Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2019 Monitoring Summary

Excellent

Chipco Creek at Coosa County Rd. 34 (32.96090/-86.25259)

BACKGROUND

Chipco Creek is among the least-disturbed watersheds within the Southern Inner Piedmont ecoregion, based on landuse, road density, and population density. Since 2010, 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 and macroinvertebrate 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. Chipco Creek was sampled in 2019 to provide high-quality reference reach data for Southern Inner Piedmont streams.

Figure 1. Chipco Creek at CHPC-1, April 30, 2019.

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

Watershed Characteristics	
Basin	Coosa
Drainage Area (mi²)	12.2
Ecoregion°	45a
Assessment Unit	AL03150107-0708-100
Use Class	F&W
AU Category	
12-digit Hydrologic Unit Code (HUC)	031501070806
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	<1.0
Wetland, Total (%)	0.2
Wetlands, Woody (%)	0.2
Wetlands, Emergent Herbaceous (%)	<1.0
Forested, Total (%)	78.6
Forested, Deciduous (%)	46.8
Forested, Evergreen (%)	31.2
Forested, Mixed (%)	0.6
Shrub/Scrub (%)	5.0
Grassland/Herbaceous (%)	9.5
Pasture/Hay (%)	1.5
Crops, Cultivated (%)	<1.0
Developed, Total (%)	5.1
Developed, Open Space (%)	4.5
Developed, Low Intensity (%)	0.6
Developed, Medium Intensity (%)	<1.0
Developed, High Intensity (%)	<1.0
Barren Land (Rock, Sand, Clay) (%)	0.1
Population/km² (2010 US Census)	2
Roads	
Road Density	1.3
# Road Crossings per Stream km	0.2
Watershed Disturbance Score*	**59**
Watershed Disturbance Category*	**3**

° Southern Inner Piedmont

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

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Chipco Creek is a *Fish & Wildlife (F&W)* stream located near Rockford, AL in the Coosa River basin. According to the 2011 National Land Cover Dataset, the watershed is mostly forested, with approximately 79% forest. There are no permitted outfalls. This watershed is of exceptional quality and 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 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. Like other streams in ecoregion 45a, Chipco Creek at CHPC-1 is a high gradient stream characterized predominantly by a cobble and gravel substrate. Overall habitat quality and availability has been rated as *Optimal* for supporting the macroinvertebrate communities due to a large riparian buffer, low sediment deposition, and stable banks.

Table 2. Physical characteristics of Chipco Creek at CHPC-1, April 30, 2019.

Physical Characteristics	
Width (ft)	15
Canopy Cover	Mostly Shaded
Depth (ft)	
Riffle	1.0
Run	1.5
Pool	2.0
% of Reach	
Riffle	5
Run	90
Pool	5
% Substrate	
Boulder	1
Cobble	44
Gravel	20
Sand	30
Silt	2
Organic Matter	3

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Table 3. Results of the habitat assessment survey conducted on Chipco Creek at CHPC-1, April 30, 2019.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	86	Optimal (80-100)
Sediment Deposition	78	Sub-optimal/Optimal (75-79.999)
Riffle Frequency	85	Optimal (80-100)
Bank Vegetative Stability	78	Sub-optimal/Optimal (75-79.999)
Riparian Zone Measurements	90	Optimal (80-100)
Habitat Assessment Score	**167**	
% Maximum Score	**83**	**Optimal (80-100)**

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 Chipco Creek at CHPC-1 was rated as *excellent*, with 78 total taxa, 13 rare, highly sensitive taxa (Attribute 2), 38 ubiquitous, sensitive taxa (Attribute 3), and 23 Attribute 2 and 3 EPT. The community was comprised of 49% attribute 2 and 3 taxa (Table 4).

Table 4. Results of the macroinvertebrate survey conducted on Chipco Creek at CHPC-1, April 30, 2019.

Macroinvertebrate Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Taxa Count	78	78
# rare and highly sensitive taxa	13	13
# sensitive taxa	38	38
# sensitive EPT taxa	23	23
Percent taxon metrics		
% rare and highly sensitive taxa	17	17
% sensitive taxa	49	49
% sensitive EPT taxa	29	29
% highly tolerant taxa	0	0
Percent individual metrics		
% rare and highly sensitive individuals	14	14
% sensitive individuals	35	35
% sensitive EPT individuals	12	12
% tolerant individuals	0	0
WMB-I Survey Score		**2.0**
WMB-I Survey Rating		**Excellent (2-2.149)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected during March through October 2019 to help characterize the reach. Specific conductance and hardness values were higher than the median concentration of all verified ecoregional reference data collected in the ecoregion 45a. E.coli was documented as exceeding the *F&W* single sample criterion during the October sampling.

