

2013 Monitoring Summary



Use Support Assessment

Kirby Creek at Jackson County Road 38 (34.53260/-85.95097)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Kirby Creek watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee River Basin (TN). 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. In 2012 Kirby Creek was added to Alabama's §303(d) list of impaired water bodies for nutrients from pasture grazing, based on 2009 data. It was later determined that additional data was needed to support a listing. The 2013 data will be used to evaluate the use support status of Kirby Creek.



Figure 1. Kirby Creek at KBYJ-1, May 15, 2013.

WATERSHED CHARACTERISTICS

The Kirby Creek watershed lies within the Southern Table Plateaus (68d) ecoregion. Kirby Creek is a *Fish & Wildlife (F&W)* stream that drains part of Jackson County's Sand Mountain. Based on the 2006 National Land Cover Dataset landuse in the watershed is primarily pasture, cropland and about 28% forest (Table 1). ADEM's NPDES Management System database shows a total of two NPDES permits issued within this watershed as of May 13, 2013.

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. Kirby Creek at KBYJ-1 is a medium-gradient riffle-run stream reach characterized primarily by bedrock (Figure 1). Bedrock naturally limits available habitat and refuge from scouring during high flow events. Overall habitat quality was rated as *sub-optimal* for a Southern Table Plateaus stream.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Table 4 summarizes results of taxonomic richness, community composition, and community tolerance metrics. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community in Kirby Creek at KBYJ-1 to be in *good* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Tennessee River
Basin		Tennessee River
Drainage Area (mi ²)		22
Ecoregion ^a		68d
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	15
	Evergreen	3
	Mixed	10
Shrub/scrub		7
Grassland/herbaceous		2
Pasture/hay		35
Cultivated crops		20
Development	Open space	5
	Low intensity	2
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km ^{2b}		60
# NPDES Permits ^c	TOTAL	2
	Construction Stormwater	2

a.Southern Table Plateaus

b.2000 US Census

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

Table 2. Physical characteristics of Kirby Creek at KBYJ-1, May 15, 2013.

Physical Characteristics	
Width (ft)	35
Canopy Cover	Mostly Shaded
Depth (ft)	
	Riffle 0.5
	Run 2.5
	Pool 4.0
% of Reach	
	Riffle 5
	Run 85
	Pool 10
% Substrate	
	Bedrock 73
	Boulder 3
	Cobble 3
	Gravel 2
	Sand 2
	Silt 10
	Organic Matter 7

Table 3. Results of the habitat assessment conducted in Kirby Creek at KBYJ-1, May 15, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	64	Sub-optimal (59-70)
Sediment Deposition	72	Optimal (>70)
Sinuosity	55	Marginal (45-64)
Bank and Vegetative Stability	69	Sub-optimal (60-74)
Riparian Buffer	50	Marginal (50-69)
Habitat Assessment Score	156	
% Maximum Score	65	Sub-optimal (59-70)

Table 4. Results of macroinvertebrate bioassessment conducted in Kirby Creek at KBYJ-1, May 15, 2013.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness measures		
# EPT taxa	20	70
Taxonomic composition measures		
% Non-insect taxa	9	68
% Dominant taxon	15	91
% EPC taxa	30	57
Functional feeding group measures		
% Predators	8	26
Tolerance measures		
% Taxa as Tolerant	27	63
WMB-I Assessment Score	---	62
WMB-I Assessment Rating		Good (59-79)

Table 5. Summary of water quality data collected March through 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
Physical							
Temperature (°C)	9	8.2	23.2	17.4	17.6	5.0	
Turbidity (NTU)	9	1.4	2.9	2.0	2.0	0.5	
Total Dissolved Solids (mg/L)	8	< 1.0	80.0	55.0	50.1	24.0	
Total Suspended Solids (mg/L)	8	< 1.0	4.0	0.8	1.2	1.2	
Specific Conductance (µmhos)	9	66.5	89.0	81.9 ^G	78.0	9.2	
Alkalinity (mg/L)	8	10.9	31.2	21.8 ^M	20.5	8.2	
Stream Flow (cfs)	9	0.9	72.8	12.7	24.3	26.8	
Chemical							
Dissolved Oxygen (mg/L)	9	4.0 ^C	10.6	7.1	7.5	2.1	1
pH (su)	9	6.2	6.9	6.8	6.8	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.008	0.037	0.015	0.017	0.012	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.079	1.401	0.658	0.710	0.521	
^J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.561	0.417	0.348	0.183	
^J Total Nitrogen (mg/L)	8	0.548	1.490	1.086	1.058	0.377	
^J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.012	0.007	0.006	0.003	
Total Phosphorus (mg/L)	8	0.012	0.031	0.025	0.023	0.007	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	3.7	5.3	4.9	4.7	0.6	
Biological							
Chlorophyll a (µg/L)	8	< 0.10	2.14	0.53	0.68	0.78	

C=exceeds F&W use classification criterion; E=#samples that exceed criterion; G=value > median concentration of all verified reference data collected in ecoregion 68d; J=reported value is an estimate; M=values > 90th percentile of all verified reference data collected in ecoregion 68d; N=# samples.

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly March through October of 2013 to help identify any stressors to the biological communities. Additional in situ data was collected during the macroinvertebrate assessment on May 15th. Dissolved Oxygen levels did not meet F&W criterion on September 4th. However, the 0.9 cfs flow measured September 4th, the lowest of the sampling season, may attribute to low dissolved oxygen that day. Median Specific Conductance was higher than expected for the ecoregion as compared to all reference data. Median Alkalinity was greater than expected as compared to the 90th percentile of all reference data collected in ecoregion 68d. No metals, organic or bacteriological samples were collected.

SUMMARY

Bioassessment results indicated the macroinvertebrate communities in Kirby Creek at KBYJ-1 to be in *good* condition. Habitat was rated *sub-optimal* overall. Median Specific Conductance and Alkalinity were greater than expected for a stream in the Southern Table Plateaus ecoregion. The F&W dissolved oxygen criterion was exceeded one time in September. Monitoring of Kirby Creek at KBYJ-1 should continue to ensure that water quality and biological conditions meet current standards.

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