

2005 Monitoring Summary



Choccolocco Creek at Forest Service Rd 540 Cleburne County (33.82946/-85.58173)

BACKGROUND

Choccolocco Creek is one of the streams 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, Choccolocco Creek was selected for biological and water quality monitoring as part of the 2005 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 and to estimate overall water quality within the ACT basin group.

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	5
Ecoregion ^a	45d
% Landuse	
Wetland	Woody <1
Forest	Deciduous 56
	Evergreen 43
	Mixed <1
Shrub/scrub	<1
Grassland/herbaceous	<1
Development	Open space 1
Population/km ² ^b	5

a. Talladega Upland

b. 2000 U S census data

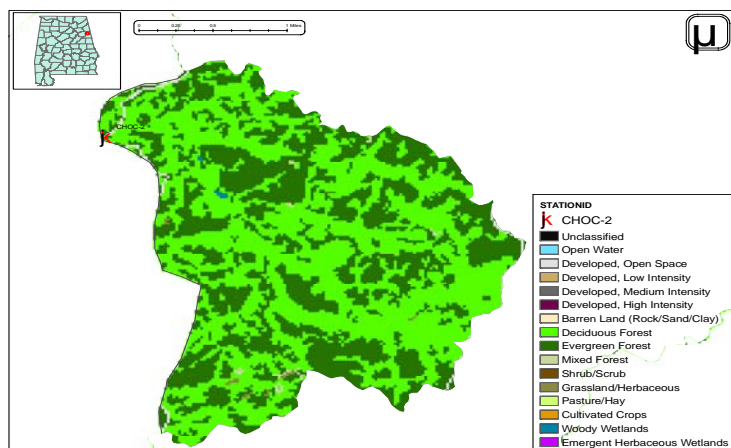


Figure 1. Sampling location and land use within the Choccolocco Creek watershed at CHOC-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Choccolocco Creek at CHOC-2 is a small *Fish & Wildlife (F&W)* stream located in the Coosa River basin. Land cover within the watershed is approximately 99% forested (Fig. 1). As of June 9, 2008, ADEM’s NPDES Management System database did not show any permitted discharges located within the watershed.

Table 2. Physical characteristics at CHOC-2, May 4, 2005.

Physical Characteristics	
Width (ft)	20
Canopy cover	Mostly Shaded
Depth (ft)	
	Riffle 0.4
	Run 1.2
	Pool 0.8
% of Reach	
	Riffle 80
	Run 15
	Pool 5
% Substrate	
	Bedrock 45
	Boulder 5
	Cobble 20
	Gravel 10
	Sand 15
	Organic Matter 5

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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. Choccolocco Creek is a high-gradient, riffle-run stream characterized by bedrock, boulder, cobble, gravel and sand substrates typical of the Talladega Upland Ecoregion. Overall habitat quality was rated as *optimal* for supporting macroinvertebrate communities.

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 an average of all individual metric scores. The final score indicated the biological community to be in *excellent* condition (Table 4).

Table 3. Results of habitat assessment conducted at CHOC-2 on May 4, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	73	Optimal (> 70)
Sediment deposition	81	Optimal (> 70)
Sinuosity	88	Optimal (≥85)
Bank and vegetative stability	86	Optimal (≥75)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	196	
% Maximum score	81	Optimal (> 70)

Table 4. Results of macroinvertebrate assessment conducted at CHOC-2, May 4, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
	(0-100)		
Taxa richness measures			
# Ephemeroptera (mayfly) genera	24	100	Excellent (>85)
# Plecoptera (stonefly) genera	10	100	Excellent (>75)
# Trichoptera (caddisfly) genera	15	100	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	4	83	Good (74.1-87.1)
% Non-insect organisms	2	93	Fair (62.7-93.9)
% Plecoptera	11	57	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	54	100	Excellent (>80.4)
WMB-I Assessment Score	---	90	Excellent (>86)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. *In situ* parameters indicated that Choccolocco Creek at CHOC-2 was meeting water quality criteria for its *Fish & Wildlife* use classification. Dissolved oxygen concentrations ranged from 7.5-10.6 mg/L. Individual fecal coliform counts did not exceed 130 colonies/100 ml of sample. Median concentrations of nutrients, total and dissolved solids, and chlorides were well within the expected limit for streams in the Talladega Upland ecoregion. Metals concentrations were below detection limits.

CONCLUSIONS

Landuse, road density, and population density categorize Choccolocco Creek among the least-disturbed watersheds in the ACT basin group. Water quality data, habitat assessment, and bioassessment indicate the reach to be in *excellent* condition and typical of the Talladega Upland ecoregion.

Table 5. Summary of water quality data collected March-October, 2005. 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.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	7	14.0	26.0	22.0	20.5	4.2
Turbidity (NTU)	7	0.8	4.3	2.2	2.3	1.3
Total dissolved solids (mg/L)	7	26.0	125.0	38.0	49.5	37.6
Total suspended solids (mg/L)	7	2.0	7.0	6.0	5.5	1.9
Specific conductance (µmhos)	7	30.7	51.6	37.7	38.3	7.1
Hardness (mg/L)	5	7.8	18.9	9.9	10.7	3.4
Alkalinity (mg/L)	7	7.9	21.0	10.9	11.0	2.7
Stream Flow (cfs)	7	2.2	18.7	11.9	10.7	---
Chemical						
Dissolved oxygen (mg/L)	7	7.5	10.6	9.2	9.1	1.2
pH (su)	7	7.3	7.7	7.5	7.5	0.1
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.011	0.011	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.023	0.006	0.008	0.008
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.251	0.075	0.104	0.072
Total nitrogen (mg/L)	7	0.076	0.274	0.156	0.175	0.048
Dissolved reactive phosphorus (mg/L)	7	0.011	0.019	0.014	0.014	0.003
Total phosphorus (mg/L)	7	< 0.004	0.064	0.038	0.035	0.021
CBOD-5 (mg/L)	7	< 1.0	3.3	1.3	1.5	1.1
COD (mg/L)	6	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	6	3.5	3.7	3.6	3.6	0.1
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.045	0.019	0.024	0.019
Iron (mg/L)	4	< 0.005	0.169	0.087	0.109	0.053
Manganese (mg/L)	4	< 0.005	0.054	0.0025	0.020	0.030
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.0075	0.008	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.000
Iron (mg/L)	4	< 0.005	0.02	0.0025	0.00833	0.010
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.000
^J Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.2	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.000
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (µg/L)	7	0.27	2.40	0.53	0.91	0.8
^J Fecal Coliform (col/100 mL)	7	15	130	36	43	35

J=estimate; N=number of samples.

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