

2005 Monitoring Summary



Channahatchee Creek at Elmore County Road 357 near Eclectic (32.65024/-85.95085)

BACKGROUND

Channahatchee 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 Piedmont ecoregion.

Additionally, Channahatchee 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 the stream and estimate overall water quality within the ACT basin group.

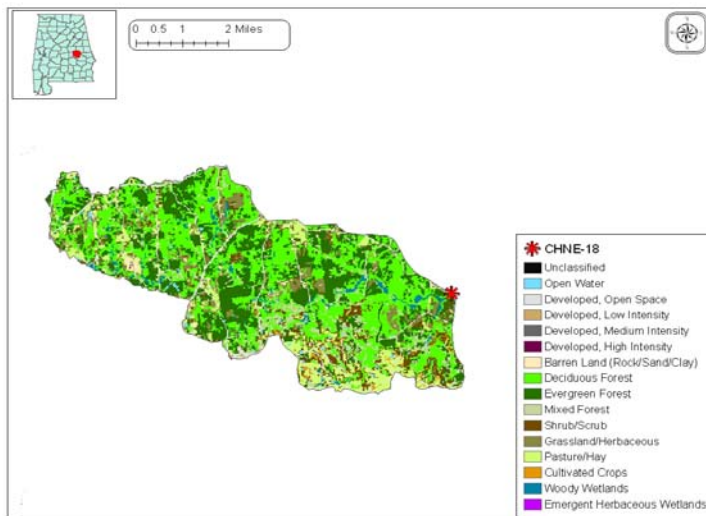


Figure 1. Watershed characteristics of Channahatchee Creek at CHNE-18.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. The Channahatchee Creek watershed at CHNE-18 is located in the Tallapoosa River basin. It is composed primarily of forest (69%), grasslands, and some pasture (Fig. 1). Population estimate was relatively high in this watershed. Some permitted discharges also existed.

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. Channahatchee Creek at CHNE-18 is a riffle-run stream characterized by sand and gravel substrates. Overall habitat quality was rated as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		25
Ecoregion ^a		45a
% Landuse		
Open water		1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	36
	Evergreen	26
	Mixed	7
Shrub/scrub		6
Grassland/herbaceous		8
Pasture/hay		9
Cultivated crops		1
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		1
Population/km ^{2b}		57
# NPDES Permits ^c	TOTAL	8
	Construction Stormwater	4
	Mining General Permit (old)	4

a. Southern Inner Piedmont

b. 2005 Census Data

c. #NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at Channahatchee Creek at CHNE-18, May 11, 2005.

Physical Characteristics		
Width (ft)		20
Canopy cover		Shaded
Depth (ft)		
	Riffle	0.8
	Run	2.0
	Pool	3.0
% Substrate		
	Boulder	2
	Cobble	15
	Gravel	30
	Sand	35
	Organic Matter	3

Table 3. Results of the habitat assessment of Channahatchee Creek at CHNE-18 May 11, 2005.

Habitat Assessment	(% Maximum Score)	Rating
Instream habitat quality	79	Optimal (> 70)
Sediment deposition	61	Sub-optimal (59-70)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	40	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	168	
% Maximum score	70	Sub-optimal (59-70)

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each score is based on a 100 point scale with the final score comprising of the average of each metric score. The metric results indicated that the macroinvertebrate community to be in *good* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment of Channahatchee Creek at CHNE-18, May 11, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	14	100	Excellent (>85)
# Plecoptera (stonefly) genera	5	83	Excellent (>75)
# Trichoptera (caddisfly) genera	4	33	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	5	80	Good (74.1-87.1)
% Non-insect organisms	2	94	Fair (62.7-93.9)
% Plecoptera	11	56	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	17	61	Good (60.7-80.4)
WMB-I Assessment Score	---	72	Good (72-86)

WATER CHEMISTRY

Results of water chemistry analyses are summarized 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. Median values were compared to the 90th percentile of similar samples tested in the same subecoregion. Total iron and manganese concentrations were higher than expected, but all others were within expected values.

CONCLUSION

Bioassessment results indicate the macroinvertebrate community to be in *good* condition. Sediment deposition, bank and vegetative stability, and elevated concentrations of iron and manganese were areas of concern within the reach. Although mostly forested, there were some areas of development in the watershed. Population density was relatively high and there were some NPDES permitted discharges within the watershed.

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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	8	11.0	26.5	20.0	19.9	5.4
Turbidity (NTU)	8	5.1	115.0	18.5	32.7	36.6
Total dissolved solids (mg/L)	7	33.0	66.0	51.0	50.4	10.8
Total suspended solids (mg/L)	7	7.0	62.0	12.0	23.3	20.7
Specific conductance (µmhos)	8	39.4	47.8	43.7	43.6	3.0
Hardness (mg/L)	5	8.1	13.8	10.9	10.9	2.4
Alkalinity (mg/L)	7	7.0	21.5	12.9	14.1	5.2
Stream Flow (cfs)	6	4.5	90.6	32.6	44.7	---
Chemical						
Dissolved oxygen (mg/L)	8	7.5	9.8	8.8	8.7	0.8
pH (su)	8	6.5	7.52	7.2	7.1	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.020	0.008	0.011	0.006
Nitrate+Nitrite Nitrogen (mg/L)	7	0.022	0.594	0.071	0.136	0.203
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.412	0.273	0.221	0.142
Total nitrogen (mg/L)	7	0.146	0.669	0.343	0.357	0.184
Dissolved reactive phosphorus (mg/L)	7	< 0.005	0.026	0.008	0.011	0.008
Total phosphorus (mg/L)	7	0.013	0.079	0.055	0.051	0.024
CBOD-5 (mg/L)	7	< 1.0	2.5	1.3	1.3	0.8
COD (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
Clorides (mg/L)	6	4.3	5.6	4.4	4.7	0.5
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	1.03	0.14 ^M	0.329	0.48
Iron (mg/L)	4	0.666	1.67	1.17 ^M	1.169	0.45
Manganese (mg/L)	4	0.026	0.133	0.083	0.081	0.049
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.032	0.008	0.014	0.012
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	0.003	0.003	0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0
Iron (mg/L)	4	0.162	0.303	0.269	0.251	0.062
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.018	0.014	0.012	0.007
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.188	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
Chlorophyll a (µg/L)	7	1.07	18.16	2.67	4.50	6.1
Fecal Coliform (col/100 mL)	7	83	1500	210	448	489

J=estimate; N= # of samples; M=value >90% of collected samples in ecoregion 45a.

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