Alabama Department of Environmental Management

303(d) TMDL Monitoring Site

Rivers and Streams Monitoring Program

2008 Monitoring Summary

Harrand Creek at Coffee County Road 702 (31.34535/-85.81470)

BACKGROUND

A 9.7 mile segment of Harrand Creek from its source downstream to its confluence with Claybank Creek has been on Alabama's Clean Water Act (CWA) 303(d) list of impaired waters since 2006. The impairment is caused by siltation/habitat alteration from urban runoff and storm sewers. In 2008, the Alabama Department of Environmental Management (ADEM) monitored Harrand Creek at HDC-2. Macroinvertebrate and habitat assessments were conducted to evaluate habitat and biological conditions. Monthly water chemistry samples were collected to identify the cause of any impairments. Results from these data may be used in the development of the siltation/habitat alteration Total Maximum Daily Load (TMDL).

Figure 1. Harrand Creek at HDC-2, March 20, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Harrand Creek at HDC-2 is a *Fish & Wildlife* (*F&W*) stream located in Enterprise. Based on the 2006 National Land Cover Dataset, landuse within the watershed is mostly forest (35%) and development (32%). As of September 1, 2012, there are 29 active NPDES discharges 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. Harrand Creek at HDC-2 is a glide-pool stream with a substrate dominated by sand (Figure 1). Overall habitat quality was categorized as *marginal* for supporting diverse aquatic macroinvertebrate communities.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south Alabama streams and rivers. Each score is based on a six-point scale, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted at HDC-2 rated the site as *poor-fair*. Relative abundance of pollution-sensitive taxa were lower than expected, and the community was dominated by a few pollution-tolerant taxa (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Choctawhatchee River
Drainage Area (mi²)		7
Ecoregion[a]		65d
% Landuse		
Open water		1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	6
	Evergreen	17
	Mixed	12
Shrub/scrub		8
Pasture/hay		10
Cultivated crops		13
Development	Open space	19
	Low intensity	10
	Moderate intensity	2
	High intensity	1
Population/km²[b]		209
# NPDES Permits[c]	**TOTAL**	29
Construction Stormwater		27
Industrial General		2

a. Southern Hilly Gulf Coastal Plain

b. 2000 US Census

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

Table 2. Physical characteristics of Harrand Creek at HDC-2, July 17, 2008.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	2.0
	Pool	4.0
% of Reach		
	Run	30
	Pool	70
% Substrate		
	Clay	1
	Mud/Muck	10
	Gravel	1
	Sand	70
	Silt	8
	Organic Matter	10

Table 4. Results of the macroinvertebrate bioassessment conducted in Harrand Creek at HDC-2, July 17, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	52	Marginal (40-<53)
Sediment Deposition	51	Marginal (40-<53)
Sinuosity	40	Poor (<45)
Bank Vegetative Stability	44	Marginal (35-<59)
Riparian Buffer	50	Marginal (50-<70)
Habitat Assessment Score	**97**	
% Maximum Score	**48**	**Marginal (40-<53)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Harrand Creek at HDC-2, July 17, 2008.

Macroinvertebrate Assessment	Results
Taxa richness and diversity measures	
Total # Taxa	33
# EPT taxa	5
# Highly-sensitive and Specialized Taxa	0
Taxonomic composition measures	
% EPC taxa	14
% EPT minus Baetidae and Hydropsychidae	2
% Chironomidae Individuals	43
% Dominant Taxon	21
% Individuals in Dominant 5 Taxa	63
Functional feeding group	
# Collector Taxa	7
% Tolerant Filterer Taxa	15
Community tolerance	
# Sensitive EPT	1
% Sensitive taxa	6
% Nutrient Tolerant individuals	32
WMB-I Assessment Score	**5+**
WMB-I Assessment Rating	**Poor-Fair**

WATER CHEMISTRY

Results of water chemistry analysis are presented in Table 5. In situ measurements and water samples were collected monthly, April through November of 2008 to help identify any stressors to the biological communities. Samples for metals analyses were collected in July, September, and November. Organics (pesticides, semi-volatile organics, and atrazine) samples were collected in July and September.

