ADEM
Alabama Department of Environmental Management

Reference Reach Site

Rivers and Streams Monitoring Program

TM
2010 Monitoring Summary

Good

Choccolocco Creek at Forest Service Road 540 (Cleburne County) (32.82946/-85.58173)

BACKGROUND

A segment of Choccolocco Creek within the Talladega National Forest is one of the stream reaches the Alabama Department of Environmental Management (ADEM) monitors as a "best attainable condition" reference watershed for comparison with streams throughout the Talladega Upland ecoregion.

Additionally, this reach of Choccolocco Creek was selected for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin.
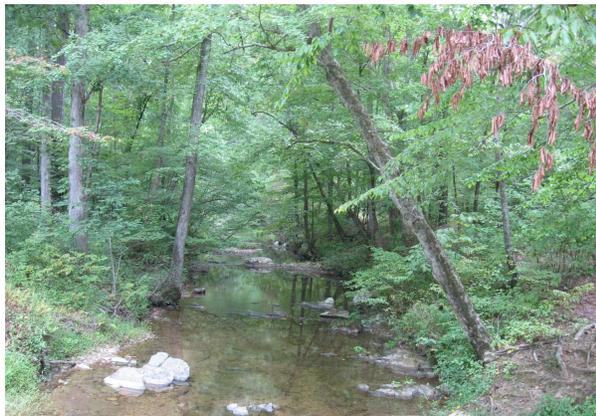

Figure 1. Choccolocco Creek at CHOC-2, September 8, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Choccolocco Creek at CHOC-2 is a *Fish & Wildlife (F&W)* stream located in the Coosa River basin. According to the 2006 National Land Cover Dataset, landuse within the watershed is 98% evergreen and deciduous forest. As of September 1, 2012, ADEM has issued zero NPDES permits 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, as well as the quality and availability of habitat. Choccolocco Creek is a high-gradient, riffle-run stream characterized by bedrock, cobble, and gravel substrates (Figure 1). Overall habitat was rated as *optimal* for supporting macroinvertebrate communities.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-1). 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 in comparison to reference reaches in the same ecoregion. The final score is the average of individual metric scores. The final score indicated the macroinvertebrate community to be in *good* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi^2)		5
Ecoregion[a]		45d
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	56
	Evergreen	42
	Mixed	<1
Shrub/scrub		<1
Grassland/herbaceous		<1
Development	Open space	1
Population/km^2[b]		<1

a. Talladega Upland
b. 2000 US Census

Table 2. Physical characteristics of Choccolocco Creek at CHOC-2, May 27, 2010.

Physical Characteristics		
Width (ft)		35
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.5
	Run	1.0
% of Reach		
	Riffle	25
	Run	75
% Substrate		
	Bedrock	50
	Boulder	5
	Cobble	15
	Gravel	20
	Sand	5
	Silt	2
	Organic Matter	3

TM Graphics provided by Florida Dept. of Environmental Protection (FDEP); used with permission

Table 3. Results of the habitat assessment conducted in Choccolocco Creek at CHOC-2, May 27, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	71	Optimal >70
Sediment Deposition	76	Optimal >70
Sinuosity	83	Sub-optimal (65-84)
Bank and Vegetative Stability	90	Optimal >74
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	**192**	
% Maximum Score	**80**	**Optimal >70**

Table 4. Results of macroinvertebrate assessment conducted in Choccolocco Creek at CHOC-2, May 27, 2010.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	31	100
Shannon Diversity	4	49
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	79	86
% Non-insect taxa	5	86
Tolerance measures		
% Tolerant taxa	17	93
WMB-I Assessment Score	---	**83**
WMB-I Assessment Rating		**Good (70-85)**

WATER CHEMISTRY RESULTS

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during the months of May, July, September, and November 2010 to identify potential stressors to the biological communities. Dissolved copper was estimated to be 0.018 mg/L on September 8, 2010, exceeding the Aquatic Life Use (ALU) criterion of 0.002 mg/L. Dissolved chromium was estimated to be 0.019, slightly exceeding the ALU criterion of 0.018 mg/L. Median specific conductance and hardness were slightly higher than expected when compared to reference reach data in ecoregion 45d.

