Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Buckhorn Creek at US Highway 29, Pike County (31.84217/-85.75905)

BACKGROUND

The Upper Pea River was identified as a Strategic Habitat Unit (SHU) by the Alabama Rivers and Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species. The Buckhorn Creek sub-watershed was identified as a priority within the Upper Pea River due to the potential for impairment from previous channelization, access of livestock to streams, and nutrient enrichment.

In cooperation with ARSN, the Alabama Department of Environmental Management (ADEM) conducted macroinvertebrate and fish community assessments of Buckhorn Creek as part of the 2014 Assessment of Southeast Alabama. The objectives of the Southeast Alabama Assessments were to provide data assess the biological, chemical, and physical conditions within the reach, estimate overall water quality within Southeast Alabama, and support restoration efforts.

Figure 1. Buckhorn Creek at BKHP-2, March 13, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Buckhorn Creek is a small *Fish & Wildlife (F&W)* stream located approximately 15 miles east of Troy in the Choctawhatchee River basin. Based on the 2011 National Land Cover Dataset, land use within the watershed is primarily forest (66%). As of April 1, 2016, there were no outfalls are active within 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. Buckhorn Creek at BKHP-2 is characterized by a sandy substrates, unstable banks, and very limited riparian vegetation and shading (Figure 1). Overall habitat quality was categorized as *marginal*.

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* condition (Table 4a).

The fish community in Buckhorn Creek at BKHP-2 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), which uses 12 measures of species richness and diversity, tolerance/intolerance, and abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Buckhorn Creek at BKHP-2 was 30, indicating the fish community to be in *poor* condition (Table 4b).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Choctawhatchee River
Drainage Area (mi²)		15
Ecoregion[a]		65d
Landuse		
Open water		1%
Wetland	Woody	3%
	Emergent herbaceous	<1%
Forest	Deciduous	19%
	Evergreen	37%
	Mixed	10%
Shrub/scrub		17%
Grassland/herbaceous		2%
Pasture/hay		5%
Cultivated crops		2%
Development	Open space	4%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km²[c]		3%

a.Southern Hilly Gulf Coastal Plain
b.2011 National Land Cover Dataset
c.2010 US Census

Table 2. Physical characteristics of Buckhorn Creek at BKHP-2, May 13, 2014.

Physical Characteristics		
Width (ft)		12
Canopy cover		Open
Depth (ft)		
	Run	2
	Pool	3
% of Reach		
	Run	85
	Pool	15
% Substrate		
	Sand	82
	Silt	15
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Buckhorn Creek at BKHP-2, May 13, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	33	Marginal (31-<55)
Sediment Deposition	40	Marginal (31-<55)
Sinuosity	38	Marginal (31-<55)
Bank Vegetative Stability	30	Poor (<31)
Riparian Buffer	25	Poor (<31
Habitat Assessment Score	***58***	
% Maximum Score	***32***	**Marginal (31-<57)**

TM Graphics provided by Florida Dept. of Environmental Protection

Table 4a. Results of the macroinvertebrate bioassessment conducted in Buckhorn Creek at BKHP-2, May 13, 2014.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	6
Taxonomic composition measures	
% Non-insect taxa	14
% Plecoptera	2
% Dominant taxon	18
Functional feeding group	
% Predators	23
Community tolerance	
Becks community tolerance index	1
% Nutrient tolerant individuals	7
WMB-I Assessment Score	**50**
WMB-I Assessment Rating	**Fair (37-55)**

Table 4b. Results of the fish community bioassessment conducted in Buckhorn Creek at BKHP-2, June 4, 2014.

Fish Community Assessment		
	Results	**Score**
Species Richness & Diversity		
Total native species	13	3
Number shiner species	3	3
Number of sucker species	0	1
Number of centrarchid species	3	3
Number of darter+madtom species	1	1
Tolerance & Intolerance Measures		
Percent of tolerant species	14.46	3
Percent Green Sunfish & Yellow Bullhead	2.41	1
Trophic Measures		
Percent insectivorous cyprinids	62.65	5
Percent invertivores	15.66	1
Percent top carnivores	10.84	5
Abundance, Condition & Reproductive Measures		
Percent DELT+hybrids	1.2	1
Number of lithophilic spawners	6	3
IBI Assessment Score		**30**
Condition		**Poor**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals) during March through October of 2014 to help identify any stressors to the biological communities. Median values of ammonia nitrogen, total nitrogen, total iron, total manganese, dissolved iron, and dissolved manganese were above expected concentrations in this ecoregion, based on the 2010 65d Ecoregional Reference Guidelines. E. coli exceeded criteria applicable to the creek's use classification during all four summer station visits (June—September). The water temperature recorded during the August station visit exceeded criteria applicable to Buckhorn Creek's *F&W* use classification; however this may be due to a low flow stage.

