Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Fair™

Hughes Creek (Morgan County) at Pine Ridge Road (34.4133/-86.60400)

BACKGROUND

Hughes Creek from Cotaco Creek to its source (AL06030002-0601-300) has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1998. It is listed for siltation from agricultural sources.

Fig. 1. HGSM-27 on Hughes Creek (Morgan Co) (4 Feb 2004).

The Alabama Department of Environmental Management (ADEM) monitored Hughes Creek at HGSM-27 to verify and document impairment caused by siltation from agricultural sources. Macroinvertebrate and habitat assessments were conducted at the site to verify impairment to aquatic communities. The assessments were conducted on June 16, 2004 and May 18, 2005.

RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Multi-habitat Bioassessment EPT methodology (MB-EPT. The method uses the number of families in three aquatic insect orders that are generally sensitive to pollution. The results were compared to existing assessment thresholds for the Southwestern Appalachians ecoregion where Hughes Creek is located to evaluate the community's health. Results of the 2004 and 2005 MB-EPT assessments indicated the macroinvertebrate community to be in *fair* condition (Table 1). Overall habitat quality was assessed as *marginal* during the 2004 and 2005 assessments (Table 2). Sand comprised close to 90% of bottom substrate in the stream reach, limiting available habitat for macroinvertebrate communities. During 2005, low flows exposed most of the root bank habitat at the site. A beaver dam upstream of the bridge further reduced flow.

In situ field measurements and water samples were collected monthly, March through August and October. Median values were similar to data collected at ADEM's least-impaired reference reaches within the ecoregion (Table 3).

Table 1. Results of habitat and MB-EPT assessments conducted June 16, 2004 and May 18, 2005.

MB-EPT Assessment	**2004**	**2005**
# EPT Families	5	8
MB-EPT Site Rating	**Fair**	**Fair**
Habitat Assessment (% maximum)		
In-stream habitat quality	30	28
Sediment deposition	43	60
Sinuosity	30	35
Bank and vegetative stability	58	41
Riparian buffer	76	95
Habitat Assessment Score	104	110
% Maximum	47	50
Habitat Rating	**Marginal**	**Marginal**

Table 2. Summary of physical characteristics observed June 16, 2004 and May 18, 2005.

Physical Characteristics		
	2004	2005
Ecoregion	68c	68c
Width (ft)	15	15
Canopy cover	Mostly open	Mostly open
Depth (ft)		
Riffle	- - -	- - -
Run	0.7	1.5
Pool	2.0	- - -
% of Reach		
Riffle	0	0
Run	80	100
Pool	20	0
% Substrate		
Cobble	1	0
Gravel	2	5
Sand	89	88
Silt	2	2
Detritus	4	5
Clay	2	0

CONCLUSIONS

Results of EPT screening-level assessments indicated impaired biological communities in the stream reach during 2004 and 2005. Results of two habitat assessments and monthly water quality sampling suggest that the primary cause of the impairment is lack of instream stable habitat and sedimentation.

Table 3. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value for non-metals parameters. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value for non-metals parameters. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	7	4.8	19.5	14.4	14.1	4.5
Turbidity (NTU)	7	2.5	54.2	5.6	13.9	18.5
Total dissolved solids (mg/L)	6	113.0	226.0	139.5	149.3	40.8
Total suspended solids (mg/L)	6	2.0	8.0	4.0	4.3	2.3
Specific conductance (µmhos)	7	2.0	226	174.0	141.3	93.4
Hardness (mg/L)	6	67.2	141.0	104.1	102.7	26.3
Alkalinity (mg/L)	6	74.0	135.2	101.6	102.7	23.0
Stream Flow (cfs)	5	2.6	56.3	6.2	16.9	---
Chemical						
Dissolved oxygen (mg/L)	7	7.7	11.1	9.9	9.7	1.2
pH (su)	7	7.4	7.9	7.7	7.7	0.2
Ammonia Nitrogen (mg/L)	6	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	6	0.195	0.539	0.470	0.439	0.115
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.346	0.075	0.143	0.118
Total nitrogen (mg/L)	6	< 0.270	0.885	0.572	0.582	0.196
Dissolved reactive phosphorus (mg/L)	6	< 0.004	0.019	0.007	0.008	0.006
Total phosphorus (mg/L)	6	< 0.100	0.640	0.050	0.148	0.241
COD (mg/L)	2	< 5	< 5	3	3	0
CBOD-5 (mg/L)	6	0.6	1.2	0.9	0.9	0.2
Chlorides (mg/L)	6	0.7	3.1	2.7	2.3	1.0
Total Metals						
Aluminum (mg/L)	6	0.050	0.360	0.174	0.193	0.100
Iron (mg/L)	6	0.09	0.44	0.26	0.27	0.10
Manganese (mg/L)	6	< 0.05	0.11	0.04	0.06	0.00
Dissolved Metals						
Aluminum (mg/L)	6	< 0.05	< 0.05	0.03	0.03	0.0
Antimony (µg/L)	6	< 10	< 10	5	5	0.0
Cadmium (mg/L)	6	< 0.015	< 0.015	0.008	0.008	0.0
Chromium (mg/L)	6	< 0.05	< 0.05	0.02	0.02	0.0
Copper (mg/L)	6	< 0.05	< 0.05	0.02	0.02	0.0
Iron (mg/L)	6	< 0.05	0.06	0.02	0.03	0.0
Lead (µg/L)	6	< 10	< 10	5	5	0.0
Manganese (mg/L)	6	< 0.05	0.08	0.02	0.04	0.0
Mercury (µg/L)	5	< 0.010	< 0.300	0.005	0.034	0.100
Nickel (mg/L)	6	< 0.05	< 0.05	0.02	0.02	0.00
Silver (mg/L)	6	< 0.05	< 0.05	0.02	0.02	0.00
Thallium (µg/L)	6	< 10	< 10	5	5	0.0
Zinc (mg/L)	6	< 0.05	< 0.05	0.02	0.02	0.00
Biological						
Chlorophyll a (µg/L)	6	1.00	1.60	0.50	0.78	0.50
Fecal Coliform (col/100 mL)	6	8	90	42	41	30

N=# samples.

FOR MORE INFORMATION, CONTACT:
Lisa Houston Huff, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2752 esh@adem.state.al.us