

2005 Monitoring Summary



Salt Creek at Gravel Rd (T18S/R7E/S3) in NE Talladega Co (33.49892/85.90240)

BACKGROUND

The Alabama Department of Environmental Management selected the Salt 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.

Additionally, Salt Creek is among the least-disturbed watersheds 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 Salt Creek as a “best attainable” condition reference watershed for comparison with other Piedmont streams.

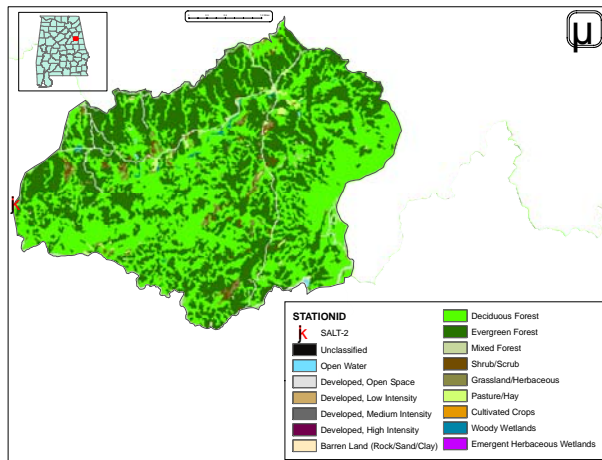


Figure 1. Sampling location and landuse within the Salt Creek watershed at SALT-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Salt Creek at SALT-2 is a small *Fish & Wildlife (F&W)* stream on the border of Talladega and Clay counties (Fig. 1). It is located within Talladega National Forest. Landuse in the watershed is primarily forest (93%), interspersed with small residential and pasture areas. Silviculture was also noted in the watershed and there are some permitted discharges.

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. Salt Creek at SALT-2 is a high-gradient, riffle-run stream with a bottom substrate dominated by bedrock (Table 2). The reach was also characterized by high bedrock bluffs. Habitat quality and availability was rated as *optimal* for supporting diverse aquatic macroinvertebrate communities (Table 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. The final score is an average of all individual metric scores. The final score indicated the biological community to be in *excellent* condition (Table 4) and characteristic of high-gradient, forested reference reaches in the Piedmont ecoregion.

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	19
Ecoregion ^a	45d
% Landuse	
Open water	<1
Wetland	Woody <1
Forest	Deciduous 49
	Evergreen 44
	Mixed <1
Shrub/scrub	1
Grassland/herbaceous	1
Pasture/hay	1
Development	Open space 3
	Low intensity <1
Barren	<1
Population/km ² ^b	19
# NPDES Permits ^c	TOTAL 7
	Mining General Permit (old) 3
	Municipal Individual 4

a. Talladega Upland

b. 2000 US Census data

c. # NPDES permits in ADEM’s NPDES Management System Database, 9 June 2008

Table 2. Physical characteristics of Salt Creek at SALT-2, May 5, 2005.

Physical Characteristics	
Width (ft)	45
Canopy cover	Mostly Shaded
Depth (ft)	
	Riffle 0.8
	Run 1.5
	Pool 2.5
% Substrate	
	Bedrock 74
	Boulder 5
	Cobble 5
	Gravel 5
	Sand 5
	Silt 3
	Organic Matter 3

Table 3. Results of the habitat assessment conducted on Salt Creek at SALT-2, May 5, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	87	Optimal (> 70)
Sediment deposition	84	Optimal (> 70)
Sinuosity	63	Marginal (45-64)
Bank and vegetative stability	89	Optimal (≥75)
Riparian buffer	83	Sub-optimal (70-90)
Habitat assessment score	205	
% Maximum score	85	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment of Salt Creek at SALT-2 conducted on May 5, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	15	100	Excellent (>85)
# Plecoptera (stonefly) genera	6	100	Excellent (>75)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	5	81	Good (74-87)
% Non-insect organisms	1	97	Good (94-97)
% Plecoptera	10	52	Good (20-60)
Tolerance measures			
Beck's community tolerance index	32	100	Excellent (>80)
WMB-I Assessment Score	—	86	Excellent (>86)

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. *In situ* parameters indicated that Salt Creek at SALT-2 was meeting water quality criteria for its *Fish & Wildlife* use classification. Dissolved oxygen concentrations ranged from 8.0-10.4 mg/L. Individual fecal coliform counts did not exceed 48 colonies/100 ml of sample. Median concentrations of nutrients, total and dissolved solids, and chlorides were within the expected range for Talladega Upland 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. Pesticides, semi-volatile organics, and atrazine were not detected in the two samples collected (April 6 and July 13, 2005).

SUMMARY

To be used for comparison with other streams, “best-attainable” reference reaches must be representative of other streams in the ecoregion. Salt Creek at SALT-2 was typical of other streams in the Talladega Upland, which are generally medium to high-gradient riffle-run streams with bedrock, boulder, cobble, gravel and sand substrates, and high ridges. Landuse, road density, and population density categorized Salt Creek among the least-disturbed watersheds in the ACT basin group. Habitat, bioassessment, and water quality data indicate the reach to be in *excellent* condition and generally unaffected by the small residential, pasture, and silvicultural areas in the watershed.

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	10.0	26.0	19.5	18.8	6.5
Turbidity (NTU)	8	1.3	9.8	2.8	3.8	2.9
Total dissolved solids (mg/L)	8	< 1.0	96.0	30.0	31.8	22.3
Total suspended solids (mg/L)	8	< 1.0	10.0	6.0	6.1	3.4
Specific conductance (µmhos)	8	32.2	66.3	37.1	40.4	10.8
Hardness (mg/L)	5	8.7	17.0	9.0	9.6	1.3
Alkalinity (mg/L)	8	< 1.0	98.7	9.7	23.0	37.3
Stream Flow (cfs)	6	4.0	38.3	22.4	22.3	---
Chemical						
Dissolved oxygen (mg/L)	8	8.0	10.4	9.4	9.4	1.0
pH (su)	8	6.8	7.66	7.2	7.2	0.3
Ammonia Nitrogen (mg/L)	8	< 0.015	0.035	0.008	0.015	0.012
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.003	0.007	0.002	0.003	0.002
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.244	0.075	0.103	0.069
Total nitrogen (mg/L)	8	0.076	0.247	0.076	0.101	0.064
Dissolved reactive phosphorus (mg/L)	8	< 0.004	0.010	0.002	0.005	0.004
Total phosphorus (mg/L)	8	< 0.004	0.110	0.035	0.042	0.037
CBOD-5 (mg/L)	8	< 1.0	3.2	1.2	1.0	0.4
Chlorides (mg/L)	8	< 1.0	4.7	3.9	3.4	1.4
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.0
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.059	0.0455	0.046	0.0
Iron (mg/L)	4	0.116	0.322	0.206	0.206	0.1
Manganese (mg/L)	4	< 0.005	0.056	0.0083	0.008	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.0075	0.008	0.0
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	0.015	0.201	0.0195	0.0195	0.0
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Mercury (µg/L)	4	< 0.3	< 0.3	0.225	0.225	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	8	< 0.10	1.34	1.07	0.86	0.5
^J Fecal Coliform (col/100 mL)	7	17	48	26	32	13

N=# of samples; J=estimate

FOR MORE INFORMATION, CONTACT:
 Lisa Houston Huff, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2752 esh@adem.state.al.us