Table 5. Summary of water quality data collected during March through October, 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 when results were less than this value.

	CHPC-1 AL03150107-0708-100	N	Min	Max	Med	Avg	SD	E	10thP	90thP
	Physical									
	Temperature (°C)	9	7.3	24.1	17.5	17.1	6.0		7.3	24.1
	Turbidity (NTU)	9	3.0	5.8	4.3	4.4	1.0		3.0	5.8
	Total Dissolved Solids (mg/L)	8	17.0	57.0	38.0	35.4	13.3		17.0	57.0
	Total Suspended Solids (mg/L)	8	<1.0	3.0	1.5	1.6	0.8		0.5	3.0
	Specific Conductance (µmhos/cm)	9	31.3	68.0	47.0G	48.2	12.1		31.3	68.0
	Hardness (mg/L)	4	10.7	27.8	16.4G	17.8	7.4		10.7	27.8
	Alkalinity (mg/L)	8	8.0	28.6	17.0	17.4	7.1		8.0	28.6
	Measured Stream Flow (cfs)	9	0.5	28.0	7.7	9.1	8.7		0.5	28.0
	Chemical									
	Dissolved Oxygen (mg/L)	9	7.4	12.3	9.7	9.4	1.6		7.4	12.3
	pH (SU)	9	6.8	7.5	7.1	7.1	0.2		6.8	7.5
	Ammonia Nitrogen (mg/L)	8	<0.004	<0.016	0.008	0.006	0.003		0.002	0.008
J	Nitrate+Nitrite Nitrogen (mg/L)	8	0.007	0.102	0.054	0.052	0.037		0.007	0.102
	Total Kjeldahl Nitrogen (mg/L)	8	<0.075	0.807	0.100	0.195	0.252		0.038	0.807
J	Total Nitrogen (mg/L)	8	<0.102	0.814	0.182	0.246	0.235		0.102	0.814
J	Dis Reactive Phosphorus (mg/L)	8	<0.005	0.006	0.004	0.004	0.002		0.002	0.006
J	Total Phosphorus (mg/L)	8	0.006	0.011	0.008	0.008	0.002		0.006	0.011
J	TOC (mg/L)	8	0.6	1.3	1.0	1.0	0.2		0.6	1.3
J	CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0		1.0	1.0
J	COD (mg/L)	8	<3.7	9.1	2.9	3.6	2.5		1.8	9.1
	Chlorides (mg/L)	8	1.5	1.7	1.6	1.6	0.1		1.5	1.7
	Sulfate (mg/L)	8	3.00	4.36	3.46	3.52	0.47		3.00	4.36
	Total Metals									
J	Aluminum (T) (mg/L)	4	<0.023	0.092	0.028	0.040	0.038		0.012	0.092
J	Iron (T) (mg/L)	4	0.197	0.534	0.307	0.336	0.161		0.197	0.534
	Manganese (T) (mg/L)	3	<0.004	<0.004	0.002	0.002	0.000		0.002	0.002
	Mercury (T) (µg/L)	1				<0.090			<0.045	<0.045
	Dissolved Metals									
	Aluminum (mg/L)	3	<0.023	<0.023	0.012	0.012	0.000		0.012	0.012
	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
J	Iron (mg/L)	3	0.071	0.410	0.237	0.239	0.170		0.071	0.410
	Lead (µg/L)	4	<0.697	<0.697	0.348	0.348	0.000		0.348	0.348
	Manganese (mg/L)	3	<0.004	<0.004	0.002	0.002	0.000		0.002	0.002
	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)	8	<1.00	2.14	0.78	0.92	0.57		0.50	2.14
	E. coli (MPN/DL)	8	43.5	436.0H	95.1	143.8	125.0	1	43.5	436.0

E=# of samples that exceed criterion.; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45a; H=Human Heath criteria; J=estimate; N=# samples

SUMMARY

The ADEM monitors Chipco Creek as a "high-quality" reference reach for comparison with other streams in the Southern Inner Piedmont ecoregion. Chipco Creek at CHPC-1 is typical of streams in the region, characterized by high gradient streams with a cobble and gravel substrate.

Water quality conditions are very high. E.coli was documented as exceeding the *F&W* single sample criterion during the October sampling. The overall habitat quality and availability has been rated as *Optimal* for supporting the macroinvertebrate communities, which is rated as *Excellent* due to high diversity and taxa richness within the reach.

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