

2005 Monitoring Summary



Weoka Creek at Hwy 231 near CR 463 (32.75053/-86.23225)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Weoka Creek watershed for biological and water quality monitoring as part of the [2005 Assessment of the Alabama, Coosa, and Tallapoosa \(ACT\) Basins](#). The objectives of the ACT Basin Assessment were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin group.

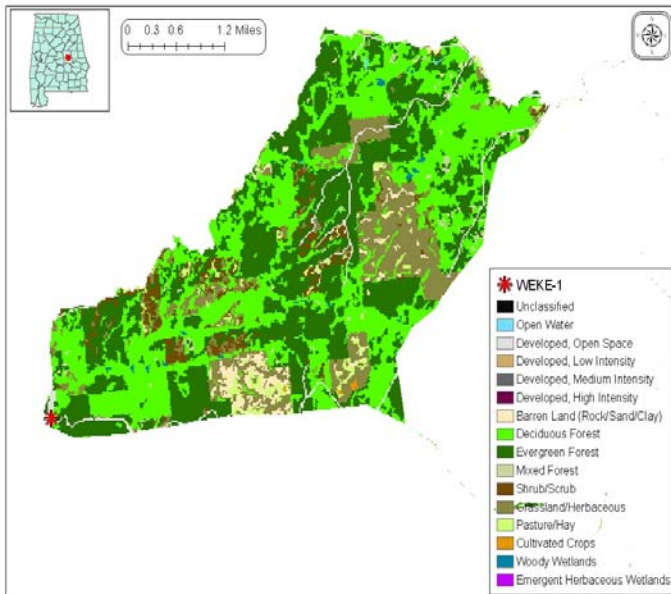


Figure 1. Overview of sampling location and watershed of Weoka Creek at WEKE-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Weoka Creek is designated as a [Fish and Wildlife \(F&W\)](#) stream located in the Tallapoosa River Basin. It is part of the *Southern Inner Piedmont* subecoregion which is a rolling, well-dissected upland. Typical of other watersheds found in this ecoregion, Weoka Creek contains mostly forest (78%) with some grassland (Fig. 1). As of June 9, 2008, ADEM's NPDES Management System database did not show any permitted discharges located within the watershed.

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. Weoka Creek at WEKE-1 is a low gradient, sand and gravel-bottomed stream. Instream habitat quality was rated as *poor* due to the high percentage of sand and lack of other available habitat.

Table 1. Summary of watershed characteristics.

| Watershed Characteristics | | |
|---|---------------|-----|
| Drainage Area (mi ²) | | 25 |
| Ecoregion ^a | | 45a |
| % Landuse | | |
| Open water | | <1 |
| Wetland | Woody | <1 |
| Forest | Deciduous | 38 |
| | Evergreen | 39 |
| | Mixed | 1 |
| Shrub/scrub | | 3 |
| Grassland/herbaceous | | 11 |
| Pasture/hay | | 3 |
| Cultivated crops | | <1 |
| Development | Open space | 3 |
| | Low intensity | <1 |
| Barren | | 1 |
| Population/km ² ^b | | 8 |

a. Southern Inner Piedmont

b. 2005 Census Data

Table 2. Physical characteristics of Weoka Creek at WEKE-1, June 15, 2005.

| Physical Characteristics | | |
|--------------------------|----------------|---------------|
| Width (ft) | | 17 |
| Canopy cover | | Mostly Shaded |
| Depth (ft) | | |
| | Run | 0.5 |
| | Pool | 1.5 |
| % of Reach | | |
| | Run | 90 |
| | Pool | 10 |
| % Substrate | | |
| | Gravel | 15 |
| | Sand | 75 |
| | Silt | 3 |
| | Organic Matter | 2 |

Table 3. Results of the habitat assessment conducted on Weoka Creek at WEKE-1, June 15, 2005.

| Habitat Assessment (% Maximum Score) | | Rating |
|--------------------------------------|-----------|-------------------------|
| Instream habitat quality | 38 | Poor (<40) |
| Sediment deposition | 54 | Sub-optimal (53-65) |
| Sinuosity | 38 | Poor (<45) |
| Bank and vegetative stability | 45 | Marginal (35-59) |
| Riparian buffer | 79 | Sub-optimal (70-90) |
| Habitat assessment score | 109 | |
| % Maximum score | 50 | Marginal (40-52) |

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 at WEKE-1 to be in *good* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted at WEKE-1, June 15, 2005.

| Macroinvertebrate Assessment | | | |
|--|----------------|-----------|---------------------|
| | Results Scores | | Rating |
| Taxa richness measures | | | |
| # EPT genera | 27 | 100 | Excellent (>78) |
| Taxonomic composition measures | | | |
| % Non-insect taxa | 6 | 94 | Good (92.7-96.3) |
| % Plecoptera | 5 | 22 | Good (5.6-52.8) |
| % Dominant taxa | 23 | 67 | Fair (47.0-70.5) |
| Functional composition measures | | | |
| % Predators | 10 | 15 | Very Poor (<15.1) |
| Tolerance measures | | | |
| Beck's community tolerance index | 14 | 64 | Good (31.8-65.9) |
| % Nutrient tolerant organisms | 46 | 40 | Poor (25.4-50.8) |
| WMB-I Assessment Score | --- | 57 | Good (56-78) |

WATER CHEMISTRY

Results of water chemistry 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 values of nutrient samples (nitrate+nitrite nitrogen, ammonia) were slightly elevated compared to the 90th percentile of data collected at least impaired ecoregional reference sites located in ecoregion 45a.