Organics and atrazine were sampled in July and September. All results were below minimum detection limits. Median conductivity, ammonia nitrogen concentrations, and chlorides were higher than expected, based on reference reach data collected in the Southern Hilly Gulf Coastal Plains ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Harrand Creek at HDC-2 to be in *poor-fair* condition. Habitat assessment results were scored as *marginal* for supporting diverse aquatic macroinvertebrate communities. Median conductivity, ammonia nitrogen concentrations, and chlorides were higher than expected based on ecoregional reference reach data collected in ecoregion 65d.

Table 5. Summary of water quality data collected April-November, 2008. 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	Q
Physical							
Temperature (°C)	9	13.9	25.1	24.1	22.2	3.7	
Turbidity (NTU)	9	8.8	24.8	11.1	14.0	5.4	
Total Dissolved Solids (mg/L)	8	8.0	62.0	29.0	31.5	17.5	
Total Suspended Solids (mg/L)	8	< 1.0	9.0	4.5	3.9	3.0	
Specific Conductance (µmhos)	9	70.2	83.8	78.8 G	76.1	4.1	
Hardness (mg/L)	3	13.7	24.8	20.6	19.7	5.6	
Alkalinity (mg/L)	8	17.3	24.1	21.4	21.2	2.0	
Stream Flow (cfs)	8	2.8	12.7	5.2	6.2	3.5	
Chemical							
Dissolved Oxygen (mg/L)	9	5.5	8.4	8.0	6.5	0.9	
pH (su)	9	6.4	6.7	6.5	6.5	0.1	
Ammonia Nitrogen (mg/L)	8	0.021	0.135	0.068 M	0.060	0.035	
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.180	0.418	0.274	0.273	0.080	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.754	0.350	0.353	0.193	
J Total Nitrogen (mg/L)	8	< 0.271	1.087	0.608	0.626	0.239	
Dissolved Reactive Phosphorus (mg/L)	8	0.006	0.012	0.008	0.008	0.002	
J Total Phosphorus (mg/L)	8	0.021	0.039	0.026	0.027	0.006	
CBOD-5 (mg/L)	8	< 1.0	2.2	0.5	1.0	0.7	
Chlorides (mg/L)	8	6.2	9.1	7.5 M	7.4	1.0	
Atrazine (µg/L)	2	< 0.05	0.05	0.02	0.02	0.00	
Total Metals							
J Aluminum (mg/L)	3	0.026	0.075	0.049	0.050	0.024	
Iron (mg/L)	3	1.360	2.940	2.200	2.167	0.790	
Manganese (mg/L)	3	0.080	0.115	0.114	0.103	0.020	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.015	< 0.019	0.010	0.009	0.001	
Antimony (µg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0	
Arsenic (µg/L)	3	< 1.6	< 2.2	1.1	1.0	0.2	
Cadmium (µg/L)	3	< 3.000	< 5.000	2.500	2.167	0.577	
Chromium (µg/L)	3	< 4.000	< 13.000	2.000	3.500	2.598	
Copper (mg/L)	3	< 0.005	< 0.013	0.002	0.004	0.002	
Iron (mg/L)	3	0.222	0.489	0.355	0.355	0.134	
Lead (µg/L)	3	< 0.8	< 1.5	0.7	0.8	0.3	
Manganese (mg/L)	3	0.074	0.112	0.102	0.098	0.020	
Mercury (µg/L)	3	< 0.030	< 0.080	0.015	0.023	0.014	
J Nickel (mg/L)	3	< 0.006	0.015 S	0.003	0.007	0.007	1
Selenium (µg/L)	3	< 1.5	< 1.6	0.8	0.8	0.0	
Silver (µg/L)	3	< 2.000	< 3.000	1.500	1.333	0.289	
Thallium (µg/L)	3	< 0.5	< 0.6	0.3	0.3	0.0	
J Zinc (mg/L)	3	< 0.006	0.008	0.003	0.005	0.003	
Biological							
Chlorophyll a (ug/L)	3	< 0.10	5.34	2.29	2.56	2.66	
J Fecal Coliform (col/100 mL)	3	21	100	58	60	40	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65d; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N=# samples; Q=# of uncertain exceedances; S=*F&W* hardness-adjusted aquatic life use

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