SUMMARY

Undisturbed landuse, limited population, and minimal road density categorize this segment of Choccolocco Creek among the least-disturbed watersheds in the ACT basin. The habitat assessment and bioassessment results indicate the reach to be in *good* condition. Additional low-level metals sampling may be necessary to more accurately measure dissolved chromium and copper concentrations at the site.

Table 5. Summary of water quality data collected May, July, September, and November, 2010. 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 for each parameter.

Parameter	N	Min	Max	Med	Avg	SD	Q	E	B
Physical									
Temperature (°C)	6	12.4	23.5	21.6	20.1	4.0			
Turbidity (NTU)	6	1.4	9.5	2.5	3.6	3.1			
Total Dissolved Solids (mg/L)	4	18.0	56.0	24.0	30.5	17.2	J		
Total Suspended Solids (mg/L)	4	< 1.0	15.0	2.5	5.1	6.7			
Specific Conductance (μmhos)	6	29.7	52.6	47.2 ^{G}	44.6	9.0			
Hardness (mg/L)	4	9.5	18.0	15.8 ^{G}	14.8	3.9			
Alkalinity (mg/L)	4	9.5	24.1	22.2	19.5	6.8			
Stream Flow (cfs)	6	0.8	15.6	2.3	4.6	5.7			
Chemical									
Dissolved Oxygen (mg/L)	6	8.5	9.9	8.8	8.9	0.5			
pH (su)	6	6.9	7.6	7.5	7.3	0.3			
Ammonia Nitrogen (mg/L)	4	< 0.021	< 0.021	0.010	0.010	0.000			
Nitrate+Nitrite Nitrogen (mg/L)	4	< 0.002	0.067	0.018	0.026	0.029	J		
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.258	0.040	0.094	0.109			
Total Nitrogen (mg/L)	4	< 0.041	0.281	0.080	0.120	0.111	J		
Dissolved Reactive Phosphorus (mg/L)	4	0.020	0.033	0.026	0.026	0.006			
Total Phosphorus (mg/L)	4	0.019	0.033	0.027	0.026	0.006	J		
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0			
COD (mg/L)	4	< 1.8	< 1.8	0.9	0.9	0.0			
TOC (mg/L)	4	0.4	2.8	0.8	1.2	1.1	J		
Chlorides (mg/L)	4	0.9	1.4	1.1	1.1	0.2			
Total Metals									
Aluminum (mg/L)	4	< 0.033	0.060	0.019	0.029	0.021	J		
Iron (mg/L)	4	< 0.026	0.077	0.049	0.047	0.031	J		
Manganese (mg/L)	4	< 0.001	0.006	0.004	0.004	0.002	J		
Dissolved Metals									
Aluminum (mg/L)	4	< 0.033	0.043	0.016	0.018	0.002			
Antimony (μg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0			
Arsenic (μg/L)	4	< 0.4	2.1	1.0	0.8	0.4			
Cadmium (mg/L)	4	< 0.000	0.014	0.001	0.002	0.003			
Chromium (mg/L)	4	< 0.009	0.019 ^{S}	0.006	0.009	0.007	J		1
Copper (mg/L)	4	< 0.013	0.020 ^{S}	0.008	0.010	0.005	J	1	
Iron (mg/L)	4	< 0.026	0.049	0.028	0.030	0.019	J		
Lead (μg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0			
Manganese (mg/L)	4	< 0.001	0.005	0.001	0.002	0.002	J		
Mercury (μg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0			
Nickel (mg/L)	4	< 0.019	0.042	0.010	0.012	0.006			
Selenium (μg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0			
Silver (mg/L)	4	< 0.000	0.002	0.000	0.000	0.001			
Thallium (μg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0			
Zinc (mg/L)	4	< 0.012	0.030	0.015	0.013	0.004			
Biological									
Chlorophyll a (ug/L)	4	< 0.10	1.07	0.46	0.51	0.42			
E. coli (col/100mL)	4	21	326	40	107	146	J		

B=estimated concentration above established criteria; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45d; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45d; N=# samples; S=*F&W* hardness-adjusted aquatic life use criteria exceeded; Q=Laboratory qualifier codes