

2015 Monitoring Summary



Channahatchee Creek at Elmore County Road 357 (32.65024, -85.95085)

BACKGROUND

Channahatchee Creek is among the least-disturbed watersheds in the Southern Inner Piedmont (45a) ecoregion, based on land use, road density, and population density. The Alabama Department of Environmental Management (ADEM) monitors Channahatchee Creek at CHNE-18 as a “best attainable condition” reference watershed for comparison with streams throughout the ecoregion. Channahatchee Creek was monitored at CHNE-18 to provide biological, chemical, and physical data to fully assess conditions at the site, and to characterize “best attainable conditions” within the Southern Inner Plateau sub-ecoregion.



Figure 1. Channahatchee Creek at CHNE-18, October 8, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Channahatchee Creek is a *Fish & Wildlife (F&W)* stream located south of Lake Martin in Elmore County, Alabama. Based on the 2011 National Land Cover Dataset, 68% of the watershed is forested. As of April 1, 2016, 14 NPDES outfalls have been issued within this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate community 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 with substrate composed primarily of cobble and sand (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics			Tallapoosa River
Basin			25
Drainage Area (mi²)			45A
Ecoregion^a			
Landuse^b			
	Open water		<1%
	Wetland	Woody	2%
		Emergent herbaceous	<1%
	Forest	Deciduous	37%
		Evergreen	25%
		Mixed	6%
	Shrub/scrub		9%
	Grassland/herbaceous		7%
	Pasture/hay		8%
	Cultivated crops		<1%
	Development	Open space	4%
		Low intensity	<1%
		Moderate intensity	<1%
		High intensity	<1%
	Barren		<1%
Population/km^{2c}			21
# NPDES Permits^d		TOTAL	14
	Construction		11
	Industrial General		3

a. Southern Inner Piedmont

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Channahatchee Creek at CHNE-18, June 24, 2015.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.3
	Run	1.5
	Pool	2.0
% of Reach		
	Riffle	10
	Run	60
	Pool	30
% Substrate		
	Bedrock	2
	Boulder	1
	Cobble	50
	Gravel	5
	Sand	20
	Silt	10
	Organic Matter	12

Table 3. Results of the habitat assessment conducted on Channahatchee

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	72	Sub-Optimal (55-79)
Sediment Deposition	44	Marginal (31-<55)
Riffle Frequency	48	Marginal (31-<55)
Bank and Vegetative Stability	53	Marginal (31-<55)
Riparian Buffer	81	Sub-Optimal (55-79)
Habitat Assessment Score	124	
% of Maximum Score	62	Sub-Optimal (57-80)

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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 4. Results of the macroinvertebrate community bioassessment conducted in Channahatchee Creek at CHNE-18, June 24, 2015.

Macroinvertebrate Assessment			
	Results	Scores	
		(0-100)	
Taxa richness and diversity measures			
# EPT taxa	15	48	
Shannon Diversity	4.09	65	
Taxonomic composition measures			
% EPT minus Baetidae and Hydropsychidae	24	52	
% Non-insect taxa	10	63	
Tolerance measures			
% Tolerant taxa	32	50	
WMB-I Assessment Score	---	55	
WMB-I Assessment Rating		Fair (47-69)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, March through October of 2015 to help identify any stressors to the biological communities. Organics were collected in April, however all were below the minimum detection level. For Channahatchee Creek at CHNE-18, flow was 3.1 cfs. Median specific conductance, hardness, and several total and dissolved metals were higher than expected, based on data collected at other reference reaches within the Southern Inner Piedmont ecoregion (45a).

SUMMARY

ADEM is currently monitoring Channahatchee Creek at CHNE-18 as a “best attainable” condition reference watershed. However, the overall habitat quality was categorized as *sub-optimal* for its stream type, and bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Median total specific conductance, hardness, alkalinity, total and dissolved iron, total and dissolved manganese, and total and dissolved aluminum values were higher than expected based on data collected at other reference reaches within the ecoregion. Monitoring should continue to ensure that Channahatchee Creek is a “best attainable” condition reference watershed for its ecoregion.

