

# 2013 Monitoring Summary

## Ecological Reference Reach

### Rock Creek at Sally Burns Road in Colbert county (34.60930/-88.06323)

#### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Rock Creek watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee (TN) River Basin. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin group.

Additionally, Rock Creek is among least-disturbed watershed in the TN basin group based on landuse, road density, and population density. Therefore, these data will also be used to evaluate the use of Rock Creek as a “best attainable” condition reference watershed for comparison with other Transition Hills streams.

General observations, a habitat assessment and macroinvertebrate sampling were unable to be completed during the sampling season due to the presence of deep pools, low stream flows, and poor substrate visibility (Figure 1).



Figure 1. Rock Creek at RCKC-2, June, 2013

#### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Rock Creek at RCKC-2 is a *Fish & Wildlife (F&W)* stream located within the Transition Hills ecoregion of Colbert County (Figure 1). This watershed drains thirty-six square miles within the Tennessee basin. Based on the 2006 National Landcover Dataset, landuse in the watershed is primarily forest (65%). Population density is relatively low in the watershed. As of May 13, 2013, ADEM has issued two NPDES permits within this watershed.

#### WATER CHEMISTRY

Results of water chemistry are presented in Table 2. In situ measurements and water samples were collected during April, June, August and October of 2013 to help identify any stressors to the biological communities.

The *F&W* human health criterion for arsenic at RCKC-2 was exceeded during the June, August and October sampling events. Specific conductance values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 65j. Total and dissolved iron and dissolved manganese values were greater than 90% of all verified ecoregional reference reach data collected in the Transition Hills ecoregion.

#### SUMMARY

To be used for comparison with other streams, “best-attainable” reference reaches must be representative of other streams in the ecoregion.

Rock Creek at RCKC-2 was typical of other streams in the Transition Hills ecoregion because of the deep, slow-flowing pools that characterized this station. The *F&W* human health criterion for arsenic at RCKC-2 was exceeded. Some water quality results were elevated as compared to data from ADEM’s least-impaired reference reaches in ecoregion 65j. Although samples of total dissolved arsenic did exceed human health criteria in Rock Creek, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies Rock Creek will be reassessed for arsenic violations.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi <sup>2</sup> )		36
Ecoregion <sup>a</sup>		65j
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	56
	Evergreen	7
	Mixed	2
Shrub/scrub		25
Grassland/herbaceous		4
Pasture/hay		2
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km <sup>2b</sup>		2
# NPDES Permits <sup>c</sup>	TOTAL	2
	401 Water Quality Certification	1
	Construction Stormwater	1

a. Transition Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM’s NPDES Management System database, May 13, 2013.

**Table 2.** Summary of water quality data collected April, June, August and October, 2013. 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	E
<b>Physical</b>							
Temperature (°C)	4	15.3	23.3	20.6	20.0	3.7	
Turbidity (NTU)	8	6.4	10.7	8.1	8.4	1.5	
Total Dissolved Solids (mg/L)	4	75.0	82.0	78.5	78.5	4.0	
Total Suspended Solids (mg/L)	4	<1.0	9.0	5.0	4.9	4.2	
Specific Conductance (µmhos)	4	98.9	110.7	106.6 <sup>G</sup>	105.7	5.6	
Hardness (mg/L)	4	42.6	53.2	46.6	47.2	5.3	
Alkalinity (mg/L)	4	44.3	50.3	45.6	46.5	2.8	
Stream Flow (cfs)	4	2.8	40.6	4.2	13.0	18.4	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	4	5.4	9.2	6.6	6.9	1.7	
pH (su)	4	6.5	7.0	6.9	6.8	0.2	
Ammonia Nitrogen (mg/L)	4	<0.004	<0.018	0.006	0.006	0.004	
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	4	0.005	0.052	0.037	0.033	0.021	
Total Kjeldahl Nitrogen (mg/L)	4	<0.041	0.345	0.233	0.208	0.136	
<sup>J</sup> Total Nitrogen (mg/L)	4	<0.026	0.373	0.282	0.241	0.150	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	4	<0.004	0.006	0.004	0.004	0.002	
Total Phosphorus (mg/L)	4	0.010	0.024	0.017	0.017	0.006	
CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	1.2	1.6	1.4	1.4	0.2	
<b>Total Metals</b>							
Aluminum (mg/L)	4	<0.076	0.451	0.204	0.224	0.170	
Iron (mg/L)	4	0.438	1.000	0.920 <sup>M</sup>	0.820	0.264	
<sup>J</sup> Manganese (mg/L)	4	0.048	0.115	0.080	0.081	0.033	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	4	<0.076	<0.076	0.038	0.038	0.000	
Antimony (µg/L)	4	<0.1	<2.6	0.1	0.4	0.6	
Arsenic (µg/L)	4	<0.4	1.4 <sup>H</sup>	0.7	0.6	0.2	3
Cadmium (µg/L)	4	<0.046	<0.170	0.085	0.070	0.031	
<sup>J</sup> Chromium (mg/L)	4	<0.001	<0.032	0.001	0.004	0.008	
<sup>J</sup> Copper (mg/L)	4	<0.001	<0.031	0.001	0.004	0.007	
<sup>J</sup> Iron (mg/L)	4	0.169	0.705	0.526 <sup>M</sup>	0.482	0.267	
Lead (µg/L)	4	<0.1	<1.1	0.1	0.2	0.2	
<sup>J</sup> Manganese (mg/L)	4	0.042	0.115	0.072 <sup>M</sup>	0.075	0.038	
Mercury (µg/L)	1				<0.057		
<sup>J</sup> Nickel (mg/L)	4	<0.001	<0.016	0.003	0.004	0.004	
Selenium (µg/L)	4	<0.2	<1.4	0.1	0.3	0.3	
Silver (µg/L)	4	<0.215	<2.12	1.060	0.822	0.476	
Thallium (µg/L)	4	<0.1	<1.1	0.1	0.2	0.2	
<sup>J</sup> Zinc (mg/L)	4	<0.003	0.017	0.004	0.005	0.002	
<b>Biological</b>							
Chlorophyll a (ug/L)	4	<0.10	0.45	0.32	0.28	0.17	
<sup>J</sup> E. coli (col/100mL)	4	93	1553	122	473	721	

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

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