2	0.7	
Total Metals						
Aluminum (mg/L)	4	0.214	0.242	0.742	1.019	
Iron (mg/L)	4	1.070	1.390 M	1.835	1.121	
J Manganese (mg/L)	4	0.029	0.044 M	0.042	0.010	
Dissolved Metals						
Aluminum (mg/L)	4	< 0.106	0.053	0.146	0.186	
Antimony (µg/L)	4	< 0.3	< 0.2	0.2	0.0	
J Arsenic (µg/L)	4	0.3	0.4 H	0.5	0.1	4
Cadmium (µg/L)	4	< 0.311	< 0.156	0.156	0.000	
J Chromium (mg/L)	4	< 0.0003	0.0004	0.0006	0.000	
J Copper (mg/L)	4	< 0.0002	0.0002	0.0004	0.000	
Iron (mg/L)	4	0.298	0.548	0.558	0.221	
Lead (µg/L)	4	< 0.4	< 0.2	0.2	0.0	
J Manganese (mg/L)	4	0.010	0.020	0.019	0.009	
J Nickel (mg/L)	4	< 0.0005	0.0005	0.001	0.002	
Selenium (µg/L)	4	< 0.4	< 0.2	0.2	0.0	
Silver (µg/L)	4	< 0.365	< 0.182	0.182	0.000	
Thallium (µg/L)	4	< 0.5	< 0.2	0.2	0.0	
J Zinc (mg/L)	4	< 0.0005	0.001	0.002	0.002	
Biological						
Chlorophyll a (mg/m³)	8	< 0.10	0.58	0.74	0.48	
J E. coli (MPN/DL)	8	135.4	219.5	233.6	84.2	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H=*F&W* human health criterion exceeded; J=estimate; M=values greater than the 90th percentile of all verified reference reach data collected in ecoregion 65f; N=# of samples; Q=# of uncertain criterion exceedances.