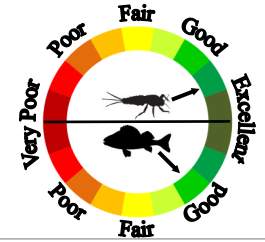


2019 Monitoring Summary



Ecological Reference Reach

Sipsey Fork at Winston County Rd. 60 near Double Springs, AL. (34.28558/-87.39906)

BACKGROUND

Sipsey Fork of the Black Warrior River is among the least-disturbed watersheds within the Dissected Plateau ecoregion, based on landuse, road density, and population density. Since 1992, it has been monitored by the Alabama Department of Environmental Management (ADEM) as a “high quality” reference watershed for comparison with other streams within the ecoregion. Habitat, macroinvertebrate community and fish community surveys were conducted to assess the health of the biological communities. Data from reference watersheds are used to characterize natural or background conditions expected in different ecoregions throughout the state. Sipsey Fork was sampled in 2019 to provide high-quality reference reach data for Dissected Plateau streams.



Figure 2. Sipsey Fork at SF-1, June 19, 2019, downstream reach.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Sipsey Fork is a *Fish & Wildlife (F&W)* stream located inside the Bankhead National Forest near Double Springs, AL in the Black Warrior River basin. According to the 2011 National Land Cover Dataset, the watershed is mostly forested, with approximately 95% forest. There are four permitted outfalls. This watershed is of exceptional quality, is very sparsely populated and has undergone very little development. The watershed has a very low road density.

REACH CHARACTERISTICS

General observations (Figure 1, Table 2) and a habitat survey (Table 3) were completed during the macroinvertebrate and fish assessments. 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. Like other streams in ecoregion 68e, Sipsey Fork at SF-1 is a high gradient stream characterized predominantly by a cobble and sand substrate. Overall habitat quality and availability has been rated as *Marginal* for supporting the macroinvertebrate and fish communities due to an infrequency of riffles, high sediment deposition, and unstable stream banks.

Table 3. Results of the habitat assessment survey conducted on Sipsey Fork at SF-1, May 30, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	57	Sub-optimal (55-74.999)
Sediment Deposition	29	Poor/Marginal (25-29.999)
Riffle Frequency	33	Marginal (30-49.999)
Bank Vegetative Stability	28	Poor/Marginal (25-29.999)
Riparian Zone Measurements	90	Optimal (80-100)
Habitat Assessment Score	99	
% Maximum Score	50	Marginal (30-49.999)

Table 1. Summary of general watershed characteristics: SF-1

Watershed Characteristics	
Basin	Black Warrior
Drainage Area (mi²)	89.2
Ecoregion^o	68e
Assessment Unit	AL03160110-0104-103
Use Class	F&W
AU Category	1
12-digit Hydrologic Unit Code (HUC)	031601100103
Conservation Status	
Strategic Habitat Unit †	22 Upper Sipsey Fork
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	<1.0
Wetland, Total (%)	0.5
Wetlands, Woody (%)	0.5
Forested, Total (%)	95.4
Forested, Deciduous (%)	57.8
Forested, Evergreen (%)	20.4
Forested, Mixed (%)	17.2
Shrub/Scrub (%)	1.0
Grassland/Herbaceous (%)	0.4
Pasture/Hay (%)	1.4
Crops, Cultivated (%)	0.1
Developed, Total (%)	1.3
Developed, Open Space (%)	1.2
Developed, Low Intensity (%)	0.1
Population/km² (2010 US Census)	2
NPDES outfalls (NPDES database, Jan 1, 2016)	
Total # of Permitted Outfalls	4
# of Construction Stormwater Permits	1
# of Industrial General	3
Roads	
Road Density	0.5

^o Dissected Plateau

† 12-digit HUC located in a Strategic Habitat Unit.

* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

Table 2. Physical characteristics of Sipsey Fork at SF-1, May 30, 2019.

