

# 2010 Monitoring Summary



## Sipsey Fork at Alabama Highway 33 in Winston County (34.21810/-87.36891)

### BACKGROUND

In 2010, the Alabama Department of Environmental Management (ADEM) sampled the Rock Creek and Crooked Creek watersheds in order to collect baseline water quality data prior to the development of watershed management plans (WMPs) for the basins. These WMPs were funded by a Clean Water Act (CWA) §319(h) nonpoint source grant provided by USEPA through ADEM's §319 grant program and will be implemented to address sources of impairment in the watershed in order to improve water quality.

Sipsey Fork at SF-2 was selected as the reference watershed for this study. Data collected will serve as a reference condition for the Rock Creek and Crooked Creek WMPs and will be used to develop reference condition criteria for large rivers in the Dissected Plateau (68e) ecoregion.



Figure 1. Sipsey Fork at SF-2, November 15, 2010.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. The Sipsey Fork watershed lies within the Dissected Plateau (68e) ecoregion. It is a *Fish and Wildlife (F&W)* stream located in Bankhead National Forest, near the town of Double Springs. Based on the 2000 National Land Cover Dataset, landuse within the watershed is largely comprised of forest (95%). Two small towns are located within the watershed (Haleyville and Double Springs) and account for the permitted outfalls (Table 1). As of February 23, 2011, three NPDES outfalls were 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. Sipsey Fork at SF-2 is a wide, low-gradient stream characterized by bedrock and sand substrates. Overall habitat quality was categorized as *sub-optimal* (Figure 1) for supporting a diverse aquatic macroinvertebrate community. The reach was also characterized by a relatively straight stream channel with high bluffs on one side, which puts it at risk to impacts from sedimentation and scouring.

Table 1. Summary of watershed characteristics.

Watershed Characteristics			
<b>Basin</b>	Black Warrior River		
<b>Drainage Area (mi<sup>2</sup>)</b>	126		
<b>Ecoregion<sup>a</sup></b>	68e		
<b>% Landuse</b>			
Open water			<1
Wetland	Woody		<1
	Emergent herbaceous		<1
Forest	Deciduous		49
	Evergreen		26
	Mixed		20
Shrub/scrub			1
Grassland/herbaceous			<1
Pasture/hay			2
Cultivated crops			<1
Development	Open space		1
	Low intensity		<1
	Moderate intensity		<1
Barren			<1
<b>Population/km<sup>2b</sup></b>	2		
<b># NPDES Permits<sup>c</sup></b>	<b>TOTAL</b>	3	
Construction Stormwater		3	

a. Dissected Plateau

b. 2000 US Census

c. #NPDES outfalls downloaded from ADEM's NPDES Management System database, February 23, 2011.

Table 2. Physical characteristics of Sipsey Fork at SF-2, July 21, 2010.

Physical Characteristics			
<b>Width (ft)</b>	56		
<b>Canopy Cover</b>	Open		
<b>Depth (ft)</b>	Run		1.5
	Pool		1.0
<b>% of Reach</b>	Run		95
	Pool		5
<b>% Substrate</b>	Bedrock		50
	Boulder		10
	Cobble		2
	Sand		20
	Silt		8
	Organic Matter		10

**Table 3.** Results of the habitat assessment conducted on Sipsey Fork at SF-2, July 21, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	54	Marginal (41-58)
Sediment Deposition	80	Optimal (>70)
Sinuosity	38	Poor (<45)
Bank and Vegetative Stability	75	Optimal (>74)
Riparian Buffer	90	Optimal (>89)
<b>Habitat Assessment Score</b>	<b>149</b>	
<b>% Maximum Score</b>	<b>68</b>	<b>Sub-optimal (59-70)</b>

## 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 indicate the macroinvertebrate community to be in *good* condition (Table 4).

**Table 4.** Results of macroinvertebrate bioassessment conducted in Sipsey Fork at SF-2, July 21, 2010.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness measures</b>		<b>(0-100)</b>
# EPT taxa	15	48
<b>Taxonomic composition measures</b>		
% Non-insect taxa	10	61
% Dominant taxon	19	79
% EPC taxa	29	40
<b>Functional feeding group measures</b>		
% Predators	21	90
<b>Tolerance measures</b>		
% Taxa as Tolerant	31	51
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>61</b>
<b>WMB-I Assessment Rating</b>		<b>Good (59-79)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May, July, September, and November of 2010 to help identify any stressors to the biological communities. In situ parameters were measured during each site visit. Dissolved mercury exceeded the aquatic life use and human health criteria during two out of four sampling events. One of four dissolved mercury sample did not meet ADEM's laboratory QC requirements and was excluded from analyses. Various nutrient samples for ammonia nitrogen, total Kjeldahl nitrogen, total nitrogen, and total phosphorus were also excluded from analyses due to laboratory QC requirements. Median hardness, specific conductance, chlorides, and dissolved copper concentrations were above values expected for streams in the Dissected Plateau ecoregion (68e). Stream flows in July and November were above normal and may account for the elevated hardness, specific conductance, chlorides, and dissolved copper results.

