Alabama Department of Environmental Management

Special Study

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Good

Mad Indian Creek at Randolph County Road 113 (33.35018/-85.63545)

BACKGROUND

Mad Indian Creek at NDNR-1 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 statewide.

Figure 1. Mad Indian Creek at NDNR-1, March 23, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mad Indian Creek at NDNR-1 is a *Fish & Wildlife (F&W)* stream located in Randolph County. Based on the 2006 National Land Cover Dataset, landuse in the watershed is primarily forest (68%) and pasture/hay. Population density in the area is low, and less than 7% of the watershed is developed. As of September 1, 2012, ADEM has issued no 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. Mad Indian Creek is a riffle-run stream with a benthic substrate that consists primarily of sand (Figure 1). Overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities due to a lack of in-stream habitat, sedimentation, and a limited riparian buffer.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tallapoosa River
Drainage Area (mi^2)		28
Ecoregion[a]		45a
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	41
	Evergreen	26
	Mixed	1
Shrub/scrub		2
Grassland/herbaceous		9
Pasture/hay		14
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		1
Population/km^2[b]		5

a.Southern Inner Piedmont
b.2000 US Census

Table 2. Physical characteristics of Mad Indian Creek at NDNR-1, May 19, 2010.

Physical Characteristics		
Width (ft)		40
Canopy cover		Mostly Open
Depth (ft)		
	Riffle	1.5
	Run	1.5
	Pool	4.0
% of Reach		
	Riffle	5
	Run	85
	Pool	10
% Substrate		
	Bedrock	1
	Boulder	2
	Cobble	2
	Gravel	15
	Sand	75
	Silt	2
	Organic Matter	3

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 NDNR-1 was in *good* condition (Table 4).

Table 3. Results of the habitat assessment conducted in Mad Indian Creek at NDNR-1 on May 19, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	47	Marginal (41-58)
Sediment Deposition	47	Marginal (41-58)
Sinuosity	40	Poor (<45)
Bank and Vegetative Stability	63	Sub-optimal (60-74)
Riparian Buffer	51	Marginal (50-69)
Habitat Assessment Score	**119**	
% Maximum score	**50**	**Marginal (41-58)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Mad Indian Creek at NDNR-1 on May 19, 2010.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	26	96
Shannon Diversity	4.99	100
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	34	36
% Non-insect taxa	4	93
Tolerance measures		
% Tolerant taxa	24	73
WMB-I Assessment Score	**---**	**80**
WMB-I Assessment Rating		**Good (70-85)**

WATER CHEMISTRY

Results of water chemistry 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. Turbidity was 759.0 NTU, above ecoregional guidelines, on October 27th. However, high stream flow conditions caused by a large rain event at the time of sampling may be the cause of the elevated turbidity. Median concentrations of ammonium nitrogen and nitrate+nitrite nitrogen were above the 90th percentile of data collected from reference reach streams in the Southern Inner Piedmont ecoregion (45a).

SUMMARY

Bioassessment results indicated the macroinvertebrate community at NDNR-1 to be in *good* condition. However, concentrations of ammonium nitrogen and nitrate+nitrite nitrogen were elevated as compared to data from other reference reaches in ecoregion 45a. Monitoring should continue to ensure that water quality and biological conditions remain stable. Data collected at this site may be useful in establishing nutrient criteria for streams in the Tallapoosa River Basin and statewide.

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
Physical						
Temperature (°C)	9	9.5	24.2	20.4	19.8	4.9
Turbidity (NTU)	9	4.0	759.0 T	7.0	93.6	249.8
J Total Dissolved Solids (mg/L)	8	8.0	116.0	29.0	35.8	33.6
Total Suspended Solids (mg/L)	8	< 1.0	1120.0	1.5	143.4	394.6
Specific Conductance (µmhos)	9	23.6	32.2	28.0	28.0	2.6
Alkalinity (mg/L)	8	5.3	15.7	6.8	8.0	3.3
Stream Flow (cfs)	6	5.5	62.5	25.0	27.3	20.2
Chemical						
Dissolved Oxygen (mg/L)	9	7.9	11.0	8.3	8.8	1.0
pH (su)	9	6.1	7.1	6.8	6.7	0.3
Ammonia Nitrogen (mg/L)	8	< 0.021	0.067	0.010 M	0.018	0.020
Nitrate+Nitrite Nitrogen (mg/L)	8	0.232	0.300	0.264 M	0.266	0.024
Total Kjeldahl Nitrogen (mg/L)	8	< 0.080	0.517	0.178	0.184	0.161
Total Nitrogen (mg/L)	8	< 0.305	0.817	0.412	0.450	0.168
J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.049	0.009	0.013	0.015
J Total Phosphorus (mg/L)	8	0.008	0.258	0.010	0.045	0.087
CBOD-5 (mg/L)	8	< 2.0	3.4	1.0	1.3	0.8
Chlorides (mg/L)	8	1.4	2.0	1.7	1.7	0.2
Biological						
Chlorophyll a (µg/L)	8	< 0.10	5.34	1.07	1.61	1.63

J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45a; N=# samples; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 45a.

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