

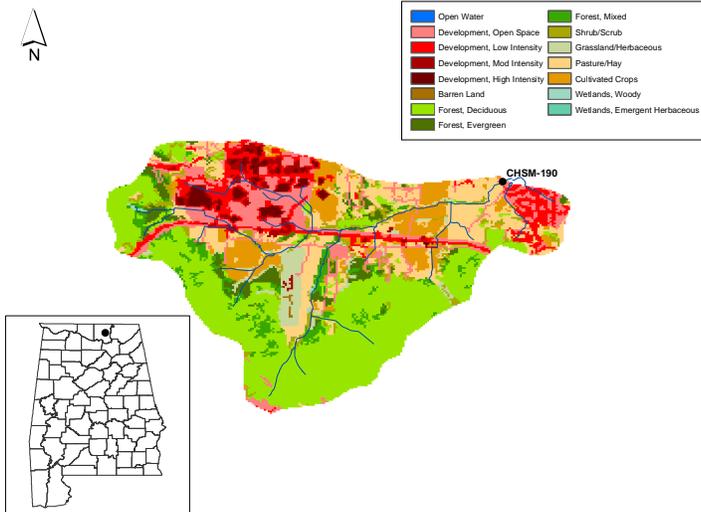
# 2009 Monitoring Summary



## Chase Creek at Jordan Rd, Madison Co. (34.78090/-86.49260)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Chase Creek watershed for biological and water quality monitoring as part of the 2009 Assessment of the Tennessee (TN) River Basin. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin.



**Figure 1.** Sampling location and landuse within the Chase Creek watershed at CHSM-190.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Chase Creek is a *Fish & Wildlife (F&W)* stream located near the city of Huntsville in the Tennessee River basin (Figure 1). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (44%), with some areas of hay and cultivated crops. The presence of agriculture and cultivated crops is typical of streams in the Eastern Highland Rim ecoregion. As of September 1, 2012, there were a total of 38 NPDES permits that were issued within the watershed, the vast majority of which are construction stormwater permits.

### 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. Chase Creek at CHSM-190 is a riffle-run stream with a bottom substrate dominated by gravel and cobble. Overall habitat quality was categorized as *poor* for supporting aquatic macroinvertebrate communities.

### 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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

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

Watershed Characteristics		
Basin		Tennessee R
Drainage Area (mi <sup>2</sup> )		7
Ecoregion <sup>a</sup>		71g
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	
Forest	Deciduous	35
	Evergreen	4
	Mixed	5
Shrub/scrub		4
Grassland/herbaceous		3
Pasture/hay		15
Cultivated crops		9
Development	Open space	12
	Low intensity	8
	Moderate intensity	3
	High intensity	2
Barren		35
Population/km <sup>2b</sup>		13
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	38
	Construction Stormwater	24
	Industrial General	9
	Industrial Individual	2
	Municipal Individual	2
	Underground Injection Control	1

a. Eastern Highland Rim

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

**Table 2.** Physical characteristics of Chase Creek at CHSM-190, June 3, 2009.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	3.0
% of Reach		
	Riffle	1
	Run	84
	Pool	15
% Substrate		
	Cobble	37
	Gravel	50
	Sand	10
	Silt	1
	Organic Matter	2

**Table 3.** Results of the habitat assessment conducted on Chase Creek at CHSM-190, June 3, 2009.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	49	Marginal (41-58)
Sediment Deposition	43	Marginal (41-58)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	16	Poor <35
Riparian Buffer	15	Poor <50
<b>Habitat Assessment Score</b>	<b>86</b>	
<b>% Maximum Score</b>	<b>36</b>	<b>Poor &lt;41</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted at Chase Creek at CHSM-190, June 3, 2009.

Macroinvertebrate Assessment		
	Results	Scores
		(0-100)
<b>Taxa richness and diversity measures</b>		
# EPT taxa	4	0
Shannon Diversity	3.75	49
<b>Taxonomic composition measures</b>		
% EPT minus Baetidae and Hydropsychidae	3	5
% Non-insect taxa	17	30
<b>Functional feeding group</b>		
% Predator Individuals	6	17
<b>Community tolerance</b>		
% Tolerant taxa	39	28
<b>WMB-I Assessment Score</b>	---	<b>22</b>
<b>WMB-I Assessment Rating</b>		<b>Poor (15-28)</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, atrazine, and semi-volatile organics) during March through October of 2009 to help identify any stressors to the biological communities.

Median specific conductance and hardness results were greater than the median of reference reach data collected in this ecoregion. Median total dissolved solids and alkalinity were greater than the 90th percentile of reference reach data collected in ecoregion 71.

## SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was also categorized as *poor*, due to limited instream habitat, sedimentation, poor bank and vegetative stability, and a narrow riparian buffer. Conductivity, hardness, and total dissolved solids were elevated above background levels. Monitoring should continue to identify the causes and sources of the degraded biological conditions.

**Table 5.** Summary of water quality data collected March-October, 2009. 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
<b>Physical</b>						
Temperature (°C)	5	11.8	22.4	15.8	16.6	3.9
Turbidity (NTU)	5	1.4	4.5	1.8	2.5	1.4
Total Dissolved Solids (mg/L)	4	132.0	198.0	194.5 <sup>M</sup>	179.8	31.9
Total Suspended Solids (mg/L)	4	< 1.0	3.0	1.5	1.6	1.1
Specific Conductance (µmhos)	5	316.0	348.4	322.0 <sup>G</sup>	330.4	14.6
Hardness (mg/L)	2	169.0	181.0	175.0 <sup>G</sup>	175.0	8.5
Alkalinity (mg/L)	4	149.0	177.0	165.5 <sup>M</sup>	164.2	11.6
Stream Flow (cfs)	4	0.3	6.6	3.9	3.6	3.1
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	5	8.1	11.9	10.2	10.2	1.4
pH (su)	5	7.5	8.3	7.8	7.8	0.3
<sup>B</sup> Ammonia Nitrogen (mg/L)	2	< 0.006	< 0.014	0.005	0.005	0.003
<sup>B</sup> Nitrate+Nitrite Nitrogen (mg/L)	3	1.228	3.257	1.290	1.925	1.154
<sup>B</sup> Total Kjeldahl Nitrogen (mg/L)	2	< 0.141	0.224	0.147	0.147	0.108
<sup>B</sup> Total Nitrogen (mg/L)	2	< 1.298	1.514	1.406	1.406	0.152
<sup>3J</sup> Dissolved Reactive Phosphorus (mg/L)	3	0.014	0.041	0.017	0.024	0.015
<sup>3J</sup> Total Phosphorus (mg/L)	1				0.016	
CBOD-5 (mg/L)	4	< 1.0	< 2.0	0.8	0.8	0.3
Chlorides (mg/L)	4	3.5	13.4	4.9	6.7	4.6
Atrazine (µg/L)	1			<	0.06	
<b>Total Metals</b>						
Aluminum (mg/L)	2	< 0.019	0.060	0.020	0.020	0.014
<sup>J</sup> Iron (mg/L)	2	< 0.020	0.027	0.018	0.018	0.012
<sup>J</sup> Manganese (mg/L)	2	0.015	0.018	0.016	0.016	0.002
<b>Dissolved Metals</b>						
Aluminum (mg/L)	2	< 0.019	< 0.060	0.020	0.020	0.014
Antimony (µg/L)	2	< 0.7	< 6.0	1.7	1.7	1.9
Arsenic (µg/L)	2	< 0.4	< 0.4	0.2	0.2	0.0
Cadmium (µg/L)	2	< 2.000	< 3.000	1.250	1.250	0.354
Chromium (mg/L)	2	< 0.007	< 0.013	0.005	0.005	0.002
Copper (mg/L)	2	< 0.013	< 0.200	0.053	0.053	0.066
Iron (mg/L)	2	< 0.014	< 0.020	0.008	0.008	0.002
Lead (µg/L)	2	< 1.0	1.9	1.2	1.2	1.0
<sup>J</sup> Manganese (mg/L)	2	< 0.001	0.012	0.006	0.006	0.008
<sup>B</sup> Mercury (µg/L)	1			<	0.080	
<sup>J</sup> Nickel (mg/L)	2	0.005	< 0.008	0.004	0.004	0.001
<sup>J</sup> Selenium (µg/L)	2	< 0.4	0.6	0.4	0.4	0.3
Silver (µg/L)	2	< 1.000	< 2.000	0.750	0.750	0.354
Thallium (µg/L)	2	< 0.4	< 0.4	0.2	0.2	0.0
Zinc (mg/L)	2	< 0.003	< 0.060	0.016	0.016	0.020
<b>Biological</b>						
Chlorophyll a (ug/L)	4	< 0.10	5.07	0.52	1.54	2.36
<sup>J</sup> Fecal Coliform (col/100 mL)	4	26	200	79	96	81

B=one or more samples excluded from calculations due to laboratory QC concerns; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 71; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 71; N=# samples.

FOR MORE INFORMATION, CONTACT:  
Ashley Lockwood, ADEM Environmental Indicators Section  
1350 Coliseum Boulevard Montgomery, AL 36110  
(334) 260-2766 asims@adem.state.al.us