

# 2005 Monitoring Summary

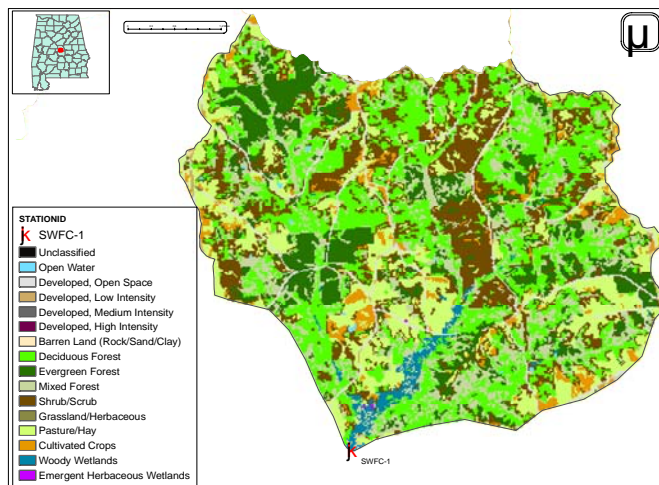


## Swift Creek at Chilton County Road 24 (32.72145/-86.69159)

### BACKGROUND

Swift Creek is a small reference stream that ADEM currently uses as “best attainable” standard for data collected from streams in the Southeastern Plains ecoregion and Fall Line Hills subecoregion. It displays instream and habitat conditions that could be described as least disturbed as compared to other stream in the region.

Additionally, Swift Creek was selected 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 Swift Creek watershed at SWFC-1.

### WATERSHED CHARACTERISTICS

Swift Creek is a small *Swimming/Fish and Wildlife (S/F&W)* stream located in the Alabama River basin. Downstream of SWFC-1, Swift Creek flows into Autauga County and finally reaches the Alabama river near Autaugaville. It runs through the Fall Line Hills subecoregion (65i), which is characterized by oak/hickory/pine forested hilly terrain. Landuse within the watershed is primarily forest (57%) and shrub lands with some pasture/hay and crops. Watershed characteristics are summarized in 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. Swift Creek at SWFC-1 is a medium-gradient, riffle-run stream characterized by gravel and sand substrates. Overall habitat quality was rated as *sub-optimal* overall for supporting macroinvertebrate communities but sediment deposition was rated *poor*. There were also few bends or riffles upstream of the reach, which provide habitat and refuge from high flow events.

**Table 1.** Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi <sup>2</sup> )		24
Ecoregion <sup>a</sup>		65i
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	27
	Evergreen	13
	Mixed	15
Shrub/scrub		19
Grassland/herbaceous		<1
Pasture/hay		16
Cultivated crops		4
Development	Open space	3
	Low intensity	1
	Moderate intensity	<1
Population/km <sup>2</sup> <sup>b</sup>		13
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	1
	Mining General Permit (old)	1

- a. Fall Line Hills  
b. 2000 US Census  
c. NPDES permits downloaded from ADEM's NPDES Management System database

**Table 2.** Physical characteristics of Swift Creek at SWFC-1, June 16, 2005.

Physical Characteristics		
Width (ft)		40
Canopy cover		Mostly Shaded
Depth (ft)		
	Riffle	0.3
	Run	1.3
	Pool	1.5
% of Reach		
	Riffle	5
	Run	85
	Pool	10
% Substrate		
	Gravel	23
	Sand	70
	Silt	2
	Organic Matter	5

### 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. Bioassessment results indicated the macroinvertebrate community in Swift Creek at SWFC-1 to be in *fair* condition. (Table 4).

**Table 3.** Results of habitat assessment conducted on Swift Creek at SWFC-1, June 16, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	54	Marginal (41-58)
Sediment deposition	35	Poor (<41)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	65	Sub-optimal (60-74)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	147	
<b>% Maximum score</b>	<b>61</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of macroinvertebrate assessment conducted at SWFC-1, June 16, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
		(0-100)	
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	5	42	Poor (23-46)
# Plecoptera (stonefly) genera	7	100	Excellent (>75)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	7	72	Fair (49.4-74.1)
% Non-insect organisms	0	99	Excellent (>97)
% Plecoptera	6	30	Good (19.7-59.8)
<b>Tolerance measures</b>			
Beck's community tolerance index	16	57	Fair (40.7-60.7)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>65</b>	<b>Fair (48-72)</b>

## 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. *In situ* measurements indicated that Swift Creek at SWFC-1 was meeting water quality criteria for temperature, turbidity, dissolved oxygen, and pH. Fecal coliform counts were greater than 200col/100mL in three out of seven samples. Median nitrate nitrite nitrogen and total suspended solids were detected at levels above 90 percent of verified reference reach samples. No other parameters exceeded expected values for this ecoregion.

## CONCLUSIONS

The condition of the macroinvertebrate community residing in Swift Creek at SWFC-1 was rated as *fair*, with a mix of both pollution sensitive and pollution tolerant taxa represented. Results of intensive water quality sampling and a habitat assessment suggest nutrient enrichment and sedimentation to be potential causes of the slightly degraded biological conditions.

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**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
<b>Physical</b>						
Temperature (°C)	10	14.0	26.0	22.0	20.9	4.0
Turbidity (NTU)	10	4.2	20.9	10.7	10.9	5.8
Total dissolved solids (mg/L)	7	15.0	234.0	33.0	57.1	78.4
Total suspended solids (mg/L)	7	7.0	42.0	21.0 <sup>M</sup>	21.0	11.5
Specific conductance (µmhos)	10	29.9	59.1	35.4	36.7	8.3
Hardness (mg/L)	5	8.1	11.0	8.4	9.1	1.3
Alkalinity (mg/L)	7	3.4	7.8	5.9	5.6	1.7
Stream Flow (cfs)	10	11.2	83.2	32.4	35.0	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	10	7.4	10.2	7.9	8.4	1.1
pH (su)	10	6.4	7.31	6.8	6.9	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.024	0.015	0.015	0.006
Nitrate+Nitrite Nitrogen (mg/L)	7	0.043	0.326	0.270 <sup>M</sup>	0.237	0.105
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.298	0.200	0.184	0.107
Total nitrogen (mg/L)	7	0.218	0.582	0.401	0.421	0.150
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.036	0.009	0.011	0.011
Total phosphorus (mg/L)	7	< 0.004	0.048	0.017	0.022	0.020
CBOD-5 (mg/L)	7	< 1.0	3.2	1.3	1.6	1.0
COD (mg/L)	5	< 2.0	< 2.0	1.0	1.0	0.0
TOC (mg/L)	1				3.5	--
<sup>J</sup> Chlorides (mg/L)	6	4.3	2.0	4.8	5.0	0.7
Atrazine (µg/L)	1				< 0.05	--
<b>Total Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.417	0.124	0.168	0.175
Iron (mg/L)	4	0.616	1.66	1.088	1.113	0.455
Manganese (mg/L)	4	< 0.005	0.158	0.102	0.091	0.070
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.0075	0.008	0.0
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	3	< 10	< 10	5	5	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	< 0.005	0.107	0.104	0.0794	0.051
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.04	0.0145	0.018	0.017
<sup>J</sup> Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.1875	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
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
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
<b>Biological</b>						
<sup>J</sup> Chlorophyll <i>a</i> (µg/L)	7	0.53	2.14	1.60	1.45	0.6
<sup>J</sup> Fecal Coliform (col/100 mL)	7	20	1100	130	341	407

J=estimate; N=# samples; Min=minimum; Max=maximum; M=value > 90% of ADEM's 65(i) reference reach samples.