

# Trend Monitoring Summary: 2004-2009

## Unnamed Tributary to the Coosa R. (Etowah Co.) at North Gadsden Park (34.0396/-85.9726)

### BACKGROUND

The unnamed tributary to the Coosa River at North Gadsden Park was selected for a stream restoration project under a Clean Water Act (CWA) §319(h) nonpoint source grant provided by the US Environmental Protection Agency Region 4 through the Alabama Department of Environmental Management (ADEM) §319 grant program. The purpose of the North Gadsden Park Stream Restoration Project was to address water quality and habitat issues within the 385 ft. stream reach located within the park. The project was fully implemented in November of 2005.

The ADEM conducted habitat, macroinvertebrate and fish community assessments in 2004 and 2009 to assess trends in water quality, evaluate the effectiveness of the stream restoration in meeting its objectives, and to document current water quality conditions.

### WATERSHED CHARACTERISTICS

The unnamed tributary to the Coosa River in North Gadsden Park is a *Fish & Wildlife (F&W)* stream within the *Southern Shale Valleys* subecoregion of the Ridge and Valley ecoregion (67g) (Griffith et al. 2001). It is characterized by a very small watershed (0.5 mi<sup>2</sup>) located entirely within Gadsden.

### REACH CHARACTERISTICS

In June 2004, the reach was observed to be overly wide and shallow due to repeated dredging. It lacked the rootbank and riparian vegetation areas that provide habitat for aquatic communities (Figure 1; Table 1). Bedrock, which limits habitat for macroinvertebrates and fish, dominated the bottom substrate (Table 1). Overall habitat quality for macroinvertebrate communities was rated as *fair* (Table 2).

As part of the stream restoration completed in 2005, the stream channel was narrowed to improve flow and increase stream depth. Vegetation was also planted on the banks to provide additional habitat and bank stability. Stable substrates, which provide habitat for insect colonization, also comprised a greater proportion of the stream bottom. (Table 1; Figure 2). These changes resulted in improved instream habitat quality, a higher frequency of riffle habitat, and greater bank and vegetative stability. Overall habitat quality improved from *fair* in 2004 to *good* in 2009 (Table 2).

**Table 1.** Summary of physical characteristics observed at UTCE-1 in June 2004 and July 2009.

Physical characteristics		Sampling Dates	
		6/17/2004	7/9/2009
Width (ft)		12	3
Canopy cover		Open	Open
Depth (ft)	Riffle	0.4	0.2
	Run	0.5	0.6
	Pool	0.8	0.6
% of Reach	Riffle	---	5
	Run	---	85
	Pool	---	10
% Substrate	Bedrock	36	0
	Boulder	0	5
	Cobble	2	30
	Gravel	30	35
	Sand	20	11
	Silt	10	2
	Clay	0	10
Organic Matter		2	7



**Figure 1.** Unnamed tributary to the Coosa River in North Gadsden Park. This photo, looking downstream, was taken in 2004, prior to project construction.



**Figure 2.** Unnamed tributary to the Coosa River in North Gadsden Park. This photo, facing upstream, was taken in 2006, one year after project completion.

**Table 2.** Results of habitat assessments conducted at UTCE-1 in June 2004 and July 2009.

Habitat Assessment	6/17/2004 % Maximum Score	7/9/2009 % Maximum Score
Instream habitat quality	52	58
Sediment deposition	74	74
Frequency of riffles	62.5	65
Bank and vegetative stability	70	78
Riparian buffer	11	40
Habitat assessment score	132	150
<b>% Maximum score</b>	<b>55</b>	<b>63</b>
<b>Habitat Assessment Rating</b>	<b>Fair</b>	<b>Good</b>

## WATER CHEMISTRY

In situ measurements and water samples were collected during June of 2004 and June, August and October of 2009 to evaluate water quality conditions before and after completion of the stream restoration project (Table 3). Most parameters were relatively stable throughout the study period.

**Table 3.** Summary of water quality data collected in June of 2004 and in June, August and October of 2009.

Parameter	6/17/2004	6/3/2009	8/19/2009	10/21/2009
<b>Physical</b>				
Temperature (°C)	27.0	22.6	25.5	15.4
Turbidity (NTU)	15.8	5.68	5.9	6.6
Total dissolved solids (mg/L) 126	166.0	156.0	184.0	144.0
Total suspended solids (mg/L)	11.0	1.0	12.0	<1.0
Specific conductance (µmhos)	274.6	276.5	299.6	254.0
Alkalinity (mg/L) 113	128.0	137.0	151.0	126.0
Stream Flow (cfs)	0.6	0.5	0.2	0.6
<b>Chemical</b>				
Dissolved oxygen (mg/L)	8.4	9.0	8.1	9.6
pH (su)	8.2	8.0	8.0	7.8
Ammonia nitrogen (mg/L)	<0.015	<0.014	<0.006	<0.006
Nitrate+nitrite nitrogen (mg/L) .183	0.256	0.405	0.271	0.415
Total Kjeldahl nitrogen (mg/L)	<0.15	<0.141	<0.089	<0.089
<sup>j</sup> Dissolved reactive phosphorus (mg/L)	<0.004	0.005	0.008	0.013
Total phosphorus (mg/L)	0.064	0.011	0.008	0.009
CBOD-5 (mg/L)	1.2	<2.0	<2.0	<2.0
Chlorides (mg/L) 4.1	5.2	2.5	2.9	2.7

