

# 2014 Monitoring Summary



## Dunham Creek at Henry County Road 16 (Dale CR 14) (31.36284/-85.41734)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Dunham Creek watershed for biological and water quality monitoring as part of the 2014 Assessment of the Southeast Alabama (SEAL) River Basins. The objectives of the SEAL Basin Assessments were to fully assess each monitoring location and to estimate overall water quality within the basins.

A previous survey of Dunham Creek at DNMH-1 conducted by the Geological Survey of Alabama indicated the fish community to be in *good/very good* condition. The reach is among the least-disturbed watersheds in the Dougherty Plains (65g) sub-ecoregion, based on landuse, road density, and population density. The 2014 data will be used to evaluate Dunham Creek as a best attainable condition reference watershed for comparison with other stations in the same ecoregion.



Figure 1. Dunham Creek at DNMH-1, June 16, 2014.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Dunham Creek is a small *Fish & Wildlife (F&W)* stream that drains through Henry County, located in ecoregion 65g. Based on the 2011 National Land Cover Dataset, landuse within the watershed is 54% agricultural. As of April 1, 2016, one NPDES outfall is active 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, this information can give an indication of physical condition and the availability and quality of habitat. Dunham Creek at DNMH-1 (Figure 1) is a low-gradient, sand-bottomed stream. Overall habitat quality was rated as *marginal*, due to sediment deposition, bank erosion and limited instream habitat.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
<b>Basin</b>	Choctawhatchee River	
<b>Drainage Area (mi<sup>2</sup>)</b>	9	
<b>Ecoregion<sup>a</sup></b>	65g	
<b>% Landuse<sup>b</sup></b>		
Open water		1%
Wetland	Woody	2%
	Emergent herbaceous	<1%
Forest	Deciduous	6%
	Evergreen	10%
	Mixed	2%
Shrub/scrub		15%
Grassland/herbaceous		3%
Pasture/hay		15%
Cultivated crops		39%
Development	Open space	5%
	Low intensity	2%
	Moderate intensity	<1%
	High intensity	<1%
<b>Population/km<sup>2c</sup></b>	22	
<b># NPDES Permits<sup>d</sup></b>	<b>TOTAL</b>	1
Construction		1

a. Dougherty 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 Dunham Creek at DNMH-1, June 16, 2014.

Physical Characteristics		
<b>Width (ft)</b>	35	
<b>Canopy Cover</b>	Shaded	
<b>Depth (ft)</b>	Run	1.0
	Pool	2.5
<b>% of Reach</b>	Run	80
	Pool	20
<b>% Substrate</b>	Cobble	1
	Gravel	2
	Sand	87
	Silt	5
	Organic Matter	5

### BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were 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 streams and rivers located within Alabama's coastal plain. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted in Dunham Creek at DNMH-1 rated the site as *fair*. Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

**Table 3.** Results of the habitat assessment conducted on Dunham Creek at DNMH-1, June 16, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	48	Marginal (31-<55)
Sediment Deposition	38	Marginal (31-<55)
Sinuosity	35	Marginal (31-<55)
Bank Vegetative Stability	55	Marginal (31-<58)
Riparian Buffer	68	Sub-Optimal (60-84)
<b>Habitat Assessment Score</b>	<b>93</b>	
<b>% of Maximum Score</b>	<b>53</b>	<b>Marginal (31-&lt;57)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Dunham Creek at DNMH-1, June 16, 2014.

Macroinvertebrate Assessment		Results
<b>Taxa richness and diversity measures</b>		
	Total # Taxa	60
	# EPT taxa	12
	# Highly-sensitive and Specialized Taxa	2
<b>Taxonomic composition measures</b>		
	% EPC taxa	27
	% Trichoptera & Chironomidae Taxa	42
	% EP Individuals	6
	% Chironomidae Individuals	78
	% Individuals in Dominant 5 Taxa	61
<b>Functional feeding group</b>		
	% Collector-Filterer Individuals	30
	% Tolerant Filterer Taxa	13
<b>Community tolerance</b>		
	# Sensitive EPT	4
	% Sensitive taxa	17
	% Nutrient Tolerant individuals	42
	<b>WMB-I Assessment Score</b>	<b>4</b>
	<b>WMB-I Assessment Rating</b>	<b>Fair</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, bi-monthly (metals), and once (pesticides, atrazine, and semi-volatile organics) during March through October, 2014 to help identify any stressors to the biological communities. *In situ* parameters were also collected during the bioassessment. *In situ* measurements show Dunham Creek at DNMH-1 to be meeting water quality criteria for its F&W use classification. Nitrate+nitrite nitrogen and total nitrogen were higher than expected. Most of the collected metals were below the detection limits. Sample collected for the analyses of pesticides, semi-volatile organics in April were below detection limits except Atrazine.

