

# 2006 Monitoring Summary



## Salt Creek at Clarke County Road 2 (31.44222/-87.87157)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Salt Creek watershed for biological and water quality monitoring as part of the 2006 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.

Salt Creek is also among the least-disturbed watersheds in the EMT based on landuse, road density, and population density. These data will be used to evaluate the use of Salt Creek as a “best attainable” condition reference watershed for comparison with other coastal plain streams.

A habitat and macroinvertebrate assessment were conducted on the Salt Creek at SLTC-1 on May 24, 2006.

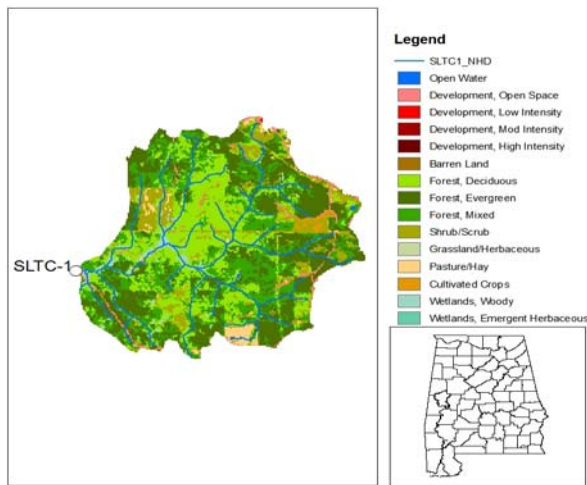


Figure 1. Salt Creek at SLTC-1, January 21, 2010.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Salt Creek is a *Fish & Wildlife* (F&W) stream located in Clarke County. Landuse within the watershed is primarily forested (81%, Figure 1). As of September 18, 2009, no NPDES permits have been issued in this watershed.

### 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 SLTC-1 is a shallow, low-gradient stream reach located in the Southern Pine Plains and Hills ecoregion (Tables 1 & 2). Overall habitat quality was categorized as *marginal* due to a lack of in-stream habitat, poor bank stability and a relatively straight stream channel, which puts it at risk to impacts from sedimentation and scouring.

### 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 characterized by pollution-tolerant taxa groups, indicating *fair* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Lower Tombigbee	
Drainage Area (mi <sup>2</sup> )	11	
Ecoregion <sup>a</sup>	65f	
% Landuse		
Open water	<1	
Wetland	Woody	2
Forest	Deciduous	26
	Evergreen	29
	Mixed	26
Shrub/scrub	11	
Grassland/herbaceous	<1	
Pasture/hay	2	
Cultivated crops	<1	
Development	Open space	2
	Low intensity	<1
Population/km <sup>2</sup> <sup>b</sup>	2	
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	0

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM’s NPDES Management System database, Sep 18, 2009

Table 2. Physical characteristics of Salt Creek at SLTC-1, May 24, 2006.

Physical characteristics		
Width (ft)	15	
Canopy cover	Mostly Shaded	
Depth (ft)	Run	0.4
	Pool	2.0
% of Reach	Run	70
	Pool	30
% Substrate	Gravel	10
	Sand	81
	Silt	5
	Organic Matter	4

**Table 3.** Results of the habitat assessment conducted May 24, 2006.

Habitat Assessment (% Maximum Score)	Rating	
Instream habitat quality	40	Poor (<40)
Sediment deposition	59	Sub-optimal (53-65)
Sinuosity	38	Poor (<45)
Bank and vegetative stability	44	Marginal (35-59)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	114	
<b>% Maximum score</b>	<b>52</b>	<b>Marginal (40-52)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted May 24, 2006

Macroinvertebrate Assessment			
	Results	Scores	Rating
<b>Taxa richness measures</b>			
# EPT genera	16	64	Good (57-78)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	8	83	Fair (61.9-92.7)
% Plecoptera	6	31	Good (5.7-52.8)
% Dominant taxa	31	48	Fair (47.1-70.5)
<b>Functional composition measures</b>			
% Predators	11	37	Fair (30.2-45.2)
<b>Tolerance measures</b>			
Beck's community tolerance index	13	59	Good (31.9-65.9)
% Nutrient tolerant organisms	47	39	Poor (25.4-50.8)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>52</b>	<b>Fair (38-56)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October at Basin Assessment stations to help identify any stressors to the biological communities. Median total dissolved solids, specific conductance, hardness, alkalinity, chlorides, and metals (total & dissolved manganese) concentrations were elevated based on the 90th percentile of reference reaches in Southern Pine Plains and Hills ecoregion. In-stream pH ranged from 5.6 to 8.2 standard units. Streams in this region of Alabama are generally characterized by a slightly acidic pH.

