

# 2014 Monitoring Summary



## Clear Creek at Swimming Hole Road in Covington County (31.12192/-86.37575)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM), selected the Clear Creek watershed for biological and water quality monitoring as part of the 2008 Southeast Alabama (SEAL) Basin Assessment. The objectives of the SEAL Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the SEAL basins. Monitoring of Clear Creek at CLC-1 continued in 2014 to provide additional biological, chemical, and physical data to fully assess the use support status of Clear Creek for the 2016 Integrated Water Quality Report.



Figure 1. Clear Creek at CLC-1, July 15, 2014.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Clear Creek is a *Fish & Wildlife (F&W)* stream located in Covington County southwest of Opp, Alabama within the Dougherty Plain (65g) ecoregion. Based on the 2011 National Land Cover Dataset, landuse within the watershed is predominantly forest (58%) with some pasture/hay and grassland/herbaceous areas. As of April 1, 2016, no NPDES outfalls have been issued within this watershed.

### REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community 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. Clear Creek at CLC-1 is a low-gradient, glide-pool stream with substrate composed primarily of sand and organic matter (Figure 1). Overall habitat quality and availability was rated as *optimal* for supporting diverse aquatic communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Yellow R
Drainage Area (mi <sup>2</sup> )		39
Ecoregion <sup>a</sup>		65G
% Landuse <sup>b</sup>		
Open water		<1%
Wetland	Woody	4%
	Emergent herbaceous	<1%
Forest	Deciduous	3%
	Evergreen	47%
	Mixed	8%
Shrub/scrub		14%
Grassland/herbaceous		11%
Pasture/hay		5%
Cultivated crops		1%
Development	Open space	6%
	Low intensity	1%
	Moderate intensity	<1%
Population/km <sup>2c</sup>		1

<sup>a</sup>. Dougherty Plain

<sup>b</sup>. 2011 National Land Cover Dataset

<sup>c</sup>. 2010 US Census

Table 2. Physical characteristics of Clear Creek at CLC-1 on July 2, 2014.

Physical Characteristics		
Width (ft)		22
Canopy Cover		Shaded
Depth (ft)	Run	2.0
	Pool	3.0
% of Reach	Run	50
	Pool	50
% Substrate	Mud/Muck	2
	Sand	50
	Organic Matter	48

**Table 3.** Results of the habitat assessment conducted on Clear Creek at CLC-1, July 2, 2014.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	76	Sub-optimal (55-79)
Sediment Deposition	73	Sub-optimal (55-79)
Sinuosity	95	Optimal (>79)
Bank and Vegetative Stability	85	Optimal (>79)
Riparian Buffer	90	Optimal (>84)
<b>Habitat Assessment Score</b>	<b>149</b>	
<b>% Maximum Score</b>	<b>83</b>	<b>Optimal (&gt;80)</b>

## BIOASSESSMENT RESULTS

The fish community in Clear Creek at CLC-1 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for Wadeable streams and rivers across the State. The data collected during this survey were used to score the overall health of the fish community, based on conditions expected for Wadeable streams and rivers in the *Southern Plains* Ichthyoregion. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, and abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Clear Creek at CLC-1 was 36, indicating the fish community to be in *fair* condition (Table 4).

**Table 4.** Results of the fish community bioassessment conducted in Clear Creek at CLC-1 on July 2, 2014.

Fish Community Assessment		
	Results	Score
<b>Species Richness &amp; Diversity</b>		
Total native species	19	3
Number shiner species	6	5
Number of sucker species	0	1
Number of centrarchid species	3	1
Number of darter+madtom species	4	3
<b>Tolerance &amp; Intolerance Measures</b>		
Percent of tolerant species	3.3	5
Percent Green Sunfish & Yellow Bullhead	2.83	1
<b>Trophic Measures</b>		
Percent insectivorous cyprinids	68.87	5
Percent invertivores	6.6	1
Percent top carnivores	1.89	3
<b>Abundance, Condition &amp; Reproductive Measures</b>		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	10	3
<b>IBI Assessment Score</b>		<b>36</b>
<b>Condition</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 March through October of 2014 to help identify any stressors to the biological communities. Based on data collected at reference reaches within the Dougherty Plain ecoregion (65g), median total specific conductance, hardness, alkalinity, and dissolved aluminum values were higher than expected.

