Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Poor

Turkey Creek at County Road 48 in Chilton County (32.94441/-86.66283)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Turkey Creek watershed for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. 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 ACT basin group.

Figure 1. Sampling location and landuse within the Turkey Creek watershed at TURC-1

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1.Turkey Creek at TURC-1 is a *Fish & Wildlife (F&W)* stream located in Chilton County (Fig. 1). It is located in the Coosa River Basin within the Southern Inner Piedmont ecoregion (45a) (Table1). Landuse in the watershed is primarily forest (49%) and pasture (23%).

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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. Streams in ecoregion 45a are characterized as being low to moderate gradient with mostly cobble, gravel and sand substrates. Turkey Creek at TURC-1 is a medium gradient, riffle/run stream with a bottom substrate consisting of sand along with a good mixture of gravel, cobble, boulder, and bedrock. Habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

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. The final score is an average of all individual metric scores. The final score indicated the biological community at TURC-1 to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		4
Ecoregion[a]		45a
% Landuse		
Open water		1
Wetland	Woody	1
Forest	Deciduous	36
	Evergreen	10
	Mixed	3
Shrub/scrub		4
Grassland/herbaceous		5
Pasture/hay		23
Cultivated crops		2
Development	Open space	8
	Low intensity	4
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^2[b]		5
# NPDES Permits[c]	**TOTAL**	4
Construction Stormwater		4

a.Southern Inner Piedmont
b.2000 U.S. Census Data
c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Turkey Creek at TURC-1, May 12, 2005.

Physical characteristics		
Width (ft)		16
Canopy cover		Est. 50/50
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	3.0
% of Reach		
	Riffle	10
	Run	55
	Pool	35
% Substrate		
	Bedrock	10
	Boulder	10
	Cobble	20
	Gravel	25
	Sand	30
	Organic Matter	5

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Table 3. Results of the habitat assessment conducted on Turkey Creek at TURC-1, May 12, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	74	Optimal (> 70)
Sediment deposition	56	Marginal (41-58)
Sinuosity	78	Sub-optimal (65-84)
Bank and vegetative stability	80	Optimal (≥75)
Riparian buffer	55	Marginal (50-69)
Habitat assessment score	166	
% Maximum score	**69**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment of Turkey Creek at TURC-1 conducted on May 12, 2005.

Macroinvertebrate Assessment Results			
	Results	**Scores**	**Rating**
Taxa richness measures		**(0-100)**	
# Ephemeroptera (mayfly) genera	8	67	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	5	42	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	12	53	Fair (49.4-74.1)
% Non-insect organisms	2	95	Good (93.9-97.0)
% Plecoptera	1	4	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	5	18	Very Poor (<20.2)
WMB-I Assessment Score	**---**	**42**	**Poor (24-48)**

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Chlorides, ammonia nitrogen and nitrate+nitrite nitrogen concentrations were higher than expected for this ecoregion. Conductivity, hardness, and some metals (total iron & manganese and dissolved manganese) were also elevated. Results of other physical and chemical analyses were similar to the 90th percentile of all verified reference data within ecoregion 45a.

CONCLUSIONS

Bioassesment results indicated the macroinvertebrate community to be in *poor* condition. Results suggest sedimentation, nutrient enrichment and elevated metals to be potential causes of the degraded biological conditions.

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Table 5. Summary of water quality data collected March-October, 2005. 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	12.0	26.0	25.0	21.4	5.9
Turbidity (NTU)	9	6.4	18.9	9.3	10.4	3.9
Total Dissolved Solids (mg/L)	8	43.0	120.0	58.5	68.8	27.4
Total Suspended Solids (mg/L)	8	6.0	52.0	17.0	21.6	16.0
Specific Conductance (µmhos)	9	40.0	70	56.7[M]	54.1	10.0
Hardness (mg/L)	5	16.8	21.5	21.2[M]	20.2	2.0
Alkalinity (mg/L)	8	12.5	22.5	15.8	16.2	3.0
Stream Flow (cfs)	9	1.9	26.7	7.2	8.6	---
Chemical						
Dissolved Oxygen (mg/L)	9	7.3	10.7	8.4	8.5	1.1
pH (su)	9	6.5	7.64	7.4	7.3	0.4
Ammonia Nitrogen (mg/L)	8	< 0.015	0.050	0.017[M]	0.022	0.016
[J] Nitrate+Nitrite Nitrogen (mg/L)	8	0.003	0.294	0.172[M]	0.177	0.099
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.591	0.162	0.246	0.208
Total Nitrogen (mg/L)	8	0.076	0.740	0.402	0.422	0.219
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.020	0.010	0.009	0.007
Total Phosphorus (mg/L)	8	< 0.004	0.073	0.048	0.046	0.023
CBOD-5 (mg/L)	8	< 1.0	3.9	1.6	1.9	1.1
[J] Chlorides (mg/L)	8	4.5	6.5	5.1[M]	5.3	0.7
Atrazine (µg/L)	2	< 0.05	0.07	0.05	0.05	0.00
Total Metals						
Aluminum (mg/L)	4	0.072	0.307	0.206	0.198	0.107
Iron (mg/L)	4	0.904	1.66	1.14[M]	1.211	0.332
Manganese (mg/L)	4	0.104	0.247	0.198[M]	0.187	0.066
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.029	0.008	0.013	0.011
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	0.257	0.372	0.299	0.274	0.106
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	0.084	0.154	0.132[M]	0.125	0.030
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.1875	0.075
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
[J] Chlorophyll a (µg/L)	8	1.07	21.89	3.20	5.41	6.89
Fecal Coliform (col/100 mL)	8	30	730	115	238	289

J=estimate; N=#of samples; Min=Minimum; Max=Maximum; M=value> 90% of all verified ecoregional reference data within ecoregion 45a