## CONCLUSIONS

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community in Salt Creek at SLTC-1 to be in *fair* condition. Results of other data collected during 2006 suggest sedimentation and elevated metals to be potential causes of the stressed biological conditions. Further sampling has been scheduled in 2011.

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**Table 5.** Summary of water quality data collected March-October, 2006. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	8	20.0	26.0	21.5	22.5	2.4
Turbidity (NTU)	9	4.9	56.1	6.8	12.8	16.4
Total Dissolved Solids (mg/L)	8	3.0	375.0	281.5 <sup>M</sup>	248.6	129.7
Total Suspended Solids (mg/L)	8	5.0	61.0	8.5	14.3	19.0
Specific Conductance (µmhos)	9	235.4	917.9	531.6 <sup>M</sup>	538.2	206.5
Hardness (mg/L)	3	70.0	103.0	100.0 <sup>M</sup>	91.0	18.2
Alkalinity (mg/L)	8	14.0	81.6	63.5 <sup>M</sup>	59.3	21.3
Stream Flow (cfs)	9	2.8	23.3	4.2	6.6	6.5
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	9	7.2	8.7	7.7	7.8	0.5
pH (su)	9	5.6 <sup>C</sup>	8.2 <sup>C</sup>	7.6	7.4	0.7
Ammonia Nitrogen (mg/L)	8	<0.010	0.141	0.080	0.079	0.055
Nitrate+Nitrite Nitrogen (mg/L)	8	<0.005	0.181	0.082	0.084	0.054
Total Kjeldahl Nitrogen (mg/L)	8	0.165	1.700	0.427	0.573	0.483
Total Nitrogen (mg/L)	8	0.221	1.703	0.519	0.657	0.455
Dissolved Reactive Phosphorus (mg/L)	8	<0.004	0.012	0.005	0.006	0.004
Total Phosphorus (mg/L)	8	<0.004	0.059	0.025	0.030	0.021
CBOD-5 (mg/L)	8	<1.0	2.9	1.1	1.3	0.9
COD (mg/L)	1	<2.0	2.0	1.0	1.0	---
TOC (mg/L)	2	1.2	1.4	1.3	1.3	0.2
Chlorides (mg/L)	5	14.0	170.0	120.0 <sup>M</sup>	105.8	58.3
Atrazine (µg/L)	1	<0.05	<0.05	0.03	0.03	---
<b>Total Metals</b>						
Aluminum (mg/L)	3	0.14	0.41	0.240	0.263	0.137
Iron (mg/L)	3	0.744	0.957	0.953	0.885	0.122
Manganese (mg/L)	3	0.099	0.111	0.107 <sup>M</sup>	0.106	0.006
<b>Dissolved Metals</b>						
Aluminum (mg/L)	3	0.07	0.1	0.070	0.073	0.025
Antimony (µg/L)	3	<7.5	<7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	<5	<5	3	3	0
Cadmium (mg/L)	3	<0.0003	<0.0003	0.0001	0.0001	0.0000
Chromium (mg/L)	3	<0.005	<0.005	0.003	0.003	0.000
Copper (mg/L)	3	<0.005	<0.005	0.003	0.003	0.000
Iron (mg/L)	3	0.148	0.264	0.260	0.224	0.066
Lead (µg/L)	3	<5	<5	3	3	0
Manganese (mg/L)	3	0.07	0.096	0.085 <sup>M</sup>	0.084	0.013
Mercury (µg/L)	3	<0.5	<0.5	0.3	0.3	0.0
Nickel (mg/L)	3	<0.005	0.01	0.003	0.005	0.004
Selenium (µg/L)	3	<7.5	<7.5	3.8	3.8	0.0
Silver (mg/L)	3	<0.0008	<0.0008	0.0004	0.0004	0.0000
Thallium (µg/L)	3	<2.5	<9	4.5	3.4	1.9
Zinc (mg/L)	3	<0.005	<0.005	0.003	0.003	0.000
<b>Biological</b>						
Chlorophyll a (µg/L)	8	0.10	44.50	0.52	6.40	15.43
Fecal Coliform (col/100 mL)	5	31	630	140	272	252

J=estimate; N=# samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within eco-region 65f; C= value exceeds established criteria for F&W use classification.