ADEM
Alabama Department of Environmental Management
Use Support Assessment

Rivers and Streams Monitoring Program

2008 Monitoring Summary

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Ihagee Creek at Russell County Road 18 near Ft. Benning (32.23850/-84.98069)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Ihagee Creek watershed for biological and water quality monitoring as part of the 2005 Basin-wide Screening Assessment of the Southeastern Alabama (Apalachicola, Choctawhatchee, and Escambia) (SE-AL) River Basins. The screening assessments were conducted at stream reaches where land use estimates and non-point source information from the local Soil and Water Conservation Districts indicated a moderate or high potential for impairment from non-point sources in non-urban areas. Results of the 2005 screening-level evaluation identified Ihagee Creek at IHGR-1 for further monitoring during the 2008 Basin Assessment of the SE-AL River Basins to more fully assess biological conditions at the site, as well as the extent and cause of any impairment.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Ihagee Creek is a *Swimming and Other Whole Body Water-Contact Sports (S)/Fish & Wildlife (F&W)* stream located in the Southern Hilly Gulf Coastal Plain ecoregion of Russell County (Figure 1). Based on the 2000 National Land Cover Dataset, landuse within the watershed consists of forest (31%), agriculture (24%), shrub/scrubland, woody wetland, and development. Population density in the area is low. As of February 23, 2011, ADEM has issued a total of eleven NPDES permits in the area.

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. Ihagee Creek at IHGR-1 is a riffle-run stream reach with a benthic substrate consisting mostly of bedrock. Overall habitat quality was categorized as *optimal* for supporting diverse aquatic macroinvertebrate communities. However, streams with primarily bedrock substrates are susceptible to scouring during high flow events.

Table 1. Summary of watershed characteristics.

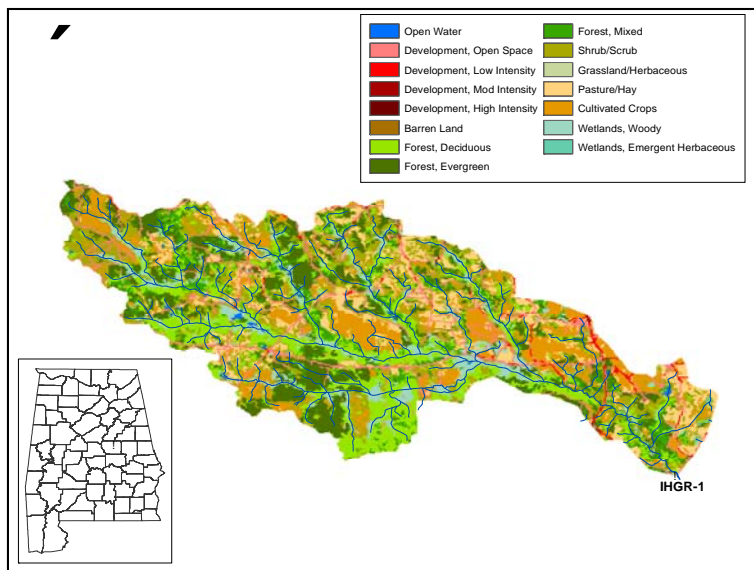| Watershed Characteristics		
Basin		Chattahoochee River
Drainage Area (mi^2)		27
Ecoregion[a]		65d
% Landuse		
Open water		<1
Wetland	Woody	8
	Emergent herbaceous	<1
Forest	Deciduous	18
	Evergreen	15
	Mixed	8
Shrub/scrub		19
Grassland/herbaceous		<1
Pasture/hay		11
Cultivated crops		13
Development	Open space	7
	Low intensity	1
	Moderate intensity	<1
Population/km^2[b]		2
# NPDES Permits[c]	**TOTAL**	11
Construction Stormwater		9
Industrial General		1
Underground Injection Control		1

a. Southern Hilly Gulf Coastal Plain
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Ihagee Creek at IHGR-1, June 5, 2008.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Estimate 50/50
Depth (ft)	
Riffle	0.8
Run	1.3
Pool	2.5
% of Reach	
Riffle	10
Run	50
Pool	40
% Substrate	
Bedrock	75
Boulder	3
Cobble	2
Gravel	5
Sand	10
Silt	2
Organic Matter	3

Figure 1. Sampling location and landuse within the Ihagee Creek watershed at IHGR-1.

TM Graphics provided by Florida Dept. of Environmental Protection (FDEP); used with permission

Table 3. Results of the habitat assessment conducted on Ihagee Creek at IHGR-1, June 5, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	67	Optimal (>65)
Sediment Deposition	71	Optimal (>65)
Sinuosity	83	Sub-optimal (65-84)
Bank and Vegetative Stability	79	Optimal (>74)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	**179**	
% Maximum Score	**74**	**Optimal (>65)**

Table 4. Results of the macroinvertebrate bioassessment conducted at Ihagee Creek at IHGR-1, June 5, 2008.

Macroinvertebrate Assessment			
	Results	Scores (0-100)	Rating
Taxa richness measures			
# Ephemeroptera (mayfly) genera	9	75	Good (75-85)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	8	67	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	14	44	Poor (24.7-49.4)
% Non-insect organisms	3	93	Fair (62.8-93.9)
% Plecoptera	1	4	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	9	32	Poor (20.2-40.9)
WMB-I Assessment Score	--	**47**	**Poor (24-48)**

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 metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated that the macroinvertebrate community at IHGR-1 was composed largely of pollution-tolerant organisms, indicating *poor* macroinvertebrate community condition (Table 4).

