

# 2010 Monitoring Summary



## Crooked Creek at Berwick Road in Berwick (Clay County) (33.27708/-85.67016)

### BACKGROUND

Crooked Creek at CRCC-5 was selected as a site for nutrient criteria development in the Tallapoosa River Basin in 2010. Data collected will be used to develop and implement nutrient criteria in wadeable, flowing streams in the Tallapoosa River Basin, as well as other streams statewide.



Figure 1. Crooked Creek at CRCC-5, March 23, 2010.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Crooked Creek at CRCC-5 is a *Fish & Wildlife (F&W)* stream located in Clay County. Based on the 2006 National Land Cover Dataset, landuse in the watershed is primarily forest (67%) and pasture/hay. Eight percent of the watershed is developed. As of September 1, 2012, ADEM has issued 23 NPDES permits 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. Crooked Creek is a wide, sandy-bottomed, glide-pool stream (Figure 1). Pool depth was estimated to be 4.0 ft. Overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities due to limited instream habitat, sedimentation, and a limited riparian buffer zone.

### BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were 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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated that the biological community at CRCC-5 was in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tallapoosa River	
Drainage Area (mi <sup>2</sup> )	51	
Ecoregion <sup>a</sup>	45a	
% Landuse		
Open water	<1	
Wetland	Woody	1
Forest	Deciduous	43
	Evergreen	23
	Mixed	1
Shrub/scrub	3	
Grassland/herbaceous	7	
Pasture/hay	15	
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren	1	
Population/km <sup>2b</sup>	7	
# NPDES Permits <sup>c</sup>	TOTAL	23
	Construction Stormwater	14
	Industrial General	2
	Municipal Individual	4
	Underground Injection Control	3

a.Southern Inner Piedmont

b.2000 US Census

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

Table 2. Physical characteristics of Crooked Creek at CRCC-5, May 19, 2010.

Physical Characteristics		
Width (ft)	60	
Canopy cover	Estimate 50/50	
Depth (ft)	Run	1.5
	Pool	4.0
% of Reach	Run	50
	Pool	50
% Substrate	Boulder	2
	Cobble	2
	Gravel	5
	Sand	85
	Silt	4
	Organic Matter	2

**Table 3.** Results of the habitat assessment conducted in Crooked Creek at CRCC-5, May 19, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	43	Marginal (41-58)
Sediment Deposition	54	Marginal (41-58)
Sinuosity	38	Poor <45
Bank and Vegetative Stability	40	Marginal (35-59)
Riparian Buffer	43	Poor <50
<b>Habitat Assessment Score</b>	<b>105</b>	
<b>% Maximum score</b>	<b>48</b>	<b>Marginal (41-58)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Crooked Creek at CRCC-5, May 19, 2010.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness and diversity measures</b>		<b>(0-100)</b>
# EPT taxa	17	57
Shannon Diversity	4.93	100
<b>Taxonomic composition measures</b>		
% EPT minus Baetidae and Hydropsychidae	8	7
% Non-insect taxa	7	76
<b>Tolerance measures</b>		
% Tolerant taxa	31	51
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>58</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (47-69)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2010 to help identify any stressors to the biological communities. A large portion of the reach was nonwadeable during normal flow conditions. Flow could only be measured during low flow in May and September.

Median concentrations of nitrate+nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, and total phosphorus were above the 90th percentile of data collected from reference reach streams in the Southern Inner Piedmont ecoregion (45a). Also, median specific conductivity was slightly higher than 40.1 µmhos, the median concentration of all verified reference data collected in ecoregion 45a.

## SUMMARY

Bioassessment results indicated the macroinvertebrate community at CRCC-5 to be in *fair* condition. Nutrient concentrations and specific conductivity were elevated as compared to data from reference reaches in ecoregion 45a. Monitoring should continue to ensure that water quality and biological conditions remain stable.

**Table 5.** Summary of water quality data collected March-October, 2010. 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	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	10	9.8	25.3	20.8	20.3	4.7
Turbidity (NTU)	9	4.1	43.7	6.9	14.8	16.2
<sup>J</sup> Total Dissolved Solids (mg/L)	8	24.0	52.0	41.0	40.8	9.4
<sup>J</sup> Total Suspended Solids (mg/L)	8	< 1.0	19.0	5.5	7.6	7.1
Specific Conductance (µmhos)	10	38.6	124.7	51.8 <sup>G</sup>	59.3	25.6
Alkalinity (mg/L)	8	8.0	23.6	11.5	13.0	5.2
Stream Flow (cfs)	2	9.7	57.1	33.9	33.9	34.1
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	10	7.7	10.8	8.4	8.7	1.1
pH (su)	10	6.8	7.3	6.9	7.0	0.2
Ammonia Nitrogen (mg/L)	8	< 0.021	0.036	0.010	0.014	0.009
Nitrate+Nitrite Nitrogen (mg/L)	8	0.531	2.910	0.818 <sup>M</sup>	1.049	0.792
Total Kjeldahl Nitrogen (mg/L)	8	< 0.080	0.571	0.280	0.271	0.173
Total Nitrogen (mg/L)	8	< 0.806	3.481	1.006 <sup>M</sup>	1.320	0.898
Dissolved Reactive Phosphorus (mg/L)	8	0.044	0.295	0.086 <sup>M</sup>	0.121	0.090
Total Phosphorus (mg/L)	8	0.060	0.312	0.146 <sup>M</sup>	0.156	0.084
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	2.8	16.9	4.8	6.0	4.6
<b>Biological</b>						
Chlorophyll a (µg/L)	8	< 0.36	4.01	0.62	1.30	1.26

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45a; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45a; N=# samples.

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