

2016 Monitoring Summary



Coffee Creek at end of River Trace Road in Bibb County (33.07704/-87.07275)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Coffee Creek at CAFC-2 to provide biological, chemical, and physical data to fully assess the use support status of Coffee Creek in the Integrated Water Quality Report. Habitat and fish community assessments were conducted on Coffee Creek at CAFC-2 on May 26, 2016, to assess physical and biological conditions. Monthly water quality sampling were also conducted, March through October, 2016.

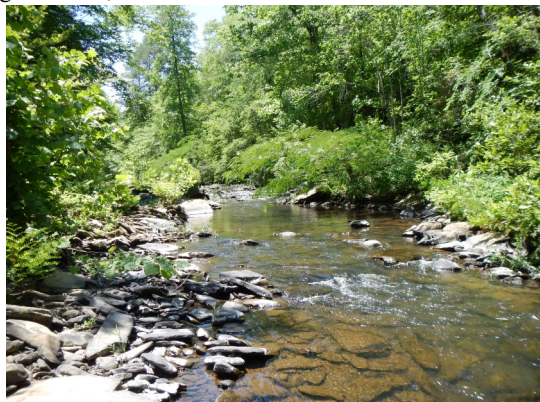


Figure 1. Coffee Creek at CAFC-2 on May 26, 2016.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Coffee Creek, a *Fish and Wildlife (F&W)* stream, is located near West Blocton, Alabama. At CAFC-2, Coffee Creek flows into the Cahaba River, within the Cahaba River National Wildlife Refuge. Since 1998, this segment of the Cahaba River has been classified as an *Outstanding Alabama Water (OAW)/F&W* in recognition of the tremendous diversity of natives fish, snails and mussels endemic to the river. The entire Cahaba River basin has been designated as a Strategic Habitat Unit (SHU) by the USFWS. The basin is critical habitat for 36 species identified as extirpated, threatened or of high conservation concern.

Based on the 2011 National Land Cover Dataset, landuse within the forty square mile Coffee Creek watershed is primarily forested. Eight percent of the watershed is developed, with 25 active NPDES outfalls.

Table 1. Summary of general watershed characteristics: CAFC-2 (2016)

Watershed Characteristics	
Basin	Cahaba
Drainage Area (mi ²)	41.1
Ecoregion ^o	67H
Assessment Unit	AL03150202-0406-100
Use Class	F&W
AU Category	1
12-digit Hydrologic Unit Code (HUC)	031502040206
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	1.0
Wetland, Total (%)	2.5
Wetlands, Woody (%)	2.5
Wetlands, Emergent Herbaceous (%)	0.1
Forested, Total (%)	73.3
Forested, Deciduous (%)	28.0
Forested, Evergreen (%)	36.5
Forested, Mixed (%)	8.8
Shrub/Scrub (%)	8.0
Grassland/Herbaceous (%)	3.4
Pasture/Hay (%)	3.4
Crops, Cultivated (%)	0.2
Developed, Total (%)	7.6
Developed, Open Space (%)	6.4
Developed, Low Intensity (%)	0.9
Developed, Medium Intensity (%)	0.3
Developed, High Intensity (%)	0.1
Barren Land (Rock, Sand, Clay) (%)	0.6
Population/km ² (2010 US Census)	41
NPDES outfalls (NPDES database, Jan 1, 2016)	
Total # of Permitted Outfalls	25
# of Construction Stormwater Permits	19
# of Industrial General	3
# of Industrial Individual	1
# of Mining Permits	1
# of Municipal Permits	1
Roads	
Road Density	2.0
# Road Crossings per Stream km	0.5
Watershed Disturbance Score*	135
Watershed Disturbance Category*	4

^o Southern Sandstone Ridges

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

Table 2. Physical characteristics of Coffee Creek at CAFC-2, May 26, 2016.

Physical Characteristics		
Canopy Cover	Estimate 50/50	
Depth (ft)	Riffle	0.5
	Run	1.0
	Pool	2.0
% of Reach	Riffle	40
	Run	30
	Pool	30
% Substrate	Bedrock	5
	Boulder	50
	Cobble	20
	Gravel	5
	Sand	3
	Silt	7
	Organic Matter	10

REACH CHARACTERISTICS

General observations (Table 2) and a habitat survey (Table 3) were completed during the fish community survey. 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. Coffee Creek at CAFC-2 is a riffle-run stream, dominated by boulder and cobble substrates (Figure 1). Overall habitat quality was rated as *optimal* for supporting aquatic life.

BIOASSESSMENT RESULTS

The fish community in Caffee Creek at CAFC-2 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed by GSA, ADCNR, and ADEM, to establish a comprehensive fish community bioassessment tool for wadeable streams and rivers across the state. These data were collected to assess the overall health of the fish community, based on conditions expected for wadeable streams and rivers in the Ridge & Valley/ Piedmont Ichthyoregion. The AL-IBI uses twelve 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 Caffee Creek at CAFC-2 was 46, indicating the fish community to be in *good* condition (Table 4).

Table 3. Results of the habitat assessment survey conducted on Caffee Creek at CAFC-2, May 26, 2016.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	88	Optimal (80-100)
Sediment Deposition	83	Optimal (80-100)
Riffle Frequency	90	Optimal (80-100)
Bank Vegetative Stability	86	Optimal (80-100)
Riparian Zone Measurements	88	Optimal (85-100)
Habitat Assessment Score	174	
% Maximum Score	87	Optimal (81-100)

Table 4. Results of the fish assessment conducted on Caffee Creek at CAFC-2 on May 26, 2016.

