

# 2015 Monitoring Summary



## Capsey Creek at unnamed Winston County road (Forest Service 266) (34.26957/-87.21056)

### BACKGROUND

The Upper Sipsey Fork of the Black Warrior River and its tributaries are one of five waterbodies within Alabama designated as an Outstanding National Resource Water (ONRW) by the USEPA. The ONRW designation identifies waters of National and State parks and wildlife refuges and waters of exceptional or ecological significance. Located entirely within Bankhead National Forest, the Upper Sipsey Fork of the Black Warrior River was identified as a Strategic Habitat Unit (SHU) by the Alabama River and Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species.

Capsey Creek, a tributary of Sipsey Fork, is among the least-disturbed watersheds in the Black Warrior river basin based on landuse, road density, and population density. It has been monitored as a “best attainable” condition reference watershed by the Alabama Department of Environmental Management (ADEM) since 1997 for comparison with other streams in the Dissected Plateau (68e) ecoregion.



Figure 1. Capsey Creek at CPSY-1, May 11, 2015.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Capsey Creek (Figure 1) is a *Fish & Wildlife (F&W)* tributary of the Black Warrior River in the Dissected Plateau ecoregion. This ecoregion is a rugged, hilly, moderately to strongly dissected plateau containing some steep-sided gorge-like valleys and moderate to high gradient streams with bedrock and boulder substrates. Based on the 2011 National Land Cover Dataset, eighty-seven percent of landuse within the watershed is forested and entirely within Bankhead National Forest. There are no NPDES outfalls located within the 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. Typical of ecoregion 68e, Capsey Creek at CPSY-1 is a riffle-run stream characterized by a mix of bedrock, boulder and sand substrates. Overall habitat quality was categorized as *sub-optimal*.

### 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 the score for each metric. Metric results indicated the macroinvertebrate community to be in *excellent* condition, with very high taxa richness and number of rare and intolerant taxa (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior R
<b>Basin</b>		Black Warrior R
<b>Drainage Area (mi<sup>2</sup>)</b>		20
<b>Ecoregion<sup>a</sup></b>		68E
<b>Landuse<sup>b</sup></b>		
	Open water	<1%
	Wetland	Woody <1%
	Forest	Deciduous 39%
		Evergreen 26%
		Mixed 22%
	Shrub/scrub	4%
	Grassland/herbaceous	2%
	Pasture/hay	6%
	Cultivated crops	<1%
	Development	Open space 1%
		Low intensity <1%
		Moderate intensity <1%
		High intensity <1%
	Barren	<1%
<b>Population/km<sup>2c</sup></b>		5

a. Dissected Plateau

b. 2011 National Land Cover Dataset

c. 2010 US Census

Table 2. Physical characteristics of Capsey Creek at CPSY-1, May 11, 2015.

Physical Characteristics	
<b>Width (ft)</b>	50
<b>Canopy Cover</b>	Estimate 50/50
<b>Depth (ft)</b>	
	Riffle 0.5
	Run 1.5
	Pool 3.0
<b>% of Reach</b>	
	Riffle 20
	Run 20
	Pool 60
<b>% Substrate</b>	
	Bedrock 40
	Boulder 20
	Cobble 10
	Gravel 5
	Sand 20
	Silt 7
	Organic Matter 3

**Table 3.** Results of the habitat assessment conducted on Capsey Creek at CPSY-1, May 11, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	72	Sub-Optimal (55-79)
Sediment Deposition	65	Sub-Optimal (55-79)
Riffle frequency	78	Sub-Optimal (55-79)
Bank Vegetative Stability	71	Sub-Optimal (58-79)
Riparian Buffer	93	Optimal (>84)
<b>Habitat Assessment Score</b>	<b>150</b>	
<b>% of Maximum Score</b>	<b>79</b>	<b>Sub-Optimal (57-80)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Capsey Creek at CPSY-1, May 11, 2015.

Macroinvertebrate Assessment		Results
<b>Taxa richness measures</b>		
	Total # Taxa	93
	# EPT taxa	36
	# Highly-sensitive and Specialized Taxa	13
<b>Taxonomic composition measures</b>		
	% EPC taxa	39
	% Non-insect taxa	6
	% Dominant taxon	21
	% Individuals in Dominant 5 Taxa	57
<b>Functional feeding group measures</b>		
	% Predators	7
<b>Tolerance measures</b>		
	# Sensitive EPT	27
	% Sensitive taxa	14
	% Taxa as Tolerant	23
<b>WMB-I Assessment Score</b>		<b>2</b>
<b>WMB-I Assessment Rating</b>		<b>Excellent</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2015 to help identify any stressors to the biological communities.