## SUMMARY

Bioassessment results indicated the macroinvertebrate community in Sipsey Fork at SF-2 to be in *good* condition. Overall habitat quality was categorized as *sub-optimal* due to low sinuosity and marginal instream habitat quality. Sipsey Fork is characterized by stream flows that rise and fall very quickly, which could increase scouring impacts to biological communities. Additionally, intensive water chemistry results indicated higher than expected concentrations of hardness, specific conductance, chlorides, dissolved copper, and dissolved mercury.

**Table 5.** Summary of water quality data collected semi monthly May-November, 2010. 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	E
<b>Physical</b>							
Temperature (°C)	5	9.3	29.7	22.5	21.0	8.6	
Turbidity (NTU)	4	1.2	8.4	2.3	3.6	3.3	
Total Dissolved Solids (mg/L)	4	34.0	57.0	38.0	41.8	10.8	
Total Suspended Solids (mg/L)	4	<	0.3	401.0	6.5	103.5	198.4
Specific Conductance (µmhos)	5	57.0	83.0	61.0 <sup>G</sup>	64.6	10.8	
Hardness (mg/L)	4	18.5	32.8	22.6 <sup>G</sup>	24.1	6.4	
Alkalinity (mg/L)	4	16.8	29.5	22.2	22.7	5.2	
Stream Flow (cfs)	4	6.7	21.1	17.1	15.5	6.4	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	5	7.4	10.8	8.8	8.8	1.3	
pH (su)	5	7.5	8.0	7.6	7.7	0.2	
JB Ammonia Nitrogen (mg/L)	1				0.500		
J Nitrate+Nitrite Nitrogen (mg/L)	4	0.010	0.033	0.026	0.024	0.010	
JB Total Kjeldahl Nitrogen (mg/L)	0						
JB Total Nitrogen (mg/L)	0						
J Dissolved Reactive Phosphorus (mg/L)	4	<	0.003	<	0.003	0.002	0.002
JB Total Phosphorus (mg/L)	0						
CBOD-5 (mg/L)	4	<	1.0	<	1.0	0.5	0.5
Chlorides (mg/L)	4	1.4	1.7	1.5 <sup>M</sup>	1.5	0.1	
<b>Total Metals</b>							
J Aluminum (mg/L)	4	<	0.020	0.315	0.063	0.113	0.137
Iron (mg/L)	4	0.268	0.392	0.340	0.335	0.051	
J Manganese (mg/L)	4	0.015	0.052	0.024	0.028	0.017	
<b>Dissolved Metals</b>							
J Aluminum (mg/L)	4	<	0.020	0.033	0.010	0.016	0.012
Antimony (µg/L)	4	<	0.5	<	0.5	0.2	0.0
Arsenic (µg/L)	4	<	1.0	<	1.0	0.5	0.0
J Cadmium (mg/L)	4	<	0.0004	<	0.0004	0.0004	0.0004
Chromium (mg/L)	4	<	0.002	<	0.002	0.001	0.001
Copper (mg/L)	4	<	0.200	<	0.200	0.100 <sup>M</sup>	0.100
J Iron (mg/L)	4	0.049	0.245	0.199	0.173	0.085	
J Lead (µg/L)	4	<	2.0	<	2.0	1.0	1.0
J Manganese (mg/L)	4	0.011	0.037	0.020	0.022	0.012	
JB Mercury (µg/L)	3	<	0.200	0.355 <sup>AH</sup>	0.343	0.266	0.144
Nickel (mg/L)	4	<	0.005	<	0.005	0.002	0.000
Selenium (µg/L)	4	<	1.2	<	1.2	0.6	0.6
Silver (mg/L)	4	<	0.001	<	0.001	0.000	0.000
Thallium (µg/L)	4	<	0.7	<	0.7	0.4	0.4
Zinc (mg/L)	4	0.030	<	0.030	0.015	0.015	0.000
<b>Biological</b>							
Chlorophyll a (ug/L)	4	<	1.00	<	1.00	0.50	0.50
J E. coli (col/100mL)	4	6	99	25	39	42	

A=F&W aquatic life use criteria exceeded; B=samples excluded due to laboratory QC concerns; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68e; H=F&W human health criteria exceeded; J=estimate; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 68e; N=# samples.

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