Physical Characteristics	
Width (ft)	60
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	0.5
Run	1.0
Pool	1.5
% of Reach	
Riffle	5
Run	50
Pool	45
% Substrate	
Bedrock	2
Boulder	3
Cobble	25
Gravel	7
Sand	50
Organic Matter	13

Table 4a. Results of the Macroinvertebrate survey conducted on Sipsey Fork at SF-1, June 19, 2019.

Macroinvertebrate Assessment	Results
Taxonomic richness and diversity metrics	
Total # taxa	83
# rare and highly sensitive taxa	9
# sensitive taxa	35
# sensitive EPT taxa	11
Percent taxon metrics	
% sensitive EPT taxa	13
% sensitive taxa	42
% rare and highly sensitive taxa	11
% tolerant taxa	6
Percent individual metrics	
% rare and highly sensitive individuals	11
% sensitive individuals	21
% sensitive EPT individuals	5
% tolerant individuals	7
WMB-I Survey Score	3+
WMB-I Survey Rating	Good-excellent (2.3-2.75)

Table 4b. Results of the Fish survey conducted on Sipsey Fork at SF-1, May 30, 2019.

Fish Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Total Native Species	18	3
Number Cyprinid species	5	3
Number of Sucker Species	2	3
Number Lepomis species	2	1
Number of darter+madtom species	5	3
Tolerance metrics		
Percent dominant species	29	3
Percent of tolerant species	1	5
Percent Lepomis	7	5
Trophic metrics		
Percent omnivores	5	5
Percent top carnivores	2	3
Abundance, condition, and reproductive metrics		
Percent DELT+hybrids	0	5
Percent simple lithophils	61	5
IBI Survey Score	44	
IBI Survey Rating	Good (41-49)	

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition and pollution tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in central Alabama streams and rivers. Each site is placed in one of six levels ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate community on Sipsey Fork at SF-1 was rated as *good-excellent* (Table 4a), with eighty-three total taxa, including 35 pollution-sensitive taxa, and 9 highly sensitive taxa were collected.

Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for Wadeable streams and rivers across the state. The AL-IBI uses twelve measures of species richness and diversity, community tolerance/intolerance, and organism abundance, condition, and reproduction to assess the overall health of the fish community, based on conditions expected for Wadeable streams and rivers in the Plateau Ichthyoregion. The final IBI score is the sum of all individual metrics on a 60-point scale. The IBI score for Sipsey Fork at SF-1 rated the fish community to be in *good* condition (Table 4b).

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected during March, May, July and September 2019 to help characterize the reach. Specific conductance and hardness had values higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 68e. There were no exceedances of the criterion values established for F&W water use classification during the sampling period.

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Table 5. Summary of water quality data collected during March, May, July and September, 2019. 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

