

# 2014 Monitoring Summary



## Harrand Creek at Lowe Field Road (Dale County) (31.33816/-85.74852)

### BACKGROUND

The 9.71 mile segment of Harrand Creek, from its confluence with Claybank Creek upstream to its source, has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2006. It was listed for siltation (habitat alteration) from urban runoff/storm sewers. The Alabama Department of Environmental Management (ADEM) monitored Harrand Creek at HDC-1 in 2014 to investigate the extent of the impairment. Macroinvertebrate and habitat assessments were conducted at the site, and monthly water chemistry samples were also collected. These data will be used to develop Total Maximum Daily Loads (TMDLs), which are targeted for completion in 2016.

The Harrand Creek watershed was also selected for biological and water quality monitoring as part of the 2014 Southeastern Alabama (SE AL) River Basin Assessment Monitoring Program. The objectives of the SE AL River Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.



Figure 1. Harrand Creek at HDC-1, September 4, 2014.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Harrand Creek at HDC-1 is a *Fish & Wildlife (F&W)* stream located in Dale County, east of the city of Enterprise, within the Fort Rucker U.S. Army installation. Based on the 2011 National Land Cover Dataset, land use within the watershed is predominantly forest (42%) and development (35%). Population density is relatively high, with large portions of the upper catchment occupied by suburban residential development (Google Earth, accessed May 6, 2016). As of April 1, 2016, 52 NPDES outfalls were active in the watershed (ADEM NPDES Management System).

### 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-1 is a low gradient, glide-pool stream located in the Southern Hilly Gulf Coastal Plain ecoregion (65D) (Figure 1). Benthic substrate consists primarily of sand. Overall habitat quality was rated as *marginal* for supporting the macroinvertebrate community due to a deficiency of instream habitat quality, sinuosity, and bank vegetative stability.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Choctawhatchee R
<b>Basin</b>		Choctawhatchee R
<b>Drainage Area (mi<sup>2</sup>)</b>		20
<b>Ecoregion<sup>a</sup></b>		65D
<b>% Landuse<sup>b</sup></b>		
Open water		1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	7%
	Evergreen	25%
	Mixed	10%
Shrub/scrub		8%
Grassland/herbaceous		1%
Pasture/hay		6%
Cultivated crops		7%
Development	Open space	17%
	Low intensity	12%
	Moderate intensity	4%
	High intensity	2%
<b>Population/km<sup>2c</sup></b>		220
<b># NPDES Permits<sup>d</sup></b>	TOTAL	52
	Construction	43
	Industrial General	7
	Industrial Individual	1
	Small Mining	1

a. Southern Hilly Gulf Coastal Plain

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Harrand Creek at HDC-1, May 20, 2014.

Physical Characteristics		
<b>Width (ft)</b>		20
<b>Canopy Cover</b>		Mostly Shaded
<b>Depth (ft)</b>	Run	1.5
	Pool	2.0
<b>% of Reach</b>	Run	90
	Pool	10
<b>% Substrate</b>	Hard Pan Clay	1
	Sand	91
	Silt	2
	Organic Matter	6

**Table 3. Results of the habitat assessment conducted on Harrand Creek at HDC-1, May 20, 2014.**

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	41	Marginal (31-<55)
Sediment Deposition	63	Sub-Optimal (55-79)
Sinuosity	40	Marginal (31-<55)
Bank Vegetative Stability	31	Marginal (31-<58)
Riparian Buffer	85	Optimal (>84)
<b>Habitat Assessment Score</b>	<b>92</b>	
<b>% Maximum Score</b>	<b>57</b>	<b>Marginal (31-&lt;57)</b>

## BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was 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. The metric results indicated the macroinvertebrate community at HDC-1 to be in *poor* condition (Table 4), due in part to low diversity of sensitive insect taxa (i.e., EPT) along with a high percentage of nutrient tolerant individuals.

Table 4. Results of the macroinvertebrate bioassessment conducted in Harrand Creek at HDC-1, May 20, 2014.

Macroinvertebrate Assessment		Results
<b>Taxa richness and diversity measures</b>		
# EPT taxa		4
<b>Taxonomic composition measures</b>		
% Non-insect taxa		10
% Plecoptera		1
% Dominant taxon		27
<b>Functional feeding group</b>		
% Predators		3
<b>Community tolerance</b>		
Becks community tolerance index		0
% Nutrient tolerant individuals		55
WMB-I Assessment Score		27
WMB-I Assessment Rating		<b>Poor (19-37)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, *in situ* measurements and water samples were collected monthly from March-October of 2014 to help identify any stressors to the biological community. Organics were not sampled. Median conductivity was higher than the median of all reference reach data for the Southern Hilly Gulf Coastal Plain ecoregion (65d). Also, median concentrations of nitrate+nitrite nitrogen, total kjeldahl nitrogen, total nitrogen, dissolved reactive phosphorous, total phosphorous, and chlorides were higher than expected based on the 90th percentile of reference reaches in this ecoregion.

Table 5. Summary of water quality data collected March-October 2014. 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
<b>Physical</b>						
Temperature (°C)	9	13.9	25.1	20.6	20.3	4.1
Turbidity (NTU)	9	9.7	56.0	21.6	25.0	15.1
Total Dissolved Solids (mg/L)	8	70.0	152.0	94.0	102.9	27.0
Total Suspended Solids (mg/L)	8	7.0	56.0	22.5	26.5	16.5
Specific Conductance (µmhos)	9	72.0	186.0	99.9 <sup>G</sup>	114.5	37.1
Alkalinity (mg/L)	8	20.2	54.3	32.2	33.8	11.1
Monthly Stream Flow (cfs)	8	19.2	47.4	29.3	28.7	13.9
Stream Flow during Sample Collection (cfs)	8	19.2	47.4	29.3	28.7	13.9
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	9	7.8	11.3	8.7	8.7	1.1
pH (su)	9	7.0	7.7	7.4	7.3	0.2
<sup>J</sup> Ammonia Nitrogen (mg/L)	8	< 0.006	0.033	0.008	0.012	0.010
Nitrate+Nitrite Nitrogen (mg/L)	8	0.389	1.899	0.551 <sup>M</sup>	0.701	0.436
Total Kjeldahl Nitrogen (mg/L)	8	0.434	1.280	0.632 <sup>M</sup>	0.689	0.259
Total Nitrogen (mg/L)	8	1.012	2.133	1.269 <sup>M</sup>	1.390	0.442
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	0.028	0.814	0.070 <sup>M</sup>	0.177	0.267
Total Phosphorus (mg/L)	8	0.102	0.876	0.160 <sup>M</sup>	0.259	0.258
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	6.5	18.5	11.2 <sup>M</sup>	11.8	3.9

G= value > median of all ecoregional reference reach data collected in ecoregion 65d; J=estimate; M=value >90% of collected samples in ecoregion 65d; N= # samples.

## SUMMARY

Habitat assessment results scored Harrand Creek at HDC-1 as *marginal* for supporting the macroinvertebrate community, and bioassessment results indicated the community to be in *poor* condition. Water chemistry analyses revealed no violations of the F&W use classification criteria. However, specific conductance, nitrate+nitrite nitrogen, total kjeldahl nitrogen, total nitrogen, dissolved reactive phosphorous, total phosphorous, and chlorides were higher than expected compared to data from ADEM's least-impaired reference reaches in the Southern Hilly Gulf Coastal Plain ecoregion. The data presented in this report and all other available data will be reviewed to identify the causes and sources of the degraded biological conditions.

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