

2005 monitoring Summary



West Fork of Little River at unnamed Dekalb Co Rd near Mentone (34.58631/85.56332)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the West Fork of Little River 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.

Additionally, West Fork of Little River is among least-disturbed watershed in the ACT basin group based on landuse, road density, and population density. Therefore, these data will also be used to evaluate the use of West Fork of Little River as a “best attainable” condition reference watershed for comparison with other Southern Table Plateaus streams.

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	28
Ecoregion ^a	68d
% Landuse	
Open water	<1
Wetland	Woody <1
	Emergent herbaceous <1
Forest	Deciduous 61
	Evergreen 5
	Mixed 15
Shrub/scrub	4
Grassland/herbaceous	1
Pasture/hay	10
Cultivated crops	2
Development	Open space 2
	Low intensity <1
Population/km ^{2b}	42
# NPDES Permits ^c	TOTAL 1
Construction Stormwater	1

a. Southern Table Plateaus
b. 2000 US Census Data
c. #NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics of West Fork of Little River at LITD-1 on May 18, 2005.

Physical Characteristics	
Width (ft)	45
Canopy cover	Open
Depth (ft)	Riffle 0.5
	Run 1.5
	Pool 2.5
% of Reach	Riffle 5
	Run 80
	Pool 15
% Substrate	Bedrock 62
	Boulder 20
	Cobble 5
	Gravel 5
	Sand 3
	Silt 2
	Organic Matter 3

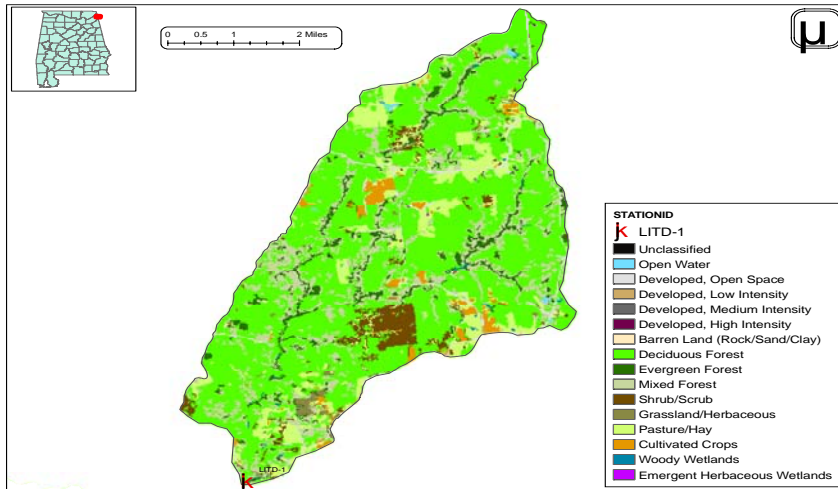


Figure 1. Sampling location and landuse within the West Fork of Little River Creek watershed at LITD-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. West Fork of Little River at LITD-1, is designated an *Outstanding National Resource Water (ONRW)*. Its also classified as a *Public Water Supply (P&W)*, *Swimming (S)* and *Fish and Wildlife (F&W)* and is located in North East Alabama (Fig. 1). Landuse in the watershed is primarily forest (81%), interspersed with pasture and agriculture areas. Population density is relatively high in 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. West Fork of Little River at LITD-1 is a high-gradient, bedrock bottomed riffle-run stream with boulder, cobble, and gravel substrates. The reach was also characterized by long, straight run areas. Habitat quality and availability was rated as *optimal* for supporting diverse aquatic macroinvertebrate communities. However, the high percentage of bedrock and lack of riffles may naturally limit 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 to be in *fair* condition (Table 4) and lower than the typical ecological reference streams of this type.

