Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

# 2005 Monitoring Summary

Poor

**Watson Creek** at Chilton CR 800 and unnamed road approximately 2.5 miles upstream of Cobb Creek (32.03091/-87.50447)

## BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Watson Creek watershed 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.

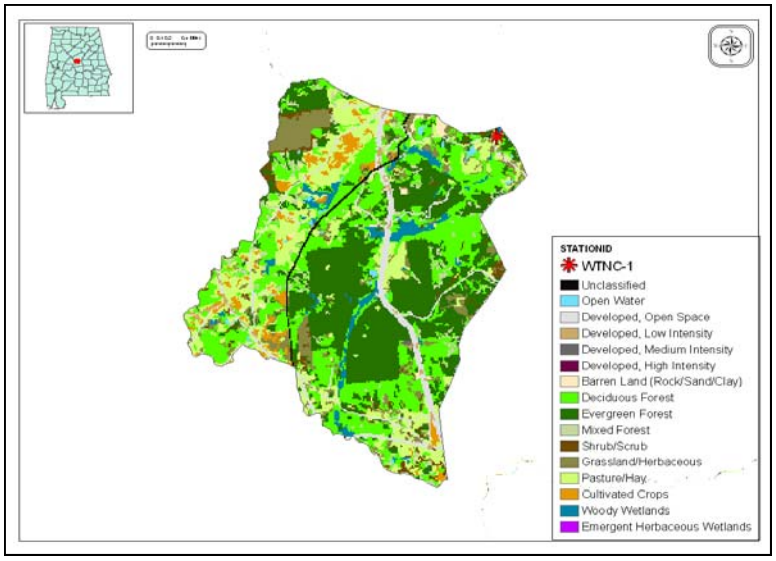


**Figure 1**. Sampling location and land use within the Watson Creek watershed at WTNC-1.

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Watson Creek is a small *Fish and Wildlife (F & W)* stream located near the city of Calera in the Coosa River Basin (Fig. 1). Landuse within the watershed is primarily forest (60%), with some pasture, and urban areas (8%). Interstate 65 runs through the watershed. Watson Creek is located in the Southern Inner Piedmont (45a) ecoregion.

## 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. Watson Creek at WTNC-1 is a medium-gradient stream characterized by sand and gravel substrates. Overall habitat quality was categorized as *marginal* due to sedimentation, bank erosion, and limited riparian buffers.

## 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 in *poor* condition (Table 4).

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

| Watershed Characteristics | | |
|---|---|---|
| Drainage Area ($mi^2$) | | 12 |
| Ecoregion[a] | | 45a |
| % Landuse | | |
| Open water | | 1 |
| Wetland | Woody | 3 |
| Forest | Deciduous | 28 |
| | Evergreen | 29 |
| | Mixed | 3 |
| Shrub/scrub | | 2 |
| Grassland/herbaceous | | 8 |
| Pasture/hay | | 15 |
| Cultivated crops | | 3 |
| Development | Open space | 6 |
| | Low intensity | 1 |
| | Moderate intensity | <1 |
| Barren | | 1 |
| Population/$km^2$[b] | | 31 |
| # NPDES Permits[c] | **TOTAL** | 1 |
| Mining | | 1 |

a.Southern Inner Piedmont
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

**Table 2**. Summary of Physical characteristics of Watson Creek at WTNC-1 on May 12, 2005.

| Physical Characteristics | | |
|---|---|---|
| Width (ft) | | 12 |
| Canopy cover | | Mostly Open |
| Depth (ft) | | |
| | Riffle | 0.2 |
| | Run | 1.0 |
| | Pool | 2.0 |
| % of Reach | | |
| | Riffle | 5 |
| | Run | 40 |
| | Pool | 55 |
| % Substrate | | |
| | Bedrock | 1 |
| | Cobble | 10 |
| | Gravel | 33 |
| | Sand | 50 |
| | Silt | 3 |
| | Organic Matter | 3 |

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**Table 3.** Results of the habitat assessment conducted at WTNC-1 on Watson Creek on May 12, 2005.

| Habitat Assessment (% Maximum Score) | | Rating |
|---|---|---|
| Instream habitat quality | 61 | Sub-optimal (59-70) |
| Sediment deposition | 43 | Marginal (41-58) |
| Sinuosity | 75 | Sub-optimal (65-84) |
| Bank and vegetative stability | 46 | Marginal (35-59) |
| Riparian buffer | 20 | Poor (<50) |
| Habitat assessment score | 125 | |
| **% Maximum score** | **52** | **Marginal (41-58)** |

**Table 4.** Results of the macroinvertebrate assessment conducted at WTNC-1 on Watson Creek on May 12, 2005.

| Macroinvertebrate Assessment Results | | | |
|---|---|---|---|
| | **Results** | **Scores** | **Rating** |
| **Taxa richness measures** | | **(0-100)** | |
| # Ephemeroptera (mayfly) genera | 8 | 67 | Fair (48-72) |
| # Plecoptera (stonefly) genera | 4 | 67 | Fair (48-72) |
| # Trichoptera (caddisfly) genera | 5 | 42 | Poor (24-48) |
| **Taxonomic composition measures** | | | |
| % Non-insect taxa | 13 | 50 | Fair (48-72) |
| % Non-insect organisms | 34 | 9 | Very Poor (<24) |
| % Plecoptera | 5 | 23 | Very Poor (<24) |
| **Tolerance measures** | | | |
| Beck's community tolerance index | 13 | 46 | Poor (24-48) |
| **WMB-I Assessment Score** | **---** | **43** | **Poor (24-48)** |

## 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. Median concentrations of specific conductance, total dissolved solids, hardness and alkalinity were higher than expected based on the 90% of verified ecoregional reference reach samples.