*In situ* parameters, which were measured during each site visit, indicated that water quality in Capsey Creek at CPSY-1 was meeting its *Fish & Wildlife* water use classification. Median concentrations of specific conductance, hardness and chlorides were elevated above background concentrations based on data collected from ADEM's ecoregional reference reaches in ecoregion 68e.

## SUMMARY

Capsey Creek is a tributary of the Upper Sipsey Fork of the Black Warrior River, which has been designated as both an *Outstanding National Resource Water* and a *Wild and Scenic River* by the USEPA and a Strategic Habitat Unit by ARSN. Bioassessment results indicated the macroinvertebrate community to be in *excellent* condition. Overall habitat quality was categorized as *sub-optimal*. Conductivity, hardness and chloride concentrations were higher than expected for streams in this region of the state. Monitoring should continue to ensure that the high water quality conditions are maintained.

**Table 5.** Summary of water quality data collected March-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	Q
<b>Physical</b>							
Temperature (°C)	12	12.6	24.4	18.6	18.5	4.7	
Turbidity (NTU)	12	2.2	11.7	3.7	4.3	2.6	
Total Dissolved Solids (mg/L)	8	17.0	72.0	53.5	49.6	17.3	
Total Suspended Solids (mg/L)	8	< 1.0	8.0	2.0	2.6	2.3	
Specific Conductance (µmhos/cm)	12	42.9	98.0	61.2	<sup>G</sup> 64.2	18.7	
Hardness (mg/L)	4	6.6	51.0	41.1	<sup>G</sup> 35.0	19.6	
Alkalinity (mg/L)	8	6.3	38.2	15.8	17.8	10.6	
Monthly Stream Flow (cfs)	12	0.4	97.4	6.3	19.4	28.3	
Measured Stream Flow (cfs)	12	0.4	97.4	6.3	19.4	28.3	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	12	7.6	11.0	9.2	9.4	1.1	
pH (SU)	12	7.1	8.0	7.3	7.4	0.3	
<sup>J</sup> Ammonia Nitrogen (mg/L)	8	< 0.007	0.068	0.007	0.021	0.027	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.031	0.288	0.148	0.158	0.075	
<sup>J</sup> Total Kjeldahl Nitrogen (mg/L)	8	0.056	0.678	0.230	0.269	0.212	
<sup>J</sup> Total Nitrogen (mg/L)	8	0.285	0.848	0.356	0.428	0.196	
<sup>J</sup> Dis Reactive Phosphorus (mg/L)	8	< 0.005	0.009	0.004	0.004	0.002	
Total Phosphorus (mg/L)	8	< 0.007	0.021	0.015	0.014	0.006	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	8	6.5	16.4	10.1	10.0	3.2	
<sup>J</sup> TOC (mg/L)	8	1.5	3.2	2.0	2.1	0.7	
<sup>J</sup> Chlorides (mg/L)	8	1.0	2.4	1.7	<sup>M</sup> 1.7	0.4	
<b>Total Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	0.023	0.192	0.080	0.094	0.073	
<sup>J</sup> Iron (mg/L)	4	0.241	0.433	0.330	0.333	0.103	
<sup>J</sup> Manganese (mg/L)	4	0.018	0.111	0.024	0.044	0.045	
<b>Dissolved Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	< 0.014	0.057	0.030	0.031	0.028	
<sup>J</sup> Antimony (µg/L)	3	< 0.2	< 0.2	0.1	0.1	0.0	
<sup>J</sup> Arsenic (µg/L)	3	< 0.1	0.3	0.2	0.2	0.1	<sup>3</sup>
<sup>J</sup> Cadmium (µg/L)	3	< 0.118	< 0.118	0.059	0.059	0.000	
<sup>J</sup> Chromium (µg/L)	3	< 0.131	0.400	0.332	0.265	0.177	
<sup>J</sup> Copper (µg/L)	3	< 0.180	0.436	0.380	0.302	0.186	
<sup>J</sup> Iron (mg/L)	4	0.082	0.510	0.268	0.282	0.180	
Lead (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
<sup>J</sup> Manganese (mg/L)	4	0.008	0.104	0.026	0.041	0.043	
<sup>J</sup> Nickel (µg/L)	3	< 0.232	< 0.232	0.116	0.116	0.000	
<sup>J</sup> Selenium (µg/L)	3	< 0.3	< 0.3	0.2	0.2	0.0	
<sup>J</sup> Silver (µg/L)	3	< 0.208	< 0.208	0.104	0.104	0.000	
Thallium (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
<sup>J</sup> Zinc (µg/L)	4	< 0.857	< 2.680	0.428	0.991	1.126	
<b>Biological</b>							
Chlorophyll a (mg/m <sup>3</sup> )	8	< 1.00	< 1.00	0.50	0.50	0.00	
E. coli (MPN/DL)	8	29.8	290.9	84.8	111.6	88.5	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68; N=# samples; Q=# of uncertain criteria exceedances.

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