Alabama Department of Environmental Management

NPS Intensive Montioring

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Good

Clear Creek at Fayette County Highway 93 (33.67834/-87.65999)

BACKGROUND

The Clear Creek watershed was selected for documenting baseline conditions before best management practices are implemented to address sedimentation from clay mining. The Alabama Department of Environmental Management (ADEM) conducted monitoring to assess the biological integrity of this site and to estimate overall water quality within the Clear Creek watershed.

Figure 1. Clear Creek at CLEF-30 on December 1, 2010, facing upstream.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		20
Ecoregion[a]		65i
% Landuse		
Open water		1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	41
	Evergreen	15
	Mixed	16
Shrub/scrub		13
Grassland/herbaceous		<1
Pasture/hay		2
Cultivated crops		5
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		7
# NPDES Permits[c]		7
Construction Stormwater		5
Municipal Individual		2

a. Fall Line Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Clear Creek at CLEF-30 is a *Fish and Wildlife (F&W)* stream located approximately 1.5 miles downstream of Bugs Lake in Fayette County, near the town of Bankston. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (72%) areas. As of September 1, 2012, ADEM's NPDES management system shows a total of seven permits issued in the Clear Creek 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. Clear Creek at CLEF-30 was characterized primarily by sand, organic matter, and gravel substrates (Figure 1). Although overall habitat quality was categorized as *optimal*, the riparian buffer and riffle habitat were limited.

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 *good* condition (Table 4).

Table 2. Physical characteristics of Clear Creek at CLEF-30, May 26, 2010.

Physical Characteristics		
Width (ft)		23
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.5
	Run	2.0
	Pool	3.5
% of Reach		
	Riffle	10
	Run	30
	Pool	60
% Substrate		
	Clay	10
	Cobble	2
	Mud/Muck	2
	Gravel	25
	Sand	30
	Silt	3
	Organic Matter	28

Table 3. Results of the habitat assessment conducted on Clear Creek at CLEF-30, May 26, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	71	Optimal (>65)
Sediment Deposition	71	Optimal (>65)
Sinuosity	73	Sub-optimal (65-84)
Bank and Vegetative Stability	69	Sub-optimal (60-74)
Riparian Buffer	69	Marginal (50-69)
Habitat Assessment Score	**171**	
% Maximum Score	**71**	**Optimal (>65)**

Table 4. Results of macroinvertebrate bioassessment conducted in Clear Creek at CLEF-30, May 26, 2010.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	29	50
% Dominant Taxon	19	78
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	8	14
Functional feeding group		
# Collector Taxa	18	55
Community tolerance		
% Nutrient Tolerant individuals	38	47
WMB-I Assessment Score	**---**	**49**
WMB-I Assessment Rating		**Good (48-74)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during April through December of 2010 to help identify any stressors to the biological communities. However, the stream bed was dry during August and September, and no samples were collected during those months. Low stream flow was recorded for the majority of sampling visits. Stream pH exceeded *F&W* criteria on October 19, 2010. Arsenic had a human health criteria exceedance on April 14, 2010. Median specific conductance and hardness were slightly higher than values expected based on data collected at reference reaches within the Fall Line Hills ecoregion (65i).

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Clear Creek at CLEF-30 had little to no flow during the months of July through November of the sampling season. Further sampling may be required to get a representative assessment of the stream.

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Table 5. Summary of water quality data collected April-December, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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	E
Physical							
Temperature (°C)	6	10.9	26.1	21.6	20.2	6.2	
Turbidity (NTU)	7	1.9	57.7	9.2	14.9	19.2	
Total Dissolved Solids (mg/L)	6	< 1.0	52.0	41.0	34.8	19.1	
Total Suspended Solids (mg/L)	6	< 1.0	26.0	3.0	6.3	9.8	
Specific Conductance (µmhos)	6	21.3	44.9	39.8 G	35.0	10.1	
Hardness (mg/L)	3	11.0	15.0	11.2 G	12.4	2.2	
Alkalinity (mg/L)	6	5.0	30.0	14.0	15.2	8.4	
Stream Flow (cfs)	5	0.1	20.3	0.2	4.4	8.9	
Chemical							
Dissolved Oxygen (mg/L)	6	7.4	10.5	7.7	8.2	1.2	
pH (su)	6	5.7 C	6.9	6.5	6.4	0.4	1
Ammonia Nitrogen (mg/L)	6	< 0.021	< 0.021	0.010	0.010	0.000	
J Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.002	0.146	0.016	0.043	0.058	
Total Kjeldahl Nitrogen (mg/L)	6	< 0.080	0.462	0.135	0.182	0.173	
J Total Nitrogen (mg/L)	6	< 0.041	0.608	0.175	0.225	0.210	
J Dissolved Reactive Phosphorus (mg/L)	6	0.004	0.013	0.008	0.008	0.003	
Total Phosphorus (mg/L)	6	0.010	0.056	0.031	0.032	0.018	
CBOD-5 (mg/L)	6	< 2.0	2.6	1.0	1.5	0.8	
Chlorides (mg/L)	6	1.1	1.9	1.5	1.4	0.3	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	3	< 0.033	0.291	0.016	0.108	0.158	
Iron (mg/L)	3	0.298	1.400	0.848	0.849	0.551	
J Manganese (mg/L)	3	0.021	0.682	0.404	0.369	0.332	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000	
J Antimony (µg/L)	3	1.0	< 1.9	0.9	1.0	0.0	
J Arsenic (µg/L)	3	0.7 H	< 2.1	1.0	0.9	0.2	1
Cadmium (mg/L)	3	< 0.0001	< 0.014	0.002	0.003	0.004	
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000	
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000	
J Iron (mg/L)	3	< 0.026	0.236	0.158	0.136	0.113	
Lead (µg/L)	3	< 1.7	< 1.7	0.8	0.8	0.0	
J Manganese (mg/L)	3	0.020	0.601	0.403	0.341	0.295	
Mercury (µg/L)	3	< 0.080	< 0.080	0.040	0.040	0.000	
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000	
Selenium (µg/L)	3	< 1.7	< 1.7	0.8	0.8	0.0	
J Silver (mg/L)	3	0.0002	< 0.002	0.001	0.001	0.000	
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000	
Biological							
Chlorophyll a (ug/L)	6	< 0.10	1.78	0.52	0.60	0.64	
J E. coli (col/100mL)	6	20	1553	63	374	609	

J=estimate; N=# samples; C=value exceeds established criteria for *F&W* water use classification; H=*F&W* human health criterion exceeded; G=value greater than median concentration of all verified reference data collected in ecoregion 65i; E=# samples that exceed criterion.