## SUMMARY

As part of assessment process, ADEM will review the monitoring information presented in this report along with all other available data.

Dunham Creek at DNMH-1 was typical of other streams in the Dougherty Plains, which are generally low-gradient streams with sand substrates (Griffith et al. 2001). Agriculture was the dominant landuse within the watershed.

Overall habitat assessment was rated as *marginal*. Bioassessment results showed the macroinvertebrate community to be in *fair* condition. Nitrate+nitrite nitrogen and total nitrogen were higher than expected. Monitoring should be continued to evaluate the stressors to the biological communities.

**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	Q
<b>Physical</b>							
Temperature (°C)	11	14.6	26.1	22.2	21.8	3.7	
Turbidity (NTU)	15	5.8	18.5	8.7	10.1	3.9	
Total Dissolved Solids (mg/L)	8 <	1.0	70.0	49.0	45.2	21.0	
Total Suspended Solids (mg/L)	8	1.0	12.0	7.0	7.0	3.5	
Specific Conductance (µmhos)	11	62.1	75.8	68.6 <sup>G</sup>	68.3	4.8	
Hardness (mg/L)	4	23.7	28.6	24.4 <sup>G</sup>	25.3	2.2	
Alkalinity (mg/L)	8	13.9	23.2	17.6	17.9	3.1	
Monthly Stream Flow (cfs)	13	12.0	28.7	16.1	18.8	5.7	
Stream Flow during Sample Collection (cfs)	13	12.0	28.7	16.1	18.8	5.7	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	11	7.2	9.7	7.5	7.9	0.8	
pH (su)	11	6.2	7.1	6.8	6.8	0.2	
Ammonia Nitrogen (mg/L)	8 <	0.006	0.026	0.004	0.008	0.008	
Nitrate+Nitrite Nitrogen (mg/L)	8	1.067	1.981	1.590 <sup>M</sup>	1.580	0.307	
Total Kjeldahl Nitrogen (mg/L)	8	0.050	0.595	0.372	0.347	0.167	
Total Nitrogen (mg/L)	8	1.490	2.460	1.948 <sup>M</sup>	1.926	0.328	
Dissolved Reactive Phosphorus (mg/L)	8 <	0.003	0.005	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.013	0.032	0.018	0.020	0.006	
CBOD-5 (mg/L)	8 <	2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	7 <	1.6	27.5	11.3	13.9	8.8	
TOC (mg/L)	8	2.0	5.0	2.9	3.1	0.9	
Chlorides (mg/L)	8	4.5	5.5	5.0	5.0	0.3	
Atrazine (µg/L)	1				0.72		
<b>Total Metals</b>							
Aluminum (mg/L)	4	0.099	0.215	0.132	0.144	0.050	
Iron (mg/L)	4	0.947	1.330	1.032	1.085	0.172	
Manganese (mg/L)	4	0.089	0.106	0.106	0.102	0.008	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	4 <	0.050	0.088	0.025	0.041	0.032	
Antimony (µg/L)	4 <	0.2	< 0.4	0.1	0.1	0.1	
Arsenic (µg/L)	4	0.4	0.5 <sup>H</sup>	0.5	0.5	0.1	4
Cadmium (µg/L)	4 <	0.246	< 0.390	0.123	0.141	0.036	
Chromium (µg/L)	4	0.270	0.518	0.355	0.361	0.142	
Copper (mg/L)	4 <	0.0003	0.0004	0.0003	0.0003	0.0001	
Iron (mg/L)	4	0.431	0.562	0.478	0.487	0.064	
Lead (µg/L)	4 <	0.2	< 0.5	0.1	0.2	0.1	
Manganese (mg/L)	4	0.076	0.080	0.078	0.078	0.002	
Nickel (mg/L)	4	0.0002	0.001	0.0004	0.0004	0.0002	
Selenium (µg/L)	4 <	0.4	< 0.5	0.2	0.2	0.0	
Silver (µg/L)	4 <	0.252	< 0.460	0.126	0.152	0.052	
Thallium (µg/L)	4 <	0.2	< 0.6	0.1	0.2	0.1	
Zinc (mg/L)	4	0.003	0.010	0.004	0.006	0.003	
<b>Biological</b>							
Chlorophyll a (µg/L)	8 <	0.10	6.94	0.60	1.36	2.32	
E. coli (col/100mL)	8	118	613	229	295	197	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65g; H=F&W human health criteria exceeded; J=estimate; M=value > 90% of all verified ecoregional reference reach data collected in the ecoregion 65g; N= # samples; Q= # of uncertain exceed-

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