SUMMARY

The habitat assessment indicated BKHP-2 to be in *marginal* condition due to a poor riparian buffer and bank stability. The fish community survey indicated the fish community to be in *poor* condition. Several physical and chemical parameters were higher than expected based on data collected at reference reaches within the ecoregion (65d).

Table 5. Summary of water quality data collected March through October, 2014. 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.

Parameter	N	Min	Max	Med	Avg	SD	E	Q
Physical								
Temperature (°C)	9	14.4	34.2 C	23.6	22.7	6.3	1	
Turbidity (NTU)	9	13.7	34.8	25.0	23.9	6.8		
Total Dissolved Solids (mg/L)	8	35.0	64.0	53.5	50.4	11.1		
Total Suspended Solids (mg/L)	8	5.0	23.0	12.5	13.4	5.7		
Specific Conductance (µmhos)	9	32.3	109.7	46.8	58.0	29.3		
Hardness (mg/L)	4	9.2	22.9	12.1	14.0	6.4		
J Alkalinity (mg/L)	8	4.8	27.0	10.7	13.0	8.7		
Stream Flow (cfs)	8	0.1	36.7	4.2	9.1	12.2		
Chemical								
Dissolved Oxygen (mg/L)	9	6.7	11.5	8.2	8.6	1.5		
pH (su)	9	6.3	7.8	6.6	6.8	0.5		
Ammonia Nitrogen (mg/L)	8	0.053	0.855	0.110 M	0.206	0.271		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.121	1.693	0.380	0.712	0.670		
Total Kjeldahl Nitrogen (mg/L)	8	0.284	1.540	0.508	0.685	0.430		
Total Nitrogen (mg/L)	8	0.545	3.185	1.008 M	1.397	1.008		
J Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.009	0.005	0.006	0.002		
Total Phosphorus (mg/L)	8	0.016	0.041	0.026	0.028	0.009		
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	8	3.3	10.8	4.6	5.8	2.8		
Total Metals								
J Aluminum (mg/L)	4	0.143	0.497	0.219	0.270	0.157		
Iron (mg/L)	4	2.190	3.420	3.230 M	3.018	0.560		
Manganese (mg/L)	4	0.141	0.330	0.246 M	0.241	0.102		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.050	0.439	0.050	0.141	0.200		
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1		
J Arsenic (µg/L)	4	0.3	0.6 H	0.4	0.4	0.1	3	
Cadmium (µg/L)	4	< 0.246	< 0.390	0.123	0.141	0.036		
J Chromium (µg/L)	4	0.430	0.967	0.522	0.610	0.246		
J Copper (mg/L)	4	0.0004	0.001	0.0004	0.0005	0.0001		
Iron (mg/L)	4	0.822	3.300	1.965 M	2.013	1.047		
J Lead (µg/L)	4	< 0.2	< 0.5	0.2	0.2	0.1		
Manganese (mg/L)	4	0.124	0.318	0.235 M	0.228	0.101		
J Nickel (mg/L)	4	0.0004	< 0.0006	0.0005	0.0005	0.0001		
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0		
Silver (µg/L)	4	< 0.252	< 0.460	0.126	0.152	0.052		
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1		
J Zinc (mg/L)	4	0.003	0.004	0.004	0.004	0.001		
Biological								
Chlorophyll a (ug/L)	8	< 0.10	11.75	2.00	2.66	3.87		
J E. coli (col/100mL)	8	148	> 2420 H	1,252	1330	777	4	

C= *F&W* criterion violated; E=# of samples that exceeded criteria; H=*F&W* human health criterion exceeded; J=estimate; M=value > 90% of all data collected within ecoregion 65d; N= # samples; Q=# of samples that it is uncertain if criteria was exceeded

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