Table 3. Results of the habitat assessment conducted on West Fork of Little River at LITD-1 on May 18, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	73	Optimal (> 70)
Sediment deposition	88	Optimal (> 70)
Sinuosity	70	Sub-optimal (65-84)
Bank and vegetative stability	86	Optimal (≥75)
Riparian buffer	93	Optimal (>90)
Habitat assessment score	202	
% Maximum score	84	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment of West Fork of Little River at LITD-1 on May 18, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures	(0-100)		
# Ephemeroptera (mayfly) genera	5	42	Poor (23-46)
# Plecoptera (stonefly) genera	4	67	Good (50-75)
# Trichoptera (caddisfly) genera	11	92	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	3	88	Excellent (>87.1)
% Non-insect organisms	1	97	Good (93.9-97.0)
% Plecoptera	3	13	Fair (13.1-19.7)
Tolerance measures			
Beck's community tolerance index	20	71	Good (60.7-80.4)
WMB-I Assessment Score	---	67	Fair (48-72)

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. Dissolved oxygen concentrations ranged from 7.6-10.9 mg/L. Individual fecal coliform counts did not exceed 54 colonies/100 ml of sample. Median concentrations of nutrients, total and dissolved solids, and chlorides were within the expected limit for Southern Tables Plateaus streams. Collected metals were generally below detection limits. Median concentrations of the metals that were detected (total aluminum, iron, and manganese and dissolved iron) were below concentrations in 90% of verified ecoregional reference reach samples.

CONCLUSIONS

To be used for comparison with other streams, "best-attainable" reference reaches must be representative of other streams in the ecoregion. West Fork of Little River at LITD-1 was typical of other streams in the Southern Tables Plateau and in-stream habitat quality was rated as *optimal*. However, a lack of riffle habitat and a large percentage of bedrock may naturally limit macroinvertebrate communities. Bioassessment results are listed as *fair* mainly because of poor representation of mayfly genre. Water quality results are within normal ranges for this stream type.

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	11.0	24.6	20.4	18.5	5.7
Turbidity (NTU)	8	0.9	2.2	1.3	1.4	0.4
Total dissolved solids (mg/L)	7	9.0	113.0	39.0	41.9	35.4
Total suspended solids (mg/L)	7	2.0	8.0	4.0	4.7	2.6
Specific conductance (µmhos)	8	15.1	27.7	19.3	20.5	4.8
Hardness (mg/L)	5	4.0	8.4	5.9	6.2	1.9
Alkalinity (mg/L)	7	1.1	9.4	2.6	3.4	2.9
Stream Flow (cfs)	8	0.2	46.9	9.5	12.8	---
Chemical						
Dissolved oxygen (mg/L)	8	7.6	10.9	8.9	9.1	1.2
pH (su)	8	5.6	8.6	6.2	6.6	1.0
Ammonia Nitrogen (mg/L)	7	< 0.015	0.039	0.008	0.014	0.012
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.114	0.050	0.047	0.041
Total Kjeldahl Nitrogen (mg/L)	7	0.150	0.388	0.075	0.120	0.118
Total nitrogen (mg/L)	7	0.077	0.416	0.135	0.167	0.117
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.019	0.006	0.008	0.007
Total phosphorus (mg/L)	7	< 0.004	0.080	0.029	0.029	0.028
^J CBOD-5 (mg/L)	7	< 1.0	5.2	1.0	1.9	1.8
Chlorides (mg/L)	7	3.7	4.7	4.0	4.1	0.4
Atrazine (µg/L)	1	< 0.05	< 0.05	0.03	0.03	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.049	0.0075	0.018	0.021
Iron (mg/L)	4	0.066	0.435	0.145	0.198	0.167
Manganese (mg/L)	4	< 0.005	0.008	0.0025	0.004	0.003
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.137	0.0075	0.040	0.065
Antimony (µg/L)	4	< 2	< 2	1	1	---
Arsenic (µg/L)	4	< 10	< 10	5	5	---
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	---
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	---
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	---
Iron (mg/L)	4	< 0.005	0.042	0.022	0.022	0.016
Lead (µg/L)	4	< 2	< 2	1	1	---
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	---
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	0.0015	0.0015	---
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	0.27	3.47	1.34	1.60	1.2
^J Fecal Coliform (col/100 mL)	7	1	54	5	12	19

N=# of samples; J=estimate

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