

2008 Monitoring Summary



Rocky Creek at unnamed Butler County Road (31.68532/-86.71178)

BACKGROUND

Rocky Creek, from Persimmon Creek to an unnamed county road north of Chapman, has been on Alabama's Clean Water Act (CWA) 303d list of impaired waters since 1998 for unknown toxicity due to unknown sources. To investigate the cause and source of impairment, the Alabama Department of Environmental Management (ADEM) monitored Rocky Creek at RYC-5 in 2008. Results from these data may also be used in the determination of Total Maximum Daily Load (TMDL) needs and priorities.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Rocky Creek at RYC-5 is a *Fish & Wildlife (F&W)* stream located in Butler County (Figure 1) in the Conecuh River basin. Based on the 2011 national landuse cover dataset, landuse within the watershed is primarily forest (72%), shrub/scrub and pasture. As of April 1, 2016, there are two NPDES permitted outfalls active in this watershed.

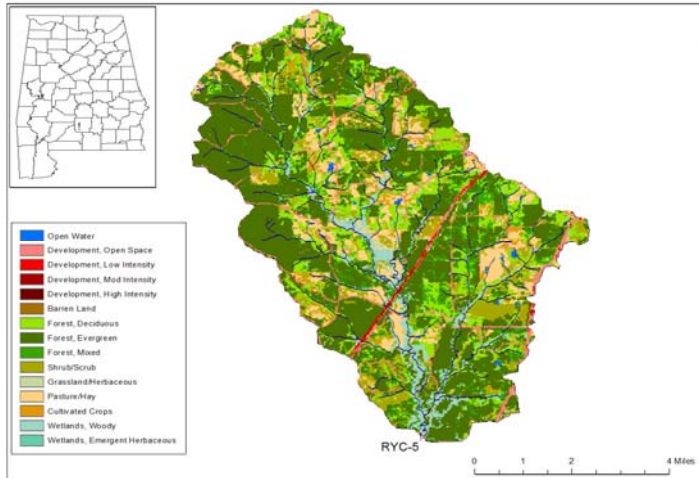


Figure 1. Sampling location and landuse within the Rocky Creek watershed at RYC-5.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were conducted 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. Rocky Creek at RYC-5 is a riffle-run stream located in the Southern Hilly Gulf Coastal Plain ecoregion. Bottom substrate consists primarily of bedrock with some cobble and organic matter. Overall habitat quality and availability were rated as *marginal* for supporting diverse aquatic macroinvertebrate communities.

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 Alabama's coastal streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted in Rocky Creek at RYC-5 rated the site as *fair* (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Conecuh River
Drainage Area (mi²)		36
Ecoregion^a		65D
% Landuse^b		
Open water		<1%
Wetland	Woody	5%
	Emergent herbaceous	<1%
Forest	Deciduous	14%
	Evergreen	50%
	Mixed	7%
Shrub/scrub		9%
Grassland/herbaceous		2%
Pasture/hay		7%
Cultivated crops		1%
Development	Open space	4%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		6
# NPDES Permits^d	TOTAL	2
	Construction	1
	Industrial General	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 Rocky Creek at RYC-5, May 14, 2008.

Physical Characteristics		
Width (ft)		1
Canopy Cover		Mostly Open
Depth (ft)	Riffle	0.3
	Run	0.5
	Pool	2.0
% of Reach	Riffle	5
	Run	20
	Pool	75
% Substrate	Bedrock	81
	Cobble	5
	Gravel	1
	Sand	1
	Organic Matter	12

Table 3. Results of the habitat assessment conducted on Rocky Creek at RYC-5, May 14, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	58	Marginal (41-<59)
Sediment Deposition	86	Optimal (>70)
Sinuosity	37.5	Poor (<45)
Bank Vegetative Stability	81	Optimal (>=75)
Riparian Buffer	75	Sub-Optimal (70-90)
Habitat Assessment Score	140	
% Maximum Score	55	Marginal (41-<59)

Table 4. Results of the macroinvertebrate bioassessment conducted in Rocky Creek at RYC-5, May 14, 2008.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # Taxa	42
	# EPT taxa	10
	# Highly-sensitive and Specialized Taxa	1
Taxonomic composition measures		
	% EPC taxa	26
	% EPT minus Baetidae and Hydropsychidae	8
	% Chironomidae Individuals	47
	% Dominant Taxon	28
	% Individuals in Dominant 5 Taxa	79
Functional feeding group		
	# Collector Taxa	17
	% Tolerant Filterer Taxa	29
Community tolerance		
	# Sensitive EPT	2
	% Sensitive taxa	6
	% Nutrient Tolerant individuals	79
	WMB-I Assessment Score	4
	WMB-I Assessment Rating	Fair