Fish Assessment	Results	Scores
Taxonomic richness & diversity metrics		
Total Native Species	17	3
Number of shiner species	3	3
Number Lepomis species	3	3
Number of darter+madtom species	5	3
Tolerance metrics		
Number of intolerant species	2	3
Percent of tolerant species	3	5
Percent Lepomis	4	5
Trophic metrics		
Percent omnivores	12	5
Percent insectivorous Cyprinids	56	3
Percent top carnivores	2	3
Abundance, Condition, & Reproductive Measures		
Percent DELT+hybrids	0	5
Percent simple miscellaneous	49	5
AL-IBI Survey Score		46
AL-IBI Survey Rating		Good (43-50)

WATER CHEMISTRY

Results of water chemistry samples are presented in Table 5. In situ measurements and water samples were collected monthly during March through October 2016 to help identify any stressors to the biological community. Total dissolved solids, conductivity, hardness, alkalinity, nitrate+nitrite nitrogen, and manganese concentrations were higher than expected, based on comparison with reference reach data for streams in the Southern Sandstone Ridges ecoregion (67h).

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Table 5. Summary of water quality data collected March through October, 2016. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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
Physical							
Temperature (°C)	9	11.3	28.1	23.8	21.6	5.8	
Turbidity (NTU)	10	1.8	57.2	3.4	10.4	17.5	
Total Dissolved Solids (mg/L)	8	89.0	275.0	150.0 ^M	163.5	65.6	
Total Suspended Solids (mg/L)	8	< 1.0	51.0	3.0	10.2	17.2	
Specific Conductance (µmhos/cm)	9	100.2	397.2	264.5 ^G	255.9	103.8	
Hardness (mg/L)	4	63.1	166.0	114.6 ^G	114.6	50.1	
Alkalinity (mg/L)	8	16.7	102.0	58.6 ^M	60.3	29.7	
Monthly Stream Flow (cfs)	8	0.1	45.4	5.7	11.7	15.8	
Measured Stream Flow (cfs)	5	4.0	45.4	13.1	18.7	16.7	
Chemical							
Dissolved Oxygen (mg/L)	9	8.4	11.2	9.1	9.4	0.9	
pH (SU)	9	7.0	8.0	7.9	7.8	0.4	
Ammonia Nitrogen (mg/L)	8	< 0.007	< 0.030	0.004	0.005	0.004	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.112	1.030	0.383 ^M	0.448	0.335	
^J Total Kjeldahl Nitrogen (mg/L)	8	0.100	0.371	0.250	0.244	0.112	
^J Dis Reactive Phosphorus (mg/L)	8	< 0.003	0.006	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.010	0.030	0.018	0.018	0.007	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	1				12.5		
Chlorides (mg/L)	8	1.3	5.9	3.0	3.3	1.5	
Sulfate (mg/L)	8	25.90	93.10	58.50	61.91	27.83	
Total Metals							
^J Aluminum (mg/L)	4	< 0.106	0.155	0.082	0.093	0.050	
^J Iron (mg/L)	4	0.072	0.422	0.412	0.329	0.172	
^J Manganese (mg/L)	4	0.018	0.300	0.076 ^M	0.117	0.128	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.106	< 0.106	0.053	0.053	0.000	
Antimony (µg/L)	4	< 0.383	< 0.383	0.192	0.192	0.000	
^J Arsenic (µg/L)	4	< 0.415	0.472 ^A	0.208	0.274	0.132	1
Cadmium (µg/L)	4	< 0.385	< 0.385	0.192	0.192	0.000	
^J Chromium (µg/L)	4	< 0.445	0.528	0.222	0.299	0.153	
Copper (µg/L)	4	< 0.454	< 0.454	0.227	0.227	0.000	
Iron (mg/L)	4	< 0.063	0.265	0.129	0.139	0.125	
Lead (µg/L)	4	< 0.362	0.362	< 0.181	0.181	0.000	
^J Manganese (mg/L)	4	< 0.004	0.098	0.010	0.030	0.046	
^J Nickel (µg/L)	4	0.912	2.386	1.468	1.558	0.665	
Selenium (µg/L)	4	< 0.505	0.505	< 0.252	0.252	0.000	
Silver (µg/L)	4	< 0.478	0.478	< 0.239	0.239	0.000	
Thallium (µg/L)	4	< 0.348	0.348	< 0.174	0.174	0.000	
^J Zinc (µg/L)	4	1.171	2.103	1.468	1.552	0.395	
Biological							
Chlorophyll a (mg/m ³)	8	< 0.10	5.34	1.47	1.78	1.83	
E. coli (MPN/DL)	8	11.0	1454.0	72.4	240.0	493.9	

A=(F&W) aquatic life use criterion exceeded; G= value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion; 67h; N=# samples; Q=# of uncertain exceedances

SUMMARY

Results of ADEM's 2016 fish community survey indicated the fish community to be in *good* condition in Caffee Creek at station CAFC-2. Overall habitat quality was categorized as *optimal*, with high diversity and availability of habitat. However, several water quality parameters were higher than expected, based on comparison with reference reach data. Monitoring should continue to ensure that biological, chemical, and physical conditions are maintained. This is especially important, considering it is a tributary to the Cahaba River, an *Outstanding Alabama Water (OAW)*.