

**2011 Monitoring
Summary**



Hughes Creek at Pickens County Road 23 crossing (33.07072/-88.09918)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Hughes Creek watershed for biological and water quality monitoring as part of the 2011 Escatawpa, Mobile, and Tombigbee (EMT) Basin Assessment. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.



Figure 1. Hughes Creek at HGHG-57, May 31, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hughes Creek is a *Fish & Wildlife (F&W)* stream located six miles southeast of the city of Aliceville in the Southern Floodplains and Low Terraces ecoregion (65p). Based on the 2006 National Land Cover Dataset, landuse within the watershed is predominantly forest (81%). As of June 13, 2013, no permits have been issued within 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. Hughes creek at HGHG-57 is a low-gradient, glide-pool stream with substrate composed primarily of hardpan clay, gravel, and sand (Figure 1). Overall habitat quality and availability was rated 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 all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Upper Tombigbee	
Drainage Area (mi²)	12	
Ecoregion^a	65p	
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	32
	Evergreen	25
	Mixed	24
Shrub/scrub		11
Grassland/herbaceous		<1
Pasture/hay		1
Cultivated crops		2
Development	Open space	2
Population/km^{2b}	3	

a.Southeastern Floodplains & Low Terraces

b.2000 US Census

Table 2. Physical characteristics of Hughes Creek at HGHG-57, May 31, 2011.

Physical Characteristics		
Canopy Cover	Mostly Shaded	
Width (ft)	12	
Depth (ft)		
	Run	0.5
	Pool	1.0
% of Reach		
	Run	40
	Pool	60
% Substrate		
	Hardpan Clay	40
	Boulder	1
	Clay	4
	Cobble	3
	Gravel	15
	Sand	25
	Silt	5
	Organic Matter	7

Table 3. Results of the habitat assessment conducted on Hughes Creek at HGHG-57, May 31, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	49	Marginal (40-52)
Sediment Deposition	70	Optimal >65
Sinuosity	40	Poor <45
Bank and Vegetative Stability	45	Marginal (35-59)
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	130	
% Maximum Score	59	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Hughes Creek at HGHG-57, May 31, 2011.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPC taxa	13	0
% Dominant Taxon	25	61
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
Functional feeding group		
# Collector Taxa	18	55
Community tolerance		
% Nutrient Tolerant individuals	14	90
WMB-I Assessment Score	---	41
WMB-I Assessment Rating		Fair (32-47)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March, May, July, and September of 2011 to help identify any stressors to the biological communities.

Stream flow steadily declined from 11.2 cfs in March to 0.2 cfs in July. During the macroinvertebrate assessment, stream flow was 0.4 cfs. Organics were collected at HGHG-57 on May 9th and September 14th, but all parameters were below detection limits. Stream pH exceeded *F&W* use criteria in March and September. However, the pH is typical for ecoregion 65i, where the majority of Hughes Creek lies.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Instream habitat was limited, and stream flow was low. Water quality conditions were characteristic of reference reaches for this stream type.

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Table 5. Summary of water quality data collected March-September, 2011. 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
Physical							
Temperature (°C)	5	18.0	25.1	22.2	21.7	2.6	
Turbidity (NTU)	5	7.5	28.2	9.9	13.6	8.6	
Total Dissolved Solids (mg/L)	4	36.0	64.0	49.0	49.5	11.7	
Total Suspended Solids (mg/L)	4	3.0	21.0	5.5	8.8	8.3	
Specific Conductance (µmhos)	5	33.6	45.7	38.7	39.3	4.3	
Hardness (mg/L)	4	6.6	10.7	9.3	9.0	1.9	
Alkalinity (mg/L)	4	3.9	8.4	7.0	6.6	1.9	
Stream Flow (cfs)	5	0.2	11.2	0.6	3.2	4.7	
Chemical							
Dissolved Oxygen (mg/L)	5	6.1	9.6	8.0	8.0	1.4	
pH (su)	5	5.6 ^c	6.4	6.2	6.1	0.4	2
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000	
^J Nitrate+Nitrite Nitrogen (mg/L)	4	0.013	0.184	0.020	0.059	0.083	
Total Kjeldahl Nitrogen (mg/L)	4	0.212	0.505	0.356	0.357	0.141	
^J Total Nitrogen (mg/L)	4	0.225	0.689	0.376	0.416	0.207	
^J Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.007	0.006	0.006	0.000	
Total Phosphorus (mg/L)	4	0.015	0.038	0.023	0.025	0.011	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	2.3	3.0	2.4	2.5	0.3	
^J Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	4	0.259	1.030	0.588	0.616	0.402	
Iron (mg/L)	4	0.586	1.800	1.192	1.193	0.548	
Manganese (mg/L)	4	0.068	0.245	0.146	0.151	0.088	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.043	0.045	0.022	0.027	0.012	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0	
^J Cadmium (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
^J Iron (mg/L)	4	0.073	0.208	0.127	0.134	0.059	
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
Manganese (mg/L)	4	0.062	0.137	0.090	0.095	0.032	
Mercury (µg/L)	4	< 0.0	< 0.0	0.0	0.0	0.0	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
^J Selenium (µg/L)	4	< 1.3	4.0	0.7	1.5	1.7	
Silver (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Thallium (µg/L)	4	< 1.1	< 1.1	0.5	0.5	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	4	< 0.10	6.41	1.34	2.28	2.89	
^J E. coli (col/100mL)	4	49	1733	167	528	807	

C=*F&W* use class criterion exceeded; E=# samples that exceeded criteria; J=estimate; N=# samples.