Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

# 2007 Monitoring Summary

Fair™

## **Mayberry Creek** at George Mill Road in Bibb County (33.07125/-86.93852)

## BACKGROUND

In 2007, the Alabama Department of Environmental Management (ADEM) monitored Mayberry Creek as a "best attainable" condition reference watershed for comparison with streams throughout the Southern Sandtones Ridges (67h) subregion. Located in the Cahaba River Basin, the site was also included as part of the 2007 Assessment of the Black Warrior/Cahaba Basins (BWC). The objectives of the BWC Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC basin group.

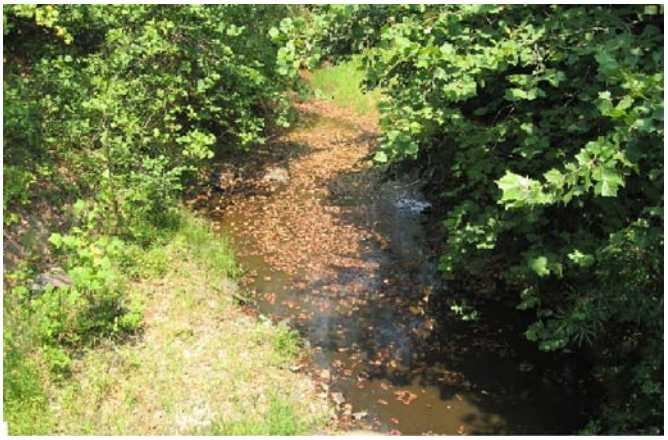

**Figure 1.** Mayberry Creek reach at MAYB-1 on August 16, 2007

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

| Watershed Characteristics | | |
|---|---|---|
| **Basin** | | Cahaba River |
| **Drainage Area (mi$^2$)** | | 12 |
| **Ecoregion**[a] | | 67h |
| **% Landuse** | | |
| Wetland | Woody | <1 |
| Forest | Deciduous | 27 |
| | Evergreen | 38 |
| | Mixed | 4 |
| Shrub/scrub | | 14 |
| Grassland/herbaceous | | 9 |
| Pasture/hay | | 3 |
| Cultivated crops | | 1 |
| Development | Open space | 4 |
| | Low intensity | <1 |
| Barren | | <1 |
| **Population/km$^2$**[b] | | 9 |
| **# NPDES Permits**[c] | **TOTAL** | 2 |
| Construction Stormwater | | 1 |
| Industrial General | | 1 |

a.Southern Sandstone Ridges
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mayberry Creek is a small *Fish & Wildlife* (*F&W*) stream located west of Montevallo. Based on the 2000 National Cover Dataset, land use within the watershed is mostly forest (69%). ADEM has issued two NPDES permits in the watershed.

## 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. Mayberry Creek at MAYB-1is a high-gradient, riffle/run stream reach, with a primarily gravel and sand bottom (Figure 1). Overall habitat quality was categorized as *suboptimal*.

## 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 the average of all individual metric scores. The final score indicated the biological community to be in *fair* condition (Table 4).

**Table 2.** Physical characteristics of Mayberry Creek at MAYB-1, May 15, 2007.

| Physical Characteristics | |
|---|---|
| **Width (ft)** | 14 |
| **Canopy Cover** | Mostly Shaded |
| **Depth (ft)** | |
| Riffle | 2.0 |
| Run | 1.5 |
| Pool | 3.0 |
| **% of Reach** | |
| Riffle | 10 |
| Run | 60 |
| Pool | 30 |
| **% Substrate** | |
| Bedrock | 7 |
| Boulder | 6 |
| Cobble | 10 |
| Mud/Muck | 1 |
| Gravel | 24 |
| Sand | 36 |
| Silt | 4 |
| Organic Matter | 8 |

**Table 3.** Results of the habitat assessment conducted on Mayberry Creek at MAYB-1, May 15, 2007.

| Habitat Assessment | %Maximum Score | Rating |
|---|---|---|
| Instream Habitat Quality | 65 | Sub-optimal (59-70) |
| Sediment Deposition | 76 | Optimal >70 |
| Sinuosity | 73 | Sub-optimal (65-84) |
| Bank and Vegetative Stability | 56 | Marginal (35-59) |
| Riparian Buffer | 79 | Sub-optimal (70-89) |
| **Habitat Assessment Score** | **164** | |
| **% Maximum Score** | **67** | **Sub-optimal (59-70)** |

