Alabama Department of Environmental Management

Use Support Assessment

Rivers and Streams Monitoring Program

2013 Monitoring Summary

Poor

Swan Creek at US Highway 72 in Limestone County (34.78497/-86.94780)

BACKGROUND

Swan Creek from the Tennessee River to US Highway 72 at SWNL-392 is classified for *Fish & Wildlife (F&W)* uses. As mandated by the Clean Water Act (CWA), the Alabama Department of Environmental Management (ADEM) conducted a Use Support Assessment (USA) study to determine if the reach could reasonably be expected to attain water quality criteria consistent with Alabama's *Fish & Wildlife (F&W)* use classification that achieves the CWA interim "fishable/swimmable" goal.

As part of this effort, a habitat and macroinvertebrate assessment was conducted at this site on Swan Creek at SWNL-392 on June 3, 2013.

Figure 1. Swan Creek at SWNL-392, July 17, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Swan Creek lies within the Eastern Highland Rim (71g) ecoregion. It is classified as a *Fish and Wildlife (F&W)* stream located near the town of Athens. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily pasture/hay (38%) and forest (25%) with some cultivated crops and development areas. As of May 13, 2013, ADEM's NPDES Management System database showed seventy permitted discharges within the watershed, primarily for construction activities.

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 as well as the quality and availability of habitat. Swan Creek at SWNL-392 is a high-gradient, riffle-run stream characterized primarily by a bedrock substrate (Figure 1). Overall habitat quality was categorized as *optimal*, despite a marginal rating for stream sinuosity.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi^2)		30
Ecoregion[a]		71g
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	15
	Evergreen	4
	Mixed	6
Shrub/scrub		5
Grassland/herbaceous		2
Pasture/hay		38
Cultivated crops		11
Development	Open space	9
	Low intensity	5
	Moderate intensity	1
	High intensity	<1
Barren		<1
Population/km^2[b]		96
# NPDES Permits[c]	**TOTAL**	70
Construction Stormwater		58
Industrial General		8
Industrial Individual		1
Municipal Individual		3

a.Eastern Highland Rim
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Swan Creek at SWNL-392, June 3, 2013.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.3
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	10
	Run	5
	Pool	85
% Substrate		
	Bedrock	70
	Cobble	10
	Gravel	15
	Sand	1
	Silt	1
	Organic Matter	3

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures 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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community at SWNL-392 to be in *poor* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Swan Creek at SWNL-392, June 3, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	66	Sub-optimal (59-70)
Sediment Deposition	74	Optimal >70
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	79	Optimal >74
Riparian Buffer	79	Sub-optimal (70-89)
Habitat Assessment Score	**178**	
% Maximum Score	**74**	**Optimal >70**

Table 4. Results of the macroinvertebrate bioassessment conducted June 3, 2013.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	8	17
Shannon Diversity	3.20	23
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	1	2
% Non-insect taxa	15	39
Functional feeding group		
% Predator Individuals	5	15
Community tolerance		
% Tolerant taxa	43	17
WMB-I Assessment Score	**---**	**19**
WMB-I Assessment Rating		**Poor (15-28)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, March through October of 2013 to help identify any stressors to the biological communities.

Swan Creek at SWNL-392 met water quality criteria for its *Fish & Wildlife* use classification throughout the sampling season. Median concentrations of chlorides and specific conductance were detected in elevated concentrations in comparison with 90th percentile of data collected at reference reaches within the Eastern Highland Rim Ecoregion (71g).

SUMMARY

These data indicate that Swan Creek at SWNL-392 is currently attaining Alabama's *F&W* use classification criteria. Bioassessment results indicated the macroinvertebrate community in Swan Creek at SWNL-392 to be in *poor* condition. Overall habitat quality was categorized as *optimal* with high amount of bank and vegetative stability and low amount of sediment deposition. Additionally, intensive water chemistry results indicated higher than expected concentrations of Specific Conductance and Chlorides when compaired to the reference reaches in ecoregion 71g. Monitoring should continue to ensure that biological and water quality conditions remain stable.

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Table 5. Summary of water quality data collected monthly March – October, 2013. 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
Physical						
Temperature (°C)	9	8.1	25.3	21.9	19.6	5.8
Turbidity (NTU)	13	1.7	17.2	5.0	5.4	4.2
J Total Dissolved Solids (mg/L)	8	71.0	270.0	128.0	145.4	65.0
J Total Suspended Solids (mg/L)	8	1.0	10.0	3.0	4.0	3.0
Specific Conductance (µmhos)	9	105.0	227.0	153.0 G	158.4	45.1
J Alkalinity (mg/L)	8	17.5	85.4	45.2	52.0	25.8
Stream Flow (cfs)	12	3.6	123.9	22.2	35.8	35.1
Chemical						
Dissolved Oxygen (mg/L)	9	8.2	13.2	9.3	9.8	1.6
pH (su)	9	7.4	8.0	7.7	7.7	0.2
J Ammonia Nitrogen (mg/L)	8	< 0.010	0.029	0.012	0.012	0.004
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.550	1.260	0.741	0.820	0.269
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.071	0.733	0.446	0.433	0.224
J Total Nitrogen (mg/L)	8	< 0.588	1.761	1.272	1.254	0.364
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.007	0.019	0.012	0.012	0.005
J Total Phosphorus (mg/L)	8	0.014	0.080	0.026	0.035	0.023
J CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	3.1	5.4	4.1 M	4.0	0.7
Biological						
Chlorophyll a (ug/L)	8	< 1.00	19.80	1.60	3.83	6.59

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 71g; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 71g; N=# samples.