

**2011 Monitoring Summary**



**Salt Creek at Clarke County Road 15 (31.44222/-87.87157)**

**BACKGROUND**

The Alabama Department of Environmental Management (ADEM) monitored Salt Creek as a Candidate Reference Reach. Reference reaches represent best-attainable conditions and provide background data used for comparison with other streams in the same ecoregion. Additionally, ADEM included the Salt Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.



Figure 1. Salt Creek at SLTC-1, May 24, 2011.

**WATERSHED CHARACTERISTICS**

Watershed characteristics are summarized in Table 1. Salt Creek is a *Fish & Wildlife (F&W)* stream in southern Clarke County, bordered roughly by Clarke County Road 2 (northeast) and the receiving waters of the Tombigbee river (west). Based on the 2006 National Land Cover Dataset, land use within the watershed is primarily forest (71%) with some shrub/scrub. As of September 4, 2011, ADEM has issued no NPDES permits in the 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. Salt Creek at SLTC-1 is a low gradient, glide-pool stream. Instream substrates were dominated by sand (Figure 1). The overall habitat assessment resulted in a *marginal* rating due to poor instream habitat quality, a relatively straight channel and unstable banks.

**BIOASSESSMENT RESULTS**

Benthic macroinvertebrate communities were sampled using ADEM’s Intensive Multi-habitat Bioassessment methodology (WMB-I). Table 4 summarizes results of taxonomic richness, community composition, and community tolerance metrics. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community in Salt Creek at SLTC-1 to be in *fair* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
<b>Basin</b>	Lower Tombigbee River	
<b>Drainage Area (mi<sup>2</sup>)</b>	11	
<b>Ecoregion<sup>a</sup></b>	65f	
<b>% Landuse</b>		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	26
	Evergreen	23
	Mixed	22
Shrub/scrub		16
Grassland/herbaceous		7
Pasture/hay		1
Development	Open space	2
	Low intensity	<1
<b>Population/km<sup>2b</sup></b>	2	

a.Southern Pine Plains & Hills  
b.2000 US Census

Table 2. Physical characteristics of Salt Creek at SLTC-1,

Physical Characteristics		
<b>Width (ft)</b>	14	
<b>Canopy Cover</b>	Mostly Shaded	
<b>Depth (ft)</b>	Run	0.2
	Pool	0.3
<b>% of Reach</b>	Run	99
	Pool	1
<b>% Substrate</b>	Gravel	2
	Sand	82
	Silt	5
	Organic Matter	11

**Table 3.** Results of the habitat assessment conducted in Salt Creek at SLTC-1, May 24, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	25	Poor <40
Sediment Deposition	60	Sub-optimal (53-65)
Sinuosity	38	Poor <45
Bank and Vegetative Stability	56	Marginal (35-59)
Riparian Buffer	90	Optimal >89
<b>Habitat Assessment Score</b>	<b>115</b>	
<b>% Maximum Score</b>	<b>52</b>	<b>Marginal (40-52)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Salt Creek at SLTC-1, May 24, 2011.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness and diversity measures</b>		<b>(0-100)</b>
% EPC taxa	33	63
% Trichoptera & Chironomidae Taxa	27	91
<b>Taxonomic composition measures</b>		
% EP Individuals	13	25
<b>Functional feeding group</b>		
% Collector-Filterer Individuals	29	52
<b>Community tolerance</b>		
% Nutrient Tolerant individuals	64	1
<b>WMB-I Assessment Score</b>	---	<b>46</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (31-45)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected April, June, August, and October 2011 to help identify any stressors to the biological communities. In situ parameters were also measured during the macroinvertebrate assessment on May 24. Salt Creek met *F&W* use classification criteria for temperature, turbidity, dissolved oxygen and pathogens. Median concentrations of hardness, specific conductivity, alkalinity and chlorides were higher than expected for streams in the Southern Pine Plains and Hills ecoregion, as were concentrations of dissolved and total manganese. Organics samples collected in June and October were less than MDL. Estimated Arsenic concentrations exceeded Human Health criteria for fish consumption in August.

## SUMMARY

Salt Creek at SLTC-1 is typical of other streams in the Southern Pine Plains and Hills ecoregion. Generally, they are low-gradient, sand-bottomed streams. Overall habitat quality was rated *marginal*.