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. Water samples were collected at Ihagee Creek at IHGR-1 in June, August, and October. In situ field measurements were also conducted at the time of each sampling event, as well as on June 5 during the habitat and macroinvertebrate assessments. The purpose of these analyses is to help identify any stressors to the biological communities. The estimated concentration of dissolved nickel exceeded the *S/F&W* use classification criterion on October 22, 2008. Median nutrient concentrations (nitrate+nitrite-nitrogen, total nitrogen, and dissolved reactive phosphorus) were higher than data collected at reference reaches in the same ecoregion.

SUMMARY

Bioassessment results indicated Ihagee Creek at IHGR-1 to be in *poor* condition. A habitat assessment showed that conditions in the reach were *optimal* for supporting diverse macroinvertebrate communities. Nutrient concentrations were elevated as compared to ecoregional reference reach data. The site is also susceptible to scouring during high flow events. The data presented in this report and all other available data will be reviewed to identify the causes and sources of the degraded biological condition.

Table 5. Summary of water quality data collected March-October, 2008. 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	E
	Physical									
	Temperature (°C)	4		15.5		27.2	23.9	22.6	5.1	
	Turbidity (NTU)	4		6.6		16.1	9.5	10.4	4.0	
	Total Dissolved Solids (mg/L)	2		70.0		72.0	71.0	71.0	1.4	
	Total Suspended Solids (mg/L)	2	<	1.0		1.0	0.8	0.8	0.4	
	Specific Conductance (µmhos)	4		44.2		65.2	56.2	55.5	8.6	
	Hardness (mg/L)	4		7.0		12.7	11.2	10.6	2.7	
	Alkalinity (mg/L)	2		3.3		4.6	4.0	4.0	0.9	
	Stream Flow (cfs)	4		3.5		5.2	4.0	4.2	0.8	
	Chemical									
	Dissolved Oxygen (mg/L)	4		8.4		10.1	8.6	8.9	0.8	
	pH (su)	4		6.1		7.1	6.6	6.6	0.4	
	Ammonia Nitrogen (mg/L)	2	<	0.015	<	0.015	0.008	0.008	0.000	
	Nitrate+Nitrite Nitrogen (mg/L)	2		0.596		0.801	0.698	0.698	0.145	
	Total Kjeldahl Nitrogen (mg/L)	2		0.267		0.487	0.377	0.377	0.156	
	Total Nitrogen (mg/L)	2		0.863		1.288	1.076	1.076	0.300	
	Dissolved Reactive Phosphorus (mg/L)	2		0.017		0.021	0.019	0.019	0.003	
	Total Phosphorus (mg/L)	2		0.053		0.066	0.060	0.060	0.009	
	CBOD-5 (mg/L)	2	<	1.0	<	1.0	0.5	0.5	0.0	
	COD (mg/L)	2	<	2.0		34.1	17.6	17.6	23.4	
	TOC (mg/L)	2		4.2		10.2	7.2	7.2	4.2	
	Chlorides (mg/L)	2		3.2		3.2	3.2	3.2	0.0	
	Atrazine (µg/L)	1			<	0.05				
	Total Metals									
J	Aluminum (mg/L)	4		0.078		0.208	0.170	0.156	0.055	
	Iron (mg/L)	4		1.320		4.290	2.630	2.718	1.266	
	Manganese (mg/L)	4		0.056		0.356	0.086	0.146	0.142	
	Dissolved Metals									
J	Aluminum (mg/L)	4	<	0.015		0.039	0.016	0.020	0.014	
	Antimony (µg/L)	3	<	2.0	<	2.0	1.0	0.1	0.0	
	Arsenic (µg/L)	3	<	1.6	<	2.2	1.1	1.0	0.2	
	Cadmium (mg/L)	3	<	0.003	<	0.005	0.002	0.002	0.001	
	Chromium (mg/L)	3	<	0.004	<	0.013	0.002	0.004	0.003	
	Copper (mg/L)	3	<	0.005	<	0.013	0.002	0.004	0.002	
	Iron (mg/L)	4		0.214		1.180	0.539	0.618	0.417	
	Lead (µg/L)	3	<	0.6	<	1.5	0.7	0.6	0.3	
	Manganese (mg/L)	4		0.045		0.343	0.080	0.137	0.140	
	Mercury (µg/L)	3	<	0.0	<	0.0	0.0	0.0	0.0	
J	Nickel (mg/L)	4	<	0.006		0.020 S	0.010	0.011	0.009	1
	Selenium (µg/L)	3	<	1.5	<	1.6	0.8	0.8	0.0	
	Silver (mg/L)	3	<	0.002	<	0.003	0.002	0.001	0.000	
	Thallium (µg/L)	3	<	0.5	<	0.6	0.3	0.3	0.0	
J	Zinc (mg/L)	4	<	0.005		0.006	0.004	0.004	0.002	
	Biological									
	Chlorophyll a (ug/L)	2		3.20		4.27	3.74	3.74	0.76	
	Fecal Coliform (col/100 mL)	2		150		230	190	190	57	

J=estimate; N=# samples; Q=# uncertain exceedances; S=estimated result exceeded *S/F&W* hardness-adjusted aquatic life use criterion.