Alabama Department of Environmental Management

Use Support

Rivers and Streams Monitoring Program

2007 Monitoring Summary

Poor

Chitwood Creek at Faulkner Road in Blount County (33.94035/-86.54229)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Chitwood Creek for biological and water quality monitoring to assess water quality after upgrades to Oneonta waste water treatment plant. ADEM monitored Chitwood Creek at CCB-4, approximately 1.8 miles downstream of the Oneonta waste water treatment facility discharge point. A habitat and macroinvertebrate assessment were conducted on Chitwood Creek at CCB-4 on May 30, 2007.

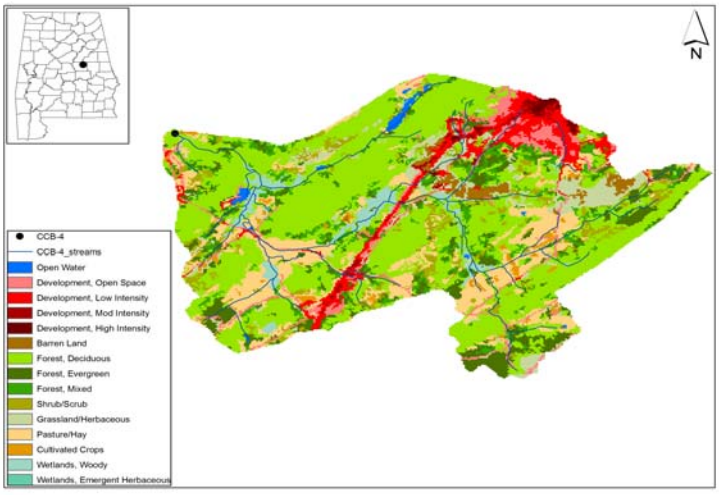

Figure 1. Sampling location and landuse within the Chitwood Creek watershed at CCB-4.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Chitwood Creek at CCB-4 is a *Fish and Wildlife* (*F&W*) stream located in the Black Warrior River basin. It drains approximately 14 square miles of the Southern Table Plateaus ecoregion of Blount County. Based on the 2000 national landuse cover dataset, landuse within the watershed is primarily forest (58%), with an even distribution of shrub/scrub, grassland and pasturelands (Figure 1). As of February 23, 2011, eleven NPDES permit outfalls are located in this 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 and the quality and availability of habitat. Chitwood Creek at CCB-4 is a low gradient, mostly-shaded stream reach. Benthic substrate consists primarily of boulder, cobble, and silt. Overall habitat quality and availability were rated as *optimal* for supporting diverse aquatic macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		14
Ecoregion[a]		68d
% Landuse		
Open water		1
Wetland	Woody	3
Forest	Deciduous	44
	Evergreen	8
	Mixed	6
Shrub/scrub		6
Grassland/herbaceous		5
Pasture/hay		13
Cultivated crops		1
Development	Open space	5
	Low intensity	5
	Moderate intensity	1
	High intensity	<1
Barren		2
Population/km^2[b]		86
# NPDES Permits[c]	**TOTAL**	11
Construction Stormwater		9
Municipal Individual		2

a. Southern Table Plateaus

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database February 23,2011

Table 2. Physical characteristics of Chitwood Creek at CCB-4, May 30, 2007.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.9
	Run	1.5
	Pool	1.0
% of Reach		
	Riffle	35
	Run	60
	Pool	5
% Substrate		
	Bedrock	3
	Boulder	40
	Cobble	35
	Gravel	5
	Sand	5
	Silt	10
	Organic Matter	2

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Table 3. Results of the habitat assessment conducted on Chitwood Creek at CCB-4, May 30, 2007.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	82	Optimal(>70)
Sediment Deposition	80	Optimal (>70)
Sinuosity	80	Sub-optimal (65-84)
Bank and Vegetative Stability	76	Optimal (>74)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**190**	
% Maximum Score	**79**	**Optimal (>70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Chitwood Creek at CCB-4, May 30, 2007.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# Ephemeroptera (mayfly) taxa	6
# Plecoptera (stonefly) taxa	2
# Trichoptera (caddisfly) taxa	7
Taxonomic composition measures	
% Non-insect taxa	12
% Plecoptera	1
% Non-insect organisms	53
Community tolerance	
Becks community tolerance index	11
WMB-I Assessment Score	34
WMB-I Assessment Rating	Poor (24-47)

Table 5. Summary of water quality data collected March-October, 2007. 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
Physical						
Temperature (°C)	9	16.0	25.0	20.0	20.6	3.2
Turbidity (NTU)	9	2.5	26.5	5.0	7.1	7.4
Total Dissolved Solids (mg/L)	8	123.0	267.0	192.5[M]	195.0	54.8
Total Suspended Solids (mg/L)	8	< 1.0	33.0	4.5	8.2	10.4
Specific Conductance (µmhos)	9	255.7	518.0	417.7[M]	387.3	85.1
Alkalinity (mg/L)	8	107.9	146.5	129.3	126.7	13.2
Stream Flow (cfs)	8	2.0	15.5	3.6	5.7	4.8
Chemical						
Dissolved Oxygen (mg/L)	9	8.1	11.9	8.8	9.0	1.2
pH (su)	9	7.6	8.9[C]	7.9	8.0	0.4
Ammonia Nitrogen (mg/L)	8	< 0.015	<0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	8	0.218	1.820	0.740	0.841	0.590
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.687	0.226	0.255	0.209
Total Nitrogen (mg/L)	8	< 0.342	2.507	0.904	1.096	0.775
Dissolved Reactive Phosphorus (mg/L)	8	0.202	2.500	1.205[M]	1.261	0.824
Total Phosphorus (mg/L)	7	0.471	2.450	1.191[M]	1.298	0.645
CBOD-5 (mg/L)	8	< 1.0	2.3	0.5	0.9	0.7
[J] Chlorides (mg/L)	8	13.4	57.5	35.9[M]	33.8	15.8
Biological						
[J] Fecal Coliform (col/100 mL)	8	10	340	38	70	111

J=estimate; N= # of samples; M=value >90% of all verified ecoregional reference reach data collected in ecoregion 68d; C=value exceeds established criteria for *F&W* water use classification.

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. The final score is the average of all individual metric scores. The metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly during March through October of 2007 to help identify any stressors to the biological communities. Median values of dissolved solids, specific conductance, pH, dissolved reactive phosphorous, total phosphorous, and chlorides were higher than expected for ecoregion 68d. Stream pH results exceeded *F&W* criteria during the March 13th site visit.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Results of the 2007 bioassessment indicated the macroinvertebrate community in Chitwood Creek at CCB-4 to be in *poor* condition. Water quality data indicate elevated median values of multiple parameters, including total phosphorous and dissolved solids. Stream pH exceeded *F&W* criteria during the March 13th site visit. These data, along with the poor bioassessment result, suggest that further assessment is needed to determine if Chitwood Creek at CCB-4 is meeting its *F&W* use classification.

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