

2015 Monitoring Summary

Bear Head Creek at Forest Road 311D (Escambia County) (31.11202/-86.71293)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Bear Head Creek for water quality and biological monitoring as a verified Ecoregional Reference Site in 2015. Reference sites represent “best-attainable conditions” and provide background data used for comparison with streams in the same ecoregion. Bear Head Creek was selected as a reference for comparison with small coastal plain streams. However, drought conditions prevented the completion of habitat and macroinvertebrate assessments.



Figure 1. Bear Head Creek at BEHE-1, May 6, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bear Head Creek is a *Fish & Wildlife (F&W)* stream located within the *Southern Pine Plains and Hills* sub-ecoregion (65f). It drains approximately four square miles in Conecuh National Forest, in Escambia County. It flows into Bear Creek, a tributary of the Blackwater River.

Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (70%) and cultivated crops. Population density is relatively low and less than five percent of the area is developed. As of April 1, 2016, there are no NPDES permitted outfalls active in this watershed.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 2. In situ measurements and water samples were collected monthly, March through October of 2015, to help identify any stressors to the biological communities. Stream pH was <6.0 su, but typical of small streams in this region of the state. Values for dissolved zinc exceeded the hardness-dependent aquatic life criterion for *F&W* streams during two sampling events, and dissolved copper exceeded the criterion during one event. Also, the median dissolved manganese value was higher than expected for streams in sub-ecoregion 65f. No organic samples were collected.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Blackwater R
Basin		
Drainage Area (mi²)		4
Ecoregion^a		65F
% Landuse^b		
Open water		<1%
Wetland	Woody	<1%
Forest	Deciduous	2%
	Evergreen	62%
	Mixed	6%
Shrub/scrub		4%
Grassland/herbaceous		4%
Pasture/hay		2%
Cultivated crops		15%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km^{2c}		3

a. Southern Pine Plains & Hills

b. 2011 National Land Cover Dataset

c. 2010 US Census

SUMMARY

Due to drought conditions, a habitat and macroinvertebrate assessment were not conducted in Bear Head Creek at BEHE-1. Dissolved zinc and dissolved copper values exceeded criterion on one occasion, and the value for median dissolved manganese was higher than ecoregional guidelines. Monitoring of Bear Head Creek at BEHE-1 should continue to ensure that conditions remain stable at the site and to verify its status as a potential reference reach for ecoregion 65f.

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Table 2. Summary of water quality data collected March through October, 2015. 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)	8	17.7	26.4	21.7	22.0	3.8		
Turbidity (NTU)	8	2.1	8.0	2.8	3.6	2.0		
^J Total Dissolved Solids (mg/L)	8	13.0	35.0	19.0	20.4	6.7		
^J Total Suspended Solids (mg/L)	8 <	1.0	5.0	1.0	1.9	1.6		
Specific Conductance (µmhos/cm@25C)	8	14.5	20.0	15.2	16.2	2.3		
Hardness (mg/L)	4 <	0.4	3.4	1.3	1.6	1.6		
Alkalinity (mg/L)	8 <	1.1 <	1.5	0.6	0.6	0.1		
Monthly Stream Flow (cfs)	8	0.1	7.5	1.5	2.2	2.6		
Stream Flow during Sample Collection (cfs)	5	0.8	7.5	2.6	3.5	2.6		
Chemical								
Dissolved Oxygen (mg/L)	8	5.6	7.6	6.0	6.3	0.7		
pH (SU)	8	4.7 ^C	5.8	5.2	5.2	0.3	8	
^J Ammonia Nitrogen (mg/L)	8 <	0.007	0.081	0.005	0.020	0.028		
^J Nitrate+Nitrite Nitrogen (mg/L)	8 <	0.002	0.019	0.002	0.006	0.008		
Total Kjeldahl Nitrogen (mg/L)	8 <	0.064	0.522	0.238	0.289	0.179		
^J Total Nitrogen (mg/L)	8 <	0.033	0.541	0.249	0.295	0.182		
^J Dissolved Reactive Phosphorus (mg/L)	8 <	0.003	0.005	0.003	0.004	0.001		
Total Phosphorus (mg/L)	8	0.011	0.029	0.013	0.015	0.006		
CBOD-5 (mg/L)	8 <	2.0	2.3	1.0	1.2	0.5		
COD (mg/L)	8	6.3	33.2	18.4	18.0	8.0		
^J TOC (mg/L)	8	3.4	11.7	4.7	5.8	2.8		
Chlorides (mg/L)	8	2.2	2.8	2.7	2.6	0.2		
Total Metals								
^J Aluminum (mg/L)	4 <	0.106	0.719	0.111	0.248	0.315		
Iron (mg/L)	4	0.376	1.340	1.044	0.951	0.412		
^J Manganese (mg/L)	4	0.026	0.046	0.038	0.037	0.009		
Dissolved Metals								
Aluminum (mg/L)	4 <	0.106	0.504	0.053	0.166	0.226		
Antimony (µg/L)	4 <	0.3 <	0.3	0.2	0.2	0.0		
^J Arsenic (µg/L)	4 <	0.3	0.3 ^H	0.3	0.3	0.1	3	
Cadmium (µg/L)	4 <	0.311 <	0.311	0.156	0.156	0.000		
^J Chromium (mg/L)	4 <	0.0003	0.001	0.0004	0.0004	0.000		
^J Copper (mg/L)	4 <	0.0002	0.001 ^S	0.0002	0.0004	0.000	1	
^J Iron (mg/L)	4	0.199	0.684	0.436	0.438	0.199		
Lead (µg/L)	4 <	0.4 <	0.4	0.2	0.2	0.0		
^J Manganese (mg/L)	4	0.025	0.047	0.038 ^M	0.037	0.010		
^J Nickel (mg/L)	4 <	0.0005	0.0005	0.0005	0.0005	0.000		
Selenium (µg/L)	4 <	0.4 <	0.4	0.2	0.2	0.0		
Silver (µg/L)	4 <	0.365 <	0.365	0.182	0.182	0.000		
Thallium (µg/L)	4 <	0.5 <	0.5	0.2	0.2	0.0		
^J Zinc (mg/L)	4 <	0.0005	0.004 ^S	0.002	0.002	0.002	2	
Biological								
Chlorophyll a (mg/m ³)	8 <	0.10	2.67	0.50	0.98	0.92		
E. coli (MPN/DL)	8	29.2	517.2	80.4	142.3	164.8		

C=F&W criterion exceeded; J=estimate; E=# of samples that exceeded criteria; H=F&W human health criterion exceeded; 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; S=exceeds hardness-adjusted aquatic life use criterion for F&W streams.