J=estimate

## MACROINVERTEBRATE BIOASSESSMENT RESULTS

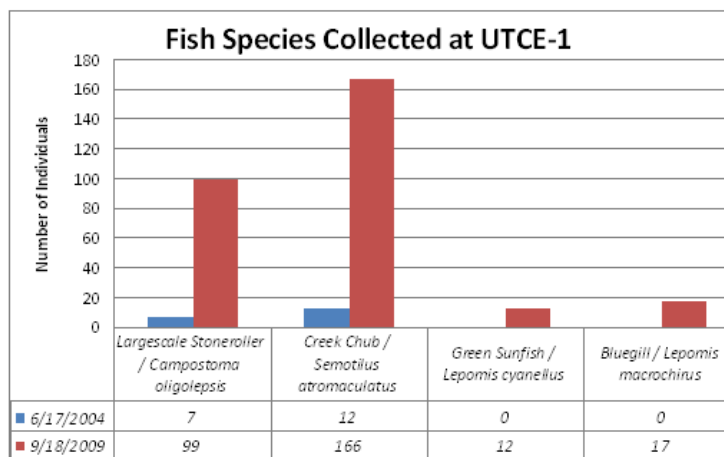
Bioassessment results are presented in Table 4. Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment Methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of the score for each metric. Ratings for each metric score were adjusted to account for the small size of this stream. Metric results indicated the macroinvertebrate community to be in *poor* condition during the 2004. Although the reach was still rated as *poor* in 2009, the number of pollution sensitive taxa and pollution-sensitive organisms increased between 2004 and 2009.

## FISH IBI

The ADEM conducted fish IBI sampling events before and after the stream restoration (Figure 3). These sampling events were completed using a time-based method where all available habitat within the reach is sampled using a backpack electrofisher for a period of 30 minutes. In 2004, prior to the stream restoration, only two species were collected in low numbers. The ADEM returned in 2009 to conduct a five year post-restoration comparison study. Using the same method as before, the total number of species collected doubled, and total number of individuals increased dramatically. The species collected included sunfish species not previously seen in the reach. The catch per hour rate increased from 38 in 2004 to 441 in 2009. After five years, the reach is showing signs of increased diversity and richness.

**Table 4.** Results of the macroinvertebrate bioassessment of the unnamed tributary to the Coosa River conducted at North Gadsden Park in June of 2004 and July of 2009.

Macroinvertebrate Assessment Results					
	6/17/2004		7/9/2009		5-Year Trend
	Results	Scores	Results	Scores	
<b>Taxa richness measures</b>	<b>(0-100)</b>		<b>(0-100)</b>		
# Ephemeroptera (mayfly) genera	2	17	5	50	Improved
# Plecoptera (stonefly) genera	0	0	0	0	Unchanged
# Trichoptera (caddisfly) genera	2	17	1	8	Declined
<b>Taxonomic composition measures</b>					
% Non-insect taxa	14	44	15	42	Unchanged
% Non-insect organisms	79	0	27	29	Improved
% Plecoptera	0	0	0	0	Unchanged
<b>Tolerance measures</b>					
Beck's community tolerance index	4	14	6	21	Improved
<b>WMB-I Assessment Score</b>	---	<b>13</b>	---	<b>21</b>	<b>Improved</b>
<b>WMB-I Overall Assessment Rating</b>		<b>Poor</b>		<b>Poor</b>	<b>Improved</b>



**Figure 3.** Comparison of fish species collected at Unnamed tributary to the Coosa River in North Gadsden Park during pre-restoration event in 2004 and post-restoration event in 2009.

## SUMMARY

In 2005, a stream restoration project was completed on the unnamed tributary to the Coosa River at North Gadsden Park. The project was implemented to address water quality and habitat issues within the 385 ft. stream reach located within the park. The ADEM conducted habitat, macroinvertebrate, and fish assessments in 2004 and 2009 to assess trends in water quality and to document water quality conditions before and after the restoration. Habitat assessment results show that the vegetation added during the project is improving bank stability and beginning to act as a buffer from runoff from surrounding areas. Results of macroinvertebrate and fish bioassessments indicate that biological conditions are also improving within the stream reach.

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