**Table 4.** Results of the macroinvertebrate bioassessment of Mayberry Creek at MAYB-1 on May 15, 2007.

| Macroinvertebrate Assessment | | | |
|---|---|---|---|
| | **Results** | **Scores** | **Rating** |
| **Taxa richness measures** | | **(0-100)** | |
| # Ephemeroptera (mayfly) genera | 8 | 67 | Fair (47-70) |
| # Plecoptera (stonefly) genera | 2 | 33 | Fair (32-49) |
| # Trichoptera (caddisfly) genera | 5 | 42 | Poor (22-44) |
| **Taxonomic composition measures** | | | |
| % Non-insect taxa | 7 | 70.1 | Fair (49.5-74.1) |
| % Non-insect organisms | 8 | 79.3 | Fair (62.8-93.9) |
| % Plecoptera | 10 | 49.5 | Good (19.8-59.8) |
| **Tolerance measures** | | | |
| Beck's community tolerance index | 11 | 39.3 | Poor (20.3-40.7) |
| **WMB-I Assessment Score** | **--** | **54** | **Fair (49-72)** |

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, during March through July of 2007. On June 20, 2007 the dissolved oxygen level of the creek dropped to 3.5 mg/l when the stream flow was 0.0 cfs. No more samples were taken after the month of July due to extreme drought conditions. Median specific conductance was higher than expected for the ecoregion. No metals or organics were collected.

## SUMMARY

Bioassessment results indicated that the macroinvertebrate community in Mayberry Creek at MAYB-1 to be in *fair* condition. The habitat was rated *suboptimal.* However stream flow during bioassessment was 0.3 cfs. Further monitoring is recommended to collect data under more normal conitions.

**Table 5.** Summary of water quality data collected March—July, 2007. 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) | 6 | 15.0 | 25.4 | 20.6 | 21.0 | 3.9 |
| | Turbidity (NTU) | 8 | 0.0 | 16.2 | 4.3 | 4.8 | 5.0 |
| | Total Dissolved Solids (mg/L) | 5 | 24.0 | 137.0 | 47.0 | 57.8 | 45.3 |
| | Total Suspended Solids (mg/L) | 5 | 1.0 | 47.0 | 4.0 | 12.0 | 19.7 |
| | Specific Conductance (µmhos) | 6 | 38.4 | 66.5 | 48.5 G | 49.8 | 9.6 |
| | Alkalinity (mg/L) | 5 | 12.4 | 29.9 | 14.7 | 17.9 | 7.0 |
| | Stream Flow (cfs) | 6 | 0.0 | 3.7 | 0.5 | 1.2 | 1.5 |
| | **Chemical** | | | | | | |
| | Dissolved Oxygen (mg/L) | 6 | 3.5 C | 9.7 | 7.0 | 6.8 | 2.0 |
| | pH (su) | 6 | 6.7 | 7.1 | 6.9 | 6.9 | 0.2 |
| | Ammonia Nitrogen (mg/L) | 5 | < 0.015 | 0.087 | 0.008 | 0.026 | 0.034 |
| | Nitrate+Nitrite Nitrogen (mg/L) | 5 | < 0.003 | 0.030 | 0.013 | 0.016 | 0.012 |
| | Total Kjeldahl Nitrogen (mg/L) | 5 | < 0.150 | 0.700 | 0.216 | 0.293 | 0.264 |
| | Total Nitrogen (mg/L) | 5 | < 0.076 | 0.725 | 0.226 | 0.309 | 0.268 |
| | Dissolved Reactive Phosphorus (mg/L) | 5 | 0.008 | 0.083 | 0.015 | 0.027 | 0.031 |
| J | Total Phosphorus (mg/L) | 5 | 0.020 | 0.038 | 0.028 | 0.029 | 0.008 |
| | CBOD-5 (mg/L) | 5 | < 1.0 | 4.1 | 1.9 | 1.8 | 1.5 |
| | COD (mg/L) | 3 | < 2.0 | 2.0 | 1.0 | 1.0 | 0.0 |
| | TOC (mg/L) | 3 | 1.6 | 4.4 | 2.7 | 2.9 | 1.4 |
| J | Chlorides (mg/L) | 5 | 2.0 | 2.8 | 2.2 | 2.4 | 0.3 |
| | **Biological** | | | | | | |
| J | Chlorophyll a (ug/L) | 5 | < 0.10 | 12.46 | 1.07 | 3.14 | 5.24 |
| J | Fecal Coliform (col/100 mL) | 5 | 6 | 50 | 28 | 25 | 18 |

C = value exceeds established criteria for *F&W* water use classification; G = value higher than median concentration of all verified ecoregional reference data in the ecoregion 67h; J = estimate; N = # of samples.

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