SF-1 AL03160110-0104-103	N	Min	Max	Med	Avg	SD	10thP	90thP
Physical								
Temperature (°C)	6	7.2	25.6	22.8	20.2	7.0	7.2	25.6
Turbidity (NTU)	6	1.7	9.9	3.5	4.2	3.0	1.7	9.9
Total Dissolved Solids (mg/L)	4	44.0	61.0	45.0	48.8	8.2	44.0	61.0
Total Suspended Solids (mg/L)	4	2.0	8.0	3.5	4.2	2.6	2.0	8.0
Specific Conductance (µmhos/cm)	6	52.1	83.0	73.8 ^G	69.5	13.8	52.1	83.0
Hardness (mg/L)	4	22.0	33.4	28.4 ^G	28.0	5.5	22.0	33.4
Alkalinity (mg/L)	4	20.3	31.6	26.5	26.2	6.1	20.3	31.6
Color (CU)	1				5		5	5
Measured Stream Flow (cfs)	6	7.8	539.0	18.8	112.4	210.7	7.8	539.0
Chemical								
Dissolved Oxygen (mg/L)	6	7.1	11.9	8.4	8.8	1.7	7.1	11.9
pH (SU)	6	6.7	7.6	7.3	7.2	0.3	6.7	7.6
Ammonia Nitrogen (mg/L)	4	<0.004	<0.016	0.005	0.005	0.003	0.002	0.008
Nitrate+Nitrite Nitrogen (mg/L)	4	0.014	0.031	0.025	0.024	0.008	0.014	0.031
Total Kjeldahl Nitrogen (mg/L)	4	<0.075	0.439	0.100	0.169	0.182	0.038	0.439
Total Nitrogen (mg/L)	4	<0.068	0.453	0.125	0.193	0.175	0.068	0.453
Dis Reactive Phosphorus (mg/L)	4	<0.005	0.005	0.002	0.003	0.001	0.002	0.005
Total Phosphorus (mg/L)	4	0.005	0.009	0.007	0.007	0.002	0.005	0.009
TOC (mg/L)	4	1.0	2.1	1.7	1.6	0.6	1.0	2.1
CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	1.0	1.0
COD (mg/L)	4	3.9	6.6	5.2	5.2	1.2	3.9	6.6
Chlorides (mg/L)	4	0.9	1.2	1.0	1.0	0.1	0.9	1.2
Sulfate (mg/L)	4	2.16	3.07	2.90	2.76	0.41	2.16	3.07
Total Metals								
Aluminum (T) (mg/L)	4	0.051	0.280	0.053	0.109	0.114	0.051	0.280
Iron (T) (mg/L)	4	0.124	0.682	0.348	0.375	0.234	0.124	0.682
Manganese (T) (mg/L)	4	<0.004	0.061	0.018	0.025	0.029	0.002	0.061
Dissolved Metals								
Aluminum (mg/L)	4	<0.023	0.032	0.017	0.020	0.010	0.012	0.032
Antimony (µg/L)	4	<1.480	<1.480	0.740	0.740	0.000	0.740	0.740
Arsenic (µg/L)	4	<0.689	<0.689	0.344	0.344	0.000	0.344	0.344
Cadmium (µg/L)	4	<0.726	<0.726	0.363	0.363	0.000	0.363	0.363
Chromium (µg/L)	4	<0.793	<0.793	0.396	0.396	0.000	0.396	0.396
Copper (µg/L)	4	<1.190	<1.190	0.595	0.595	0.000	0.595	0.595
Iron (mg/L)	4	<0.063	0.452	0.151	0.196	0.204	0.032	0.452
Lead (µg/L)	4	<0.697	<0.697	0.348	0.348	0.000	0.348	0.348
Manganese (mg/L)	4	<0.004	0.054	0.014	0.021	0.025	0.002	0.054
Nickel (µg/L)	4	<1.960	<1.960	0.980	0.980	0.000	0.980	0.980
Selenium (µg/L)	4	<1.900	<1.900	0.950	0.950	0.000	0.950	0.950
Silver (µg/L)	4	<1.350	<1.350	0.675	0.675	0.000	0.675	0.675
Thallium (µg/L)	4	<0.641	<0.641	0.320	0.320	0.000	0.320	0.320
Zinc (µg/L)	4	<2.340	<2.340	1.170	1.170	0.000	1.170	1.170
Biological								
Chlorophyll a (mg/m³)	4	0.10	1.00	0.50	0.39	0.22	0.05	0.50
E. coli (MPN/DL)	4	24.3	161.6	39.2	66.1	64.1	24.3	161.6

G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 68e; J=estimate; N=# samples.

SUMMARY

The ADEM monitors Sipsey Fork as a "high-quality" reference reach for comparison with other streams in the Dissected Plateau ecoregion. Sipsey Fork at SF-1 is typical of streams in the region, characterized by high gradient streams with a cobble and sand substrate.

Water quality conditions are very high. Specific conductance and hardness median values were above the median values of data collected in ecoregion 68e. The overall habitat quality and availability has been rated as *Marginal* for supporting the macroinvertebrate and fish communities due to high sediment deposition. The macroinvertebrate community is rated as *good-excellent* due to high diversity and taxa richness within the reach. The fish community is rated to be in *good* condition.