Bioassessment results indicated the macroinvertebrate communities to be in *fair* condition. A similar assessment conducted in 2006 also indicated the macroinvertebrate communities to be in *fair* condition. Water quality results indicated some changes since 2006, with an increase in median concentrations of total dissolved solids, chlorides, and specific conductance. Median hardness, alkalinity, and total and dissolved manganese decreased since 2006. However, flow rates in 2011 were significantly lower than in 2006, and may have affected these results. Monitoring should continue to ensure that water quality and biological conditions meet current standards.

**Table 5.** Summary of water quality data collected between April and October 2011. 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	Med	Avg	SD	E
<b>Physical</b>							
Temperature (°C)	5	17.1	26.4	22.2		3.8	
Turbidity (NTU)	5	5.8	22.3	10.5	13.0	7.8	
<sup>J</sup> Total Dissolved Solids (mg/L)	4	198.0	394.0	353.0	324.5	89.7	
Total Suspended Solids (mg/L)	4	< 1.0	44.0	6.5	14.4	20.3	
Specific Conductance (µmhos)	5	362.2	1629.0	702.3 <sup>G</sup>	811.8	482.8	
Hardness (mg/L)	4	80.8	83.5	82.8 <sup>G</sup>	82.5	1.2	
Alkalinity (mg/L)	4	67.3	75.3	74.2 <sup>M</sup>	72.7	3.7	
Stream Flow (cfs)	5	1.3	11.0	3.4	4.5	3.8	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	5	7.4	9.4	8.5	8.4	0.7	
pH (su)	5	7.3	7.7	7.5	7.5	0.2	
Ammonia Nitrogen (mg/L)	4	< 0.007	0.069	0.038	0.037	0.030	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.049	0.148	0.082	0.090	0.048	
Total Kjeldahl Nitrogen (mg/L)	4	0.232	0.357	0.288	0.292	0.054	
Total Nitrogen (mg/L)	4	0.320	0.470	0.369	0.382	0.064	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.009	0.006	0.007	0.001	
<sup>J</sup> Total Phosphorus (mg/L)	4	0.008	0.022	0.014	0.014	0.006	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	4	< 2.8	15.2	6.9	7.6	7.2	
<sup>J</sup> TOC (mg/L)	3	1.0	3.1	1.1	1.7	1.2	
Chlorides (mg/L)	4	55.3	158.7	150.1 <sup>M</sup>	128.5	49.2	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
<b>Total Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	0.087	0.626	0.112	0.234	0.262	
Iron (mg/L)	4	0.690	1.480	0.975	1.030	0.385	
Manganese (mg/L)	4	0.080	0.114	0.092 <sup>M</sup>	0.094	0.015	
<b>Dissolved Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	< 0.043	0.054	0.022	0.030	0.016	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
<sup>J</sup> Arsenic (µg/L)	4	< 1.4	1.8 <sup>H</sup>	0.7	1.0	0.6	1
Cadmium (mg/L)	4	< 0.0000	< 0.0000	0.0000	0.0000	0.0000	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
<sup>J</sup> Iron (mg/L)	4	0.140	0.368	0.247	0.250	0.095	
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
Manganese (mg/L)	4	0.060	0.090	0.073 <sup>M</sup>	0.074	0.016	
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
Selenium (µg/L)	4	< 1.3	< 1.3	0.7	0.7	0.0	
Silver (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000	
Thallium (µg/L)	4	< 1.1	< 1.1	0.5	0.5	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
<b>Biological</b>							
Chlorophyll a (ug/L)	4	0.53	4.98	0.87	1.81	2.12	
<sup>J</sup> E. coli (col/100mL)	4	62	261	236	199	94	

E= #samples that exceeded criteria; G=value greater than median concentration of all verified reference data collected in ecoregion 65f; H=*F&W* human health criteria exceeded (fish only); J=estimate; M=value>90% of all verified ecoregional reference reach data collected in ecoregion 65f; N=# of samples; Q=Laboratory Qualifier Codes;

FOR MORE INFORMATION, CONTACT:  
Hugh Cox, ADEM Environmental Indicator Section  
1350 Coliseum Boulevard Montgomery, AL 36110  
(334) 260-2753 hec@adem.state.al.us