

2010 Monitoring Summary



Basin Assessment Site

Ohatchee Creek at Verbon George Road in Calhoun County (33.89680/85.87570)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Ohatchee Creek watershed for biological and water quality monitoring as part of the 2010 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 site and to estimate overall water quality within the ACT basin group.



Figure 1. Ohatchee Creek at OHTC-6, June 15, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Ohatchee Creek is a small *Fish & Wildlife (F&W)* stream located in Calhoun County (Figure 1). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (69%), with some pasture/hay. As of September 1, 2012, ADEM has issued 2 NPDES permits 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. Ohatchee Creek at OHTC-6 is a high-gradient, riffle-run stream located in the Ridge and Valley ecoregion (67g). Bottom substrate consists primarily of gravel and cobble with an even mix of sand, silt and bedrock present. Overall habitat quality was categorized as *sub-optimal* for supporting diverse aquatic 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 the average of the score for each metric. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi²)		34
Ecoregion^a		67g
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	40
	Evergreen	17
	Mixed	12
Shrub/scrub		4
Grassland/herbaceous		3
Pasture/hay		17
Cultivated crops		2
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^{2b}		12
# NPDES Permits^c		2
TOTAL		2
	Construction Stormwater	2

a.Southern Shale Valleys

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Ohatchee Creek at OHTC-6, June 15, 2010.

Physical Characteristics		
Width (ft)		19
Canopy Cover		Open
Depth (ft)	Riffle	0.2
	Run	0.8
	Pool	1.5
% of Reach		
	Riffle	15
	Run	70
	Pool	15
% Substrate		
	Bedrock	10
	Boulder	2
	Cobble	30
	Gravel	32
	Sand	10
	Silt	10
	Organic Matter	6

Table 3. Results of the habitat assessment conducted in Ohatchee Creek at OHTC-6, June 15, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	83	Optimal >70
Sediment Deposition	79	Optimal >70
Sinuosity	73	Sub-optimal (65-84)
Bank and Vegetative Stability	48	Marginal (35-59)
Riparian Buffer	34	Poor <50
Habitat Assessment Score	156	
% Maximum Score	65	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Ohatchee Creek at OHTC-6, June 15, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
# EPT taxa	14	43
Shannon Diversity	4.16	68
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	2	4
% Non-insect taxa	11	58
Tolerance measures		
% Tolerant taxa	19	89
WMB-I Assessment Score	---	52
WMB-I Assessment Rating		Fair (47-69)

WATER CHEMISTRY

Results of water chemistry analysis are presented in Table 5. In situ measurements and water samples were collected semi-monthly, or quarterly (pesticides, herbicides atrazine, and semi-volatile organics) during March through December of 2010 to help identify stressors to the biological communities. Median values of specific conductance and hardness were elevated above the median concentration of all verified ecoregional reference reach data collected in ecoregion 67g. The dissolved arsenic concentration on May 12th and dissolved copper concentration on September 9th exceeded established *F&W* criteria. The median dissolved manganese value was greater than the 90th percentile of all verified ecoregional reference data collected in ecoregion 67g. Although samples of total dissolved arsenic did exceed human health criteria at OHTC-6, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies, Arsenic will be reassessed for arsenic violations.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal* primarily due to stable in-stream habitat and lack of instream sediment deposition. Water chemistry results indicated that arsenic and copper exceeded criteria established for *F&W* streams. Specific conductance, hardness and dissolved manganese values were elevated above ecoregional reference data during the sampling period. As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data to identify the causes and sources of the degraded biological conditions.

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Table 5. Summary of water quality data collected March-December, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	E	Q
Physical								
Temperature (°C)	5	9.5	23.5	21.7	18.8	5.7		
Turbidity (NTU)	5	6.3	42.8	8.6	15.0	15.6		
Total Dissolved Solids (mg/L)	4	70.0	116.0	104.0	98.5	19.8		
Total Suspended Solids (mg/L)	4	2.0	17.0	6.0	7.8	6.5		
Specific Conductance (µmhos)	5	107.4	213.0	182.7 ^G	173.5	42.6		
Hardness (mg/L)	4	46.7	104.0	85.9 ^G	80.6	26.0		
Alkalinity (mg/L)	4	45.1	112.0	95.3	86.9	31.7		
Stream Flow (cfs)	4	3.5	18.4	9.2	10.1	6.3		
Chemical								
Dissolved Oxygen (mg/L)	5	8.0	9.6	8.8	8.8	0.6		
pH (su)	5	6.8	7.8	7.6	7.5	0.4		
Ammonia Nitrogen (mg/L)	4	< 0.021	0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	4	0.182	0.271	0.224	0.226	0.036		
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.477	0.188	0.223	0.184		
Total Nitrogen (mg/L)	4	< 0.311	0.659	0.412	0.449	0.149		
Dissolved Reactive Phosphorus (mg/L)	4	0.010	0.022	0.014	0.015	0.006		
Total Phosphorus (mg/L)	4	0.010	0.069	0.014	0.027	0.028		
CBOD-5 (mg/L)	4	< 2.0	2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	1.4	2.2	1.5	1.7	0.4		
Atrazine (µg/L)	2	< 0.02	0.02	0.01	0.01	0.00		
Total Metals								
^J Aluminum (mg/L)	4	< 0.033	0.631	0.062	0.193	0.295		
Iron (mg/L)	4	0.281	0.668	0.412	0.444	0.169		
Manganese (mg/L)	4	0.044	0.075	0.059	0.059	0.013		
Dissolved Metals								
^J Aluminum (mg/L)	4	< 0.033	0.091	0.016	0.035	0.037		
Antimony (µg/L)	4	< 1.9	<1.89	0.9	0.9	0.0		
^J Arsenic (µg/L)	4	< 1.0	2.09 ^H	1.0	1.0	0.0	1	
Cadmium (mg/L)	4	< 0.000	0.014	0.001	0.002	0.003		
^J Chromium (mg/L)	4	< 0.009	0.021	0.006	0.010	0.008		
^J Copper (mg/L)	4	< 0.013	0.021 ^S	0.008	0.011	0.007		1
^J Iron (mg/L)	4	< 0.026	0.213	0.120	0.116	0.088		
Lead (µg/L)	4	< 1.7	<1.69	0.8	0.8	0.0		
^J Manganese (mg/L)	4	0.030	0.053	0.04 ^M	0.041	0.010		
^J Mercury (µg/L)	4	< 0.1	<0.1	0.1	0.1	0.1		
Nickel (mg/L)	4	< 0.019	0.042	0.010	0.012	0.006		
^J Selenium (µg/L)	4	< 1.7	2.0	0.8	1.1	0.6		
Silver (mg/L)	4	< 0.000	<0.002	0.000	0.000	0.001		
Thallium (µg/L)	4	< 0.6	<0.6	0.3	0.3	0.0		
Zinc (mg/L)	4	< 0.012	0.030	0.015	0.013	0.004		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	2.67	0.80	1.08	1.14		
^J E. coli (col/100ml)	4	77	2420	163	706	1143		

J=estimate; N=# samples; G=value higher than median concentration of all verified ecoregional reference reach data collected in the 67g watershed; M=value > 90% of all verified ecological reference reach data collected within eco-region 67g; H=Fish and Wildlife Human Health criterion exceeded; S=Fish and Wildlife hardness-adjusted aquatic life use criteria exceeded; E= # of samples that exceeded criteria; Q=# of uncertain exceedances.