**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)	9	12.0	25.2	23.2	21.5	4.4	
Turbidity (NTU)	9	2.0	14.5	4.7	6.4	4.2	
Total Dissolved Solids (mg/L)	8	52.0	101.0	76.0	74.8	19.6	
Total Suspended Solids (mg/L)	8	< 1.0	24.0	5.0	7.6	8.2	
Specific Conductance (µmhos)	9	33.8	184.8	103.3 <sup>G</sup>	104.2	52.6	
Hardness (mg/L)	4	18.9	87.7	48.2 <sup>G</sup>	50.8	32.5	
Alkalinity (mg/L)	8	10.5	95.9	40.3 <sup>M</sup>	46.1	30.1	
Stream Flow (cfs)	5	4.9	44.6	12.1	18.0	15.5	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	9	6.7	9.8	7.3	7.5	0.9	
pH (su)	9	6.4	7.7	7.2	7.0	0.5	
<sup>J</sup> Ammonia Nitrogen (mg/L)	8	< 0.006	0.016	0.003	0.005	0.004	
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	8	0.012	0.136	0.050	0.052	0.040	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.049	1.090	0.290	0.380	0.348	
<sup>J</sup> Total Nitrogen (mg/L)	8	< 0.088	1.102	0.334	0.432	0.341	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.006	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.011	0.036	0.015	0.018	0.009	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	1.7	2.8	2.6	2.5	0.4	
<b>Total Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	< 0.050	0.386	0.190	0.198	0.179	
Iron (mg/L)	4	0.159	0.825	0.360	0.426	0.291	
<sup>J</sup> Manganese (mg/L)	4	0.018	0.037	0.028	0.028	0.009	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	4	< 0.050	0.277	0.142 <sup>M</sup>	0.146	0.140	
Antimony (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
<sup>J</sup> Arsenic (µg/L)	4	0.3	0.4 <sup>H</sup>	0.4	0.4	0.1	4
Cadmium (µg/L)	4	< 0.246	< 0.246	0.123	0.123	0.0	
<sup>J</sup> Chromium (µg/L)	4	0.541	0.935	0.780	0.759	0.164	
<sup>J</sup> Copper (mg/L)	4	< 0.002	< 0.002	0.001	0.001	0.0	
<sup>J</sup> Iron (mg/L)	4	0.110	0.566	0.271	0.304	0.194	
<sup>J</sup> Lead (µg/L)	4	< 0.2	0.3	0.1	0.2	0.1	
<sup>J</sup> Manganese (mg/L)	4	0.014	0.028	0.018	0.020	0.006	
<sup>J</sup> Nickel (mg/L)	4	0.002	0.002	0.0020	0.000	0.0	
Selenium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0	
Silver (µg/L)	4	< 0.252	< 0.252	0.126	0.126	0.0	
Thallium (µg/L)	4	< 0.2	< 0.2	0.1	0.1	0.0	
<sup>J</sup> Zinc (mg/L)	4	0.003	0.011	0.004	0.006	0.004	
<b>Biological</b>							
Chlorophyll a (ug/L)	8	< 0.10	8.54	1.10	2.46	3.25	
<sup>J</sup> E. coli (col/100mL)	8	37	3973 <sup>N</sup>	200	906	1477	2

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

## SUMMARY

The overall habitat quality for Clear Creek at CLC-1 was categorized as *optimal* for this stream type. Bioassessment results indicated the fish community to be in *fair* condition. Median total specific conductance, hardness, alkalinity, and dissolved aluminum values were higher than expected based on data collected at reference reaches within the ecoregion.

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