## CONCLUSIONS

Bioassesment results indicated the macroinvertebrate community to be in *poor* condition. Results of monthly water samples and a habitat assessment suggest sedimentation, high conductivity, hardness and alkalinity as potential causes of the degraded biological condition.

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**Table 5.** Summary of water quality data collected March-May 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 . hardness.

| Parameter | N | Min | Max | Median | Avg | SD |
|---|---|---|---|---|---|---|
| Physical | | | | | | |
| Temperature (°C) | 7 | 13.0 | 28.5 | 23.0 | 21.4 | 5.3 |
| Turbidity (NTU) | 7 | 5.2 | 23.3 | 12.6 | 12.8 | 6.6 |
| Total dissolved solids (mg/L) | 6 | 37.0 | 163.0 | 118.0 M | 111.2 | 40.9 |
| Total suspended solids (mg/L) | 6 | 5.0 | 41.0 | 12.5 | 16.7 | 13.1 |
| Specific conductance (µmhos) | 7 | 75.9 | 209.7 | 149.2 M | 152.9 | 47.7 |
| Hardness (mg/L) | 4 | 28.3 | 104.0 | 81.6 M | 73.9 | 35.4 |
| Alkalinity (mg/L) | 6 | 23.5 | 100.5 | 62.6 M | 64.7 | 27.9 |
| Stream Flow (cfs) | 7 | 0.3 | 55 | 4.3 | 14.0 | --- |
| Chemical | | | | | | |
| Dissolved oxygen (mg/L) | 7 | 6.1 | 9.5 | 8.3 | 7.9 | 1.2 |
| pH (su) | 7 | 7.0 | 8.2 | 7.4 | 7.5 | 0.4 |
| Ammonia Nitrogen (mg/L) | 6 | < 0.015 | 0.035 | 0.008 | 0.013 | 0.011 |
| Nitrate+Nitrite Nitrogen (mg/L) | 6 | < 0.003 | 0.318 | 0.105 M | 0.129 | 0.114 |
| Total Kjeldahl Nitrogen (mg/L) | 6 | < 0.150 | 1.17 | 0.221 | 0.377 | 0.407 |
| Total nitrogen (mg/L) | 6 | < 0.213 | 1.488 | 0.320 | 0.506 | 0.487 |
| Dissolved reactive phosphorus (mg/L) | 6 | < 0.004 | 0.012 | 0.010 | 0.008 | 0.005 |
| Total phosphorus (mg/L) | 6 | 0.005 | 0.077 | 0.041 | 0.040 | 0.029 |
| CBOD-5 (mg/L) | 6 | < 1.0 | 3.5 | 2.3 | 2.1 | 1.2 |
| J Chlorides (mg/L) | 6 | 4.2 | 7.2 | 5.2 M | 5.5 | 1.1 |
| Atrazine (µg/L) | 2 | < 0.05 | 0.06 | 0.04 | 0.04 | 0.0 |
| Total Metals | | | | | | |
| Aluminum (mg/L) | 4 | < 0.015 | 0.126 | 0.008 | 0.037 | 0.1 |
| Iron (mg/L) | 4 | 0.304 | 0.598 | 0.419 | 0.435 | 0.1 |
| Manganese (mg/L) | 4 | 0.034 | 0.128 | 0.081 | 0.081 | 0.0 |
| Dissolved Metals | | | | | | |
| Aluminum (mg/L) | 4 | < 0.015 | < 0.015 | 0.008 | 0.008 | 0.0 |
| Antimony (µg/L) | 4 | < 2 | < 2 | 1 | 1 | 0.0 |
| Arsenic (µg/L) | 4 | 10 | 10 | 5 | 5 | 0.0 |
| Cadmium (mg/L) | 4 | < 0.005 | < 0.005 | 0.003 | 0.003 | 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 | 0.344 | 0.168 | 0.171 | 0.2 |
| Lead (µg/L) | 4 | < 2 | < 2 | 1 | 1 | 0.0 |
| Manganese (mg/L) | 4 | < 0.005 | 0.07 | 0.043 | 0.040 | 0.0 |
| Mercury (µg/L) | 4 | < 0.3 | < 0.3 | 0.15 | 0.15 | 0.0 |
| Nickel (mg/L) | 4 | < 0.006 | < 0.006 | 0.003 | 0.003 | 0.0 |
| Selenium (µg/L) | 4 | < 10 | < 10 | 5 | 5 | 0.0 |
| Silver (mg/L) | 4 | < 0.003 | < 0.003 | 0.002 | 0.002 | 0.0 |
| Thallium (µg/L) | 4 | < 1 | < 1 | 0.5 | 0.500 | 0.0 |
| Zinc (mg/L) | 4 | < 0.006 | < 0.006 | 0.003 | 0.003 | 0.0 |
| Biological | | | | | | |
| J Chlorophyll *a* (µg/L) | 6 | 0.53 | 20.83 | 1.87 | 4.66 | 8.0 |
| J Fecal Coliform (col/100 mL) | 6 | 27 | 440 | 315 | 285 | 169 |

J =estimate; N=# samples; M=value > 90th percentile of all data collected within ecoregion 45a