Alabama Department of Environmental Management

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Basin Assessment Site

Fair

Terrapin Creek on dirt road 224 off Cleburne County Road 49 (33.89420/-85.46410)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Terrapin Creek watershed for biological and water quality monitoring as part of the 2010 Alabama, Coosa, and Tallapoosa (ACT) Basin Assessment Monitoring. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

Figure 1. Reach Characteristics of Terrapin Creek at TEPC-1A, September 9, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Terrapin Creek is a *Fish & Wildlife (F&W)* stream located in Cleburne County on Talladega Upland ecoregion (45d). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (66%) interspersed with grassland, pasture, and shrubs/scrubs. Population density is relatively low in this area. Only one NPDES permit has been issued 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. Terrapin Creek at TEPC-1A is characterized by gravel, cobble, boulder, sand, and bedrock substrates (Figure 1). Overall habitat quality was categorized as *optimal.*

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi^2)		41
Ecoregion[a]		45d
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	38
	Evergreen	27
	Mixed	<1
Shrub/scrub		5
Grassland/herbaceous		18
Pasture/hay		5
Development	Open space	2
	Low intensity	<1
Barren		2
Population/km^2 [b]		4
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a.Talladega Upland
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012

Table 2. Physical characteristics of Terrapin Creek at TEPC-1A, May 27, 2010.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	0.5
Run	1.5
Pool	3.0
% of Reach	
Riffle	10
Run	80
Pool	10
% Substrate	
Bedrock	2
Boulder	20
Cobble	25
Gravel	28
Sand	15
Silt	3
Organic Matter	7

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 the scores for each individual metric. Metric results indicated the macroinvertebrate community to be *fair* community condition (Table 4).

Table 3. Results of the habitat assessment conducted on Terrapin Creek at TEPC-1A, May 27, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	87	Optimal >70
Sediment Deposition	79	Optimal >70
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	86	Optimal >74
Riparian Buffer	84	Sub-optimal (70-89)
Habitat Assessment Score	**199**	
% Maximum Score	**83**	**Optimal >70**

Table 4. Results of the macroinvertebrate bioassessment conducted in Terrapin Creek at TEPC-1A, May 27, 2010.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	22	78
Shannon Diversity	4.21	70
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	46	50
% Non-insect taxa	10	65
Tolerance measures		
% Tolerant taxa	21	83
WMB-I Assessment Score	**---**	**69**
WMB-I Assessment Rating		**Fair (47-69)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May, July, September and November 2010 to help identify any stressors to the biological communities. *In situ* parameters suggested that Terrapin Creek at TEPC-1A was meeting *F&W* use classification. Median values of specific conductance, hardness, total iron, and dissolved iron were higher than expected based on verified reference reach data collected in the ecoregion 45d. Copper and chromium exceeded Aquatic Life Use criteria in September.

SUMMARY

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

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Habitat was assessed as *optimal* for supporting macroinvertebrate communities. Specific conductance, hardness, total and dissolved iron were elevated for this ecoregion.

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Table 5. Summary of water quality data collected March-October, 2010. 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	Q	E
Physical								
Temperature (°C)	5	8.7	22.9	21.8	18.8	6.0		
Turbidity (NTU)	5	2.7	21.7	4.9	8.3	7.7		
Total Dissolved Solids (mg/L)	4	< 1.0	64.0	46.0	39.1	27.2		
Total Suspended Solids (mg/L)	4	< 1.0	8.0	4.0	4.1	3.5		
Specific Conductance (µmhos)	5	25.5	51.8	41.1 G	38.8	10.7		
Hardness (mg/L)	4	8.0	16.6	13.6 M	12.9	3.8		
Alkalinity (mg/L)	4	6.7	23.3	22.4	18.7	8.0		
Stream Flow (cfs)	5	36.9	835.0	121.0	250.2	330.6		
Chemical								
Dissolved Oxygen (mg/L)	5	5.7	9.8	8.3	7.9	1.6		
pH (su)	5	6.4	7.0	6.6	6.7	0.2		
Ammonia Nitrogen (mg/L)	4	< 0.021	< 0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	4	0.013	0.077	0.034	0.040	0.030	J	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.414	0.125	0.176	0.178		
Total Nitrogen (mg/L)	4	< 0.053	0.463	0.173	0.216	0.180	J	
Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.010	0.010	0.009	0.002	J	
Total Phosphorus (mg/L)	4	0.011	0.025	0.016	0.017	0.006		
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	0.9	1.6	1.4	1.3	0.3		
Total Metals								
Aluminum (mg/L)	4	< 0.033	0.507	0.030	0.146	0.241	J	
Iron (mg/L)	4	0.609	1.720	0.792 M	0.978	0.504		
Manganese (mg/L)	4	0.014	0.161	0.056	0.072	0.063	J	
Dissolved Metals								
Aluminum (mg/L)	4	< 0.033	0.056	0.019	0.028	0.019	J	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0		
Arsenic (µg/L)	4	< 0.4	2.1	1.0	0.8	0.4		
Cadmium (mg/L)	4	< 0.000	0.014	0.001	0.002	0.003		
Chromium (mg/L)	4	< 0.009	0.019 A	0.006	0.009	0.007	J	1
Copper (mg/L)	4	< 0.013	0.020 A	0.008	0.011	0.006	J	1
Iron (mg/L)	4	0.205	1.460	0.444 M	0.638	0.560		
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Manganese (mg/L)	4	< 0.001	0.149	0.014	0.044	0.070	J	
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0		
Nickel (mg/L)	4	< 0.019	0.042	0.010	0.012	0.006		
Selenium (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Silver (mg/L)	4	< 0.000	0.002	0.000	0.000	0.001		
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	4	< 0.012	0.030	0.015	0.013	0.004		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	1.07	0.40	0.48	0.44		
E. coli (col/100mL)	4	45	210	106	117	75		

A=value exceeded Aquatic Life Uses criterion; E= # samples that exceeded criteria; G=value > median concentration of all verified reference reach data collected in the ecoregion 71f; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 71f; N=# samples; Q=qualifier.