WATER CHEMISTRY

Results of water chemistry analysis are presented in Table 5. In situ measurements and water samples were collected monthly, or annually (pesticides, semi-volatile organics, atrazine) during March through October of 2008 to help identify any stressors to the biological communities. Dissolved oxygen concentrations were below the stream's *F&W* use classification criteria during the June 12th site visit, when flow was measured at 0.24 cubic feet per second (cfs). Fecal coliform counts exceeded the *F&W* use classification criterion collected on October 10th, possibly due to heavy rainfall during the site visit. Median concentrations of total Kjeldahl nitrogen, dissolved iron, hardness, and specific conductance were higher than expected for the ecoregion. Organics were collected and all results were less than minimum detection limits (<MDL) except for Atrazine, a commonly used herbicide.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Rocky Creek to be in *fair* condition. Habitat assessment results were scored as *marginal*. Monitoring should continue to ensure that conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2008. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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
Physical							
Temperature (°C)	9	8.9	26.0	22.1	20.6	5.9	
Turbidity (NTU)	8	5.2	19.1	11.2	11.8	4.7	
Total Dissolved Solids (mg/L)	8	18.0	80.0	56.0	53.8	18.1	
Total Suspended Solids (mg/L)	8	< 1.0	10.0	5.0	4.4	3.2	
Specific Conductance (µmhos)	9	69.4	93.1	80.7 ^G	79.5	8.4	
Hardness (mg/L)	7	20.7	36.0	29.0 ^G	27.9	6.3	
Alkalinity (mg/L)	8	21.0	38.6	28.4	29.4	6.0	
Monthly Stream Flow (cfs)	8	0.1	8.1	0.5	1.9	2.8	
Stream Flow during sample collection (cfs)	7	0.2	8.1	0.5	2.2	2.9	
Chemical							
Dissolved Oxygen (mg/L)	9	4.6 ^C	9.9	6.4	6.4	1.5	1
pH (su)	9	6.0	6.9	6.6	6.6	0.3	
Ammonia Nitrogen (mg/L)	8	< 0.014	0.016	0.008	0.008	0.003	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.004	0.070	0.032	0.035	0.022	
Total Kjeldahl Nitrogen (mg/L)	8	0.300	0.973	0.643 ^M	0.618	0.231	
Total Nitrogen (mg/L)	8	0.304	1.000	0.706	0.653	0.235	
Dissolved Reactive Phosphorus (mg/L)	8	0.007	0.015	0.013	0.012	0.003	
Total Phosphorus (mg/L)	8	0.022	0.043	0.034	0.033	0.007	
CBOD-5 (mg/L)	8	< 1.0	4.8	1.0	1.4	1.4	
Chlorides (mg/L)	8	2.0	5.6	3.3	3.4	1.1	
Atrazine (µg/L)	1			<	0.05		
Total Metals							
^J Aluminum (mg/L)	8	0.082	0.265	0.122	0.155	0.071	
Iron (mg/L)	8	1.600	2.960	2.605	2.445	0.514	
^J Manganese (mg/L)	8	0.062	0.179	0.080	0.098	0.041	
Dissolved Metals							
^J Aluminum (mg/L)	8	< 0.015	0.068	0.038	0.036	0.026	
Antimony (µg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Arsenic (µg/L)	8	< 1.6	< 2.2	1.1	1.1	0.1	
Cadmium (µg/L)	8	< 3.000	< 5.000	2.500	2.125	0.518	
Chromium (µg/L)	8	< 4.000	< 13.000	2.000	3.688	2.329	
Copper (mg/L)	8	< 0.005	< 0.013	0.002	0.004	0.002	
Iron (mg/L)	8	0.888	1.760	1.130 ^M	1.244	0.316	
Lead (µg/L)	8	< 0.6	< 1.5	0.7	0.7	0.2	
Manganese (mg/L)	8	0.008	0.093	0.064	0.062	0.027	
Mercury (µg/L)	8	< 0.030	< 0.080	0.015	0.018	0.009	
^J Nickel (mg/L)	8	< 0.004	0.018	0.003	0.005	0.005	
Selenium (µg/L)	8	< 1.5	< 1.6	0.8	0.8	0.0	
Silver (µg/L)	8	< 2.000	< 3.000	1.500	1.312	0.259	
Thallium (µg/L)	8	< 0.5	< 0.6	0.3	0.3	0.0	
^J Zinc (mg/L)	8	< 0.003	< 0.006	0.003	0.003	0.001	
Biological							
Chlorophyll a (ug/L)	4	1.07	2.14	1.69	1.65	0.44	
^J Fecal Coliform (col/100 mL)	8	20	4600 ^C	62	650	1599	1

C=value exceeds established criteria for *F&W* water use classification; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 65d; J=estimate; N=# samples; M= Value > 90% of all verified ecoregional reference reach data collected in the 65d ecoregion;

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