CONCLUSION

The macroinvertebrate community was rated as *good*. Results of intensive water quality sampling and bioassessment suggest a lack of instream habitat and nutrient enrichment as potential sources of the degraded biological condition.

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 |
|--|---|---------|---------|--------------------|-------|-------|
| Physical | | | | | | |
| Temperature (°C) | 8 | 11.0 | 27.0 | 21.0 | 20.4 | 5.9 |
| Turbidity (NTU) | 8 | 6.5 | 78.0 | 18.8 | 26.1 | 23.4 |
| Total dissolved solids (mg/L) | 8 | 37.4 | 51.0 | 47.8 | 46.8 | 4.3 |
| Total suspended solids (mg/L) | 8 | 11.0 | 27.0 | 21.0 ^M | 20.4 | 5.9 |
| Specific conductance (µmhos) | 8 | 37.4 | 51 | 47.8 | 46.8 | 4.3 |
| Hardness (mg/L) | 8 | 7.3 | 10.0 | 8.4 | 8.5 | 1.0 |
| Alkalinity (mg/L) | 7 | 4.7 | 20.1 | 9.5 | 10.0 | 5.3 |
| Stream Flow (cfs) | 6 | 3.9 | 54.9 | 22.8 | 25.2 | --- |
| Chemical | | | | | | |
| Dissolved oxygen (mg/L) | 8 | 7.3 | 10 | 8.4 | 8.5 | 1.0 |
| pH (su) | 8 | 6.4 | 8 | 7.2 | 7.2 | 0.5 |
| Ammonia nitrogen (mg/L) | 7 | < 0.015 | 0.028 | 0.015 | 0.016 | 0.006 |
| Nitrate+nitrite nitrogen (mg/L) | 7 | 0.003 | 0.275 | 0.183 ^M | 0.162 | 0.088 |
| Total Kjeldahl nitrogen (mg/L) | 7 | 0.150 | 0.264 | 0.075 | 0.130 | 0.075 |
| Total nitrogen (mg/L) | 7 | 0.076 | 0.310 | 0.164 | 0.170 | 0.087 |
| Dissolved reactive phosphorus (mg/L) | 7 | < 0.004 | 0.017 | 0.005 | 0.006 | 0.005 |
| Total phosphorus (mg/L) | 7 | < 0.004 | 0.056 | 0.016 | 0.023 | 0.022 |
| CBOD-5 (mg/L) | 7 | 1.0 | 3.7 | 1.4 | 1.8 | 1.1 |
| COD (mg/L) | 3 | 2.0 | 2.0 | 1.0 | 1.0 | 0.0 |
| ^J Chlorides (mg/L) | 7 | 4.1 | 2.0 | 4.2 | 4.5 | 0.5 |
| Atrazine (µg/L) | 1 | < 0.05 | < 0.05 | 0.03 | 0.03 | 0.00 |
| Total Metals | | | | | | |
| Aluminum (mg/L) | 4 | < 0.015 | 0.037 | 0.012 | 0.017 | 0.014 |
| Iron (mg/L) | 4 | 0.091 | 0.187 | 0.16 | 0.150 | 0.044 |
| Manganese (mg/L) | 4 | 0.005 | 0.021 | 0.008 | 0.010 | 0.009 |
| Dissolved Metals | | | | | | |
| Aluminum (mg/L) | 4 | < 0.015 | 0.149 | 0.008 | 0.043 | 0.071 |
| Antimony (µg/L) | 4 | < 2 | < 2 | 1 | 1 | 0 |
| Arsenic (µg/L) | 4 | < 10 | < 10 | 5 | 5 | 0 |
| Cadmium (mg/L) | 4 | < 0.005 | < 0.005 | 0.002 | 0.002 | 0.000 |
| Chromium (mg/L) | 4 | < 0.004 | < 0.004 | 0.002 | 0.002 | 0.000 |
| Copper (mg/L) | 4 | < 0.005 | < 0.005 | 0.002 | 0.002 | 0.000 |
| Iron (mg/L) | 4 | 0.005 | 0.129 | 0.078 | 0.072 | 0.063 |
| Lead (µg/L) | 4 | < 2 | < 2 | 1 | 1 | 0 |
| Manganese (mg/L) | 4 | < 0.005 | 0.021 | 0.003 | 0.007 | 0.009 |
| Mercury (µg/L) | 4 | < 0.3 | < 0.3 | 0.2 | 0.2 | 0.0 |
| Nickel (mg/L) | 4 | < 0.006 | < 0.006 | 0.003 | 0.003 | 0.000 |
| Selenium (µg/L) | 4 | < 10 | < 10 | 5 | 5 | 0 |
| Silver (mg/L) | 4 | < 0.003 | < 0.003 | 0.002 | 0.002 | 0.000 |
| Thallium (µg/L) | 4 | < 1 | < 1 | 0.5 | 0.5 | 0.0 |
| Zinc (mg/L) | 4 | < 0.006 | < 0.006 | 0.003 | 0.003 | 0.000 |
| Biological | | | | | | |
| ^J Chlorophyll a (mg/L) | 7 | 0.10 | 8.81 | 0.53 | 1.68 | 3.16 |
| ^J Fecal Coliform (col/100 mL) | 7 | 1 | 600 | 10 | 94 | 223 |

J=estimate; N= # of samples; M=value >90% of collected samples in ecoregion 45a.

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