Table 5. Summary of water quality data collected March-October, 2015. 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	Med	Avg	SD	Q
Physical							
Temperature (°C)	10	12.5	25.2	18.8	19.8	3.8	
Turbidity (NTU)	10	4.7	16.3	8.1	8.4	3.2	
† Total Dissolved Solids (mg/L)	8	46.0	67.0	52.0	53.0	6.3	
† Total Suspended Solids (mg/L)	8	1.0	6.0	2.5	2.9	1.6	
Specific Conductance (µmhos/cm)	10	45.8	57.6	52.0 ^G	52.0	3.6	
Hardness (mg/L)	4	14.2	17.2	15.2 ^G	15.4	1.3	
Alkalinity (mg/L)	8	15.1	25.1	21.7	21.1	3.4	
Monthly Stream Flow (cfs)	10	0.1	44.6	4.7	10.2	14.0	
Measured Stream Flow (cfs)	9	0.3	44.6	6.3	11.3	14.4	
Chemical							
Dissolved Oxygen (mg/L)	10	6.1	10.5	8.1	8.0	1.4	
pH (SU)	10	6.4	7.1	6.8	6.7	0.2	
† Ammonia Nitrogen (mg/L)	8	< 0.007	0.071	0.005	0.017	0.023	
† Nitrate+Nitrite Nitrogen (mg/L)	8	0.009	0.125	0.048	0.059	0.042	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.064	0.402	0.196	0.203	0.130	
Total Nitrogen (mg/L)	8	< 0.129	0.429	0.226	0.262	0.110	
† Dis Reactive Phosphorus (mg/L)	8	0.005	0.009	0.006	0.007	0.002	
Total Phosphorus (mg/L)	8	0.018	0.030	0.021	0.022	0.004	
† CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
† COD (mg/L)	7	9.4	16.4	15.4	13.9	2.8	
† TOC (mg/L)	8	3.3	5.1	3.6	3.9	0.6	
Chlorides (mg/L)	8	2.3	2.8	2.7	2.6	0.2	
Atrazine (µg/L)	1				< 0.10		
Total Metals							
† Aluminum (mg/L)	4	0.131	0.762	0.316 ^M	0.382	0.273	
Iron (mg/L)	4	1.020	1.930	1.220 ^M	1.348	0.402	
† Manganese (mg/L)	4	0.059	0.147	0.079 ^M	0.091	0.041	
Dissolved Metals							
† DAluminum (mg/L)	4	< 0.106	0.243	0.120 ^M	0.134	0.080	
Antimony (µg/L)	4	< 0.342	0.342	0.171	0.171	0.000	
† Arsenic (µg/L)	4	< 0.276	0.367 ^H	0.301	0.277	0.099	3
Cadmium (µg/L)	4	< 0.311	< 0.311	0.156	0.156	0.000	
† Chromium (µg/L)	4	< 0.347	0.424	0.174	0.236	0.125	
† Copper (µg/L)	4	0.320	0.526	0.369	0.396	0.091	
Diron (mg/L)	4	0.736	1.260	0.770 ^M	0.884	0.251	
Lead (µg/L)	4	< 0.428	< 0.428	0.214	0.214	0.000	
† DManganese (mg/L)	4	0.038	0.121	0.050 ^M	0.065	0.038	
Nickel (µg/L)	4	< 0.460	< 0.460	0.230	0.230	0.000	
Selenium (µg/L)	4	< 0.395	< 0.395	0.198	0.198	0.000	
Silver (µg/L)	4	< 0.365	< 0.365	0.182	0.182	0.000	
Thallium (µg/L)	4	< 0.514	< 0.514	0.257	0.257	0.000	
† Zinc (µg/L)	4	< 0.522	2.091	1.700	1.438	0.840	
Biological							
Chlorophyll a (mg/m³)	8	< 0.10	3.56	0.50	0.71	1.17	
E. coli (MPN/DL)	8	129.6	325.5	185.4	210.7	85.1	

A = F&W aquatic life use criterion exceeded; E = # samples that exceeded criteria; G = value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 45a; H = F&W human health criterion exceeded; J = estimate; M = value >90% of collected samples in

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