Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2005 Monitoring Summary

Fair™

Turkey Creek at state highway 10 in Wilcox County (31.84408/-86.96070)

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.

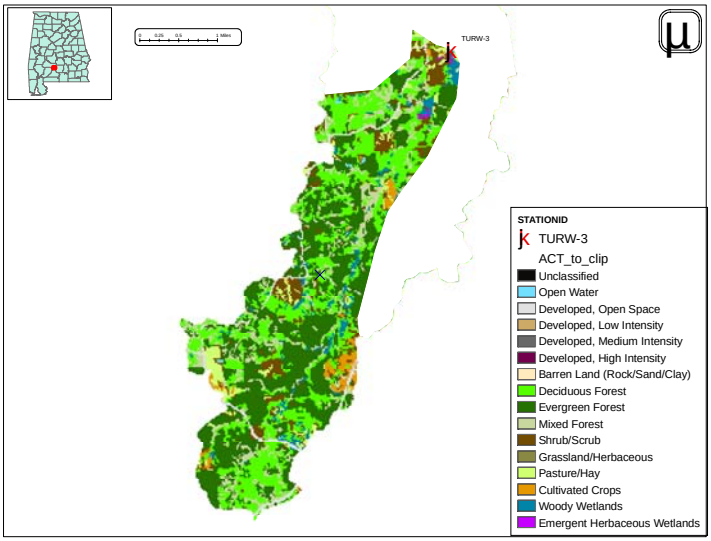

Figure 1. Sampling location and landuse within the Turkey Creek watershed at TURW-3.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Turkey Creek is a small *Fish & Wildlife (F&W)* stream located in the Southern Hilly Gulf Coast Plains ecoregion (65d) in Wilcox County. Landuse within the watershed is primarily forest (79%) with extensive silviculture and limited pasture and crop land (Fig. 1). There is only one permitted discharge located along the watershed (Table 1).

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. Turkey Creek at TURW-3 is a low-gradient stream with bedrock and sand substrate with large area's of pool and little rifle habitat. Overall habitat quality was categorized as *optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi^2)		8
Ecoregion[a]		65d
% Landuse		
Open water		<1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	30
	Evergreen	38
	Mixed	11
Shrub/scrub		9
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
Population/km^2[b]		2
# NPDES Permits[c]	**TOTAL**	1
Mining General Permit (old)		1

a. Southern Hilly Gulf Coastal Plains
b. 2000 U.S. Census Data
c. # NPDES per mits download from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of Turkey Creek at TURW-3 on May 26, 2005.

Physical Characteristics		
Width (ft)		15
Canopy cover		Mostly Shaded
Depth (ft)		
	Riffle	0.3
	Run	1.0
	Pool	3.0
% of Reach		
	Riffle	5
	Run	10
	Pool	85
% Substrate		
	Bedrock	40
	Boulder	5
	Cobble	5
	Gravel	5
	Sand	34
	Silt	5
	Organic Matter	6

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

Table 3. Results of the habitat assessment conducted on Turkey Creek at TURW-3 on May 26, 2005.

Habitat Assessment	(% Maximum Score)	Rating
Instream habitat quality	61	Sub-optimal (53-65)
Sediment deposition	65	Sub-optimal (53-65)
Sinuosity	58	Marginal (45-64)
Bank and vegetative stability	61	Sub-optimal (60-74)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	168	
% Maximum score	**70**	**Optimal (>65)**

Table 4. Results of the macroinvertebrate bioassessment conducted on Turkey Creek at TURW-3 on May 26, 2005.

Macroinvertebrate Assessment Results			
	Results	**Scores (0-100)**	**Rating**
Taxa richness measures			
# Ephemeroptera (mayfly) genera	13	100	Excellent (>85)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	6	50	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	7	71	Fair (49.4-74.1)
% Non-insect organisms	6	85	Fair (62.7-93.9)
% Plecoptera	1	4	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	5	18	Very Poor (<20.2)
WMB-I Assessment Score	---	**52**	**Fair (48-72)**

WATER CHEMISTRY

Results of water chemistry analyses 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. Median values of nutrients, *in situ* values and metals collected during this period were within ranges expected for this ecoregion or below detection limits (Table 5).

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *optimal*. The water chemistry and *in situ* measurements were similar to concentrations obtained at ADEM's least impaired ecoreference reaches.

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)	8	12.0	25.0	20.5	20.2	4.3
Turbidity (NTU)	8	8.2	51.2	20.7	27.8	16.6
Total Dissolved Solids (mg/L)	7	57.0	179.0	80.0	99.0	46.2
Total Suspended Solids (mg/L)	7	7.0	44.0	21.0	23.3	12.7
Specific Conductance (µmhos)	8	34.9	80	49.3	52.5	16.0
Hardness (mg/L)	3	10.1	19.8	14.7	14.9	4.9
Alkalinity (mg/L)	7	5.2	35.0	11.1	14.0	10.4
Stream Flow (cfs)	7	1.3	32.8	9.4	10.4	---
Chemical						
Dissolved Oxygen (mg/L)	8	6.7	10.4	7.9	8.3	1.5
pH (su)	8	6.2	7.6	7.1	6.9	0.5
Ammonia Nitrogen (mg/L)	7	< 0.015	0.139	0.008	0.026	0.050
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.095	0.023	0.032	0.032
Total Kjeldahl Nitrogen (mg/L)	7	0.150	0.498	0.197	0.263	0.148
Total Nitrogen (mg/L)	7	0.124	0.593	0.206	0.295	0.170
Dissolved Reactive Phosphorus (mg/L)	7	0.006	0.037	0.008	0.012	0.011
Total Phosphorus (mg/L)	7	< 0.004	0.069	0.033	0.035	0.025
CBOD-5 (mg/L)	7	< 1.0	2.7	1.1	1.2	0.7
Chlorides (mg/L)	7	4.6	6.8	5.1	5.3	0.7
Atrazine (µg/L)	2	< 0.05	0.06	0.04	0.04	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	1.25	0.218	0.423	0.6
Iron (mg/L)	4	1.47	1.97	1.545	1.633	0.2
Manganese (mg/L)	4	< 0.005	0.035	0.022	0.020	---
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.082	0.049	0.047	---
Antimony (µg/L)	4	< 2	< 2	1	1	---
Arsenic (µg/L)	3	< 10	< 10	5	5	---
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	---
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Iron (mg/L)	4	0.177	0.607	0.327	0.359	0.2
Lead (µg/L)	4	< 2	< 2	1	1	---
Manganese (mg/L)	4	< 0.005	0.044	0.010	0.017	---
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	---
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Selenium (µg/L)	4	< 10	< 10	5	5	---
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	---
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	---
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Biological						
[J] Chlorophyll a (µg/L)	7	0.89	2.67	1.07	1.50	0.7
[J] Fecal Coliform (col/100 mL)	6	67	470	180	205	145

J=estimate; N=# samples

FOR MORE INFORMATION, CONTACT:
Keith Gilliland, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2735, wkg@adem.state.al.us