

2015 Monitoring Summary



Camp Creek at Marion County Road 257 (34.14285/-87.87092)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Camp Creek watershed in Marion County for biological and water quality monitoring as part of the 2015 Rivers and Streams Monitoring Project. The objectives of the project were to provide data to fully assess each monitoring site and to estimate overall water quality throughout Alabama using habitat and macroinvertebrate surveys and intensive water quality data.



Figure 1. Camp Creek at CPM-84, August 26, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Camp Creek is a *Fish and Wildlife (F&W)* stream located in the Fall Line Hills ecoregion (65i) of Marion County. The watershed drains approximately 18 square miles of land near Hamilton, Alabama. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (68%) with some shrub/scrub. As of April 1, 2016, zero outfalls were active within the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate community bioassessment. 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. Camp Creek at CPM-84 is a riffle-run stream characterized by gravel, sand, and bedrock substrates (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse macroinvertebrate communities due to moderate sediment deposition.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted at CPM-84 rated the site as a 3, or *Good* (Table 4).

Table 1. Summary of watershed characteristics.

| Watershed Characteristics | | |
|---------------------------------------|---------------------|-----------|
| Basin | | Tombigbee |
| Drainage Area (mi²) | | 18 |
| Ecoregion^a | | 65i |
| % Landuse^b | | |
| Open water | | <1% |
| Wetland | Woody | <1% |
| | Emergent herbaceous | <1% |
| Forest | Deciduous | 50% |
| | Evergreen | 14% |
| | Mixed | 4% |
| Shrub/scrub | | 16% |
| Grassland/herbaceous | | 5% |
| Pasture/hay | | 6% |
| Cultivated crops | | 1% |
| Development | Open space | 4% |
| | Low intensity | 1% |
| | Moderate intensity | <1% |
| | High intensity | <1% |
| Barren | | <1% |
| Population/km^{2c} | | 6 |

a. Fall Line Hills

b. 2011 National Land Cover Dataset

c. 2010 US Census

Table 2. Physical characteristics of Camp Creek at CPM-84, June 10, 2015.

| Physical Characteristics | | |
|--------------------------|----------------|-------------|
| Width (ft) | | 15 |
| Canopy Cover | | Mostly Open |
| Depth (ft) | Riffle | 0.5 |
| | Run | 1.0 |
| | Pool | 1.5 |
| % of Reach | Riffle | 25 |
| | Run | 70 |
| | Pool | 5 |
| % Substrate | Bedrock | 15 |
| | Boulder | 1 |
| | Cobble | 11 |
| | Gravel | 40 |
| | Sand | 24 |
| | Silt | 4 |
| | Organic Matter | 5 |

Table 3. Results of the habitat assessment conducted on Camp Creek at CMPM-84, June 10, 2015.

| Habitat Assessment | % Maximum Score | Rating |
|---------------------------------|-----------------|-----------------------------|
| Instream Habitat Quality | 83 | Optimal >79 |
| Sediment Deposition | 40 | Marginal (31-54) |
| Riffle Frequency | 80 | Optimal >79 |
| Bank Vegetative Stability | 63 | Sub-optimal (58-79) |
| Riparian Buffer | 88 | Optimal >84 |
| Habitat Assessment Score | 142 | |
| % Maximum Score | 71 | Sub-optimal (>80) |

Table 4. Results of the macroinvertebrate community bioassessment conducted in Camp Creek at CMPM-84, June 10, 2015.

| Macroinvertebrate Assessment | | Results |
|---|---|-------------|
| Taxa richness and diversity measures | | |
| | Total # Taxa | 82 |
| | # EPT taxa | 22 |
| | # Highly-sensitive and Specialized Taxa | 6 |
| Taxonomic composition measures | | |
| | % EPC taxa | 34 |
| | % EPT minus Baetidae and Hydropsychidae | 11 |
| | % Chironomidae Individuals | 55 |
| | % Dominant Taxon | 16 |
| | % Individuals in Dominant 5 Taxa | 48 |
| Functional feeding group | | |
| | # Collector Taxa | 27 |
| | % Tolerant Filterer Taxa | 7 |
| Community tolerance | | |
| | # Sensitive EPT | 10 |
| | % Sensitive taxa | 27 |
| | % Nutrient Tolerant individuals | 35 |
| | WMB-I Assessment Score | 3 |
| | WMB-I Assessment Rating | Good |

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2015 to help identify any stressors to the biological communities. Median specific conductance and hardness were slightly higher than expected based on data collected from reference reaches in ecoregion 65i. Median nitrate+nitrite nitrogen concentrations were also higher than expected for streams in this sub-ecoregion. Turbidity was 50 NTU above background levels during a high flow event in April.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Camp Creek at CMPM-84 to be in *good* condition. Habitat was rated as *sub-optimal*. Median concentrations of nitrate+nitrite nitrogen, hardness, and specific conductance were slightly elevated. Monitoring should continue to ensure that the high level of biological integrity within Camp Creek is maintained.

Table 5. Summary of water quality data collected March-October, 2015. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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) | 10 | 13.8 | 26.2 | 19.1 | 19.0 | 4.0 |
| Turbidity (NTU) | 9 | 2.0 | 159.0 ^T | 6.7 | 23.1 | 51.0 |
| Total Dissolved Solids (mg/L) | 8 | 20.0 | 56.0 | 35.5 | 37.5 | 11.3 |
| Total Suspended Solids (mg/L) | 8 | < 1.0 | 49.0 | 3.5 | 9.1 | 16.3 |
| Specific Conductance (µmhos/cm) | 10 | 27.2 | 41.2 | 36.8 ^G | 35.9 | 4.2 |
| Hardness (mg/L) | 4 | 9.7 | 13.0 | 12.7 ^G | 12.0 | 1.6 |
| Alkalinity (mg/L) | 8 | 4.4 | 9.6 | 6.7 | 7.0 | 1.8 |
| Monthly Stream Flow (cfs) | 8 | 4.4 | 74.7 | 26.2 | 29.6 | 24.9 |
| Chemical | | | | | | |
| Dissolved Oxygen (mg/L) | 10 | 7.4 | 11.2 | 9.2 | 9.4 | 1.0 |
| pH (SU) | 10 | 6.3 | 7.4 | 6.9 | 6.9 | 0.3 |
| Ammonia Nitrogen (mg/L) | 8 | < 0.007 | 0.030 | 0.005 | 0.010 | 0.011 |
| Nitrate+Nitrite Nitrogen (mg/L) | 8 | 0.318 | 0.647 | 0.492 ^M | 0.483 | 0.132 |
| Total Kjeldahl Nitrogen (mg/L) | 8 | < 0.064 | 0.671 | 0.214 | 0.282 | 0.229 |
| Total Nitrogen (mg/L) | 8 | 0.489 | 1.315 | 0.684 | 0.765 | 0.264 |
| ^J Dissolved Reactive Phosphorus (mg/L) | 8 | 0.004 | 0.006 | 0.004 | 0.005 | 0.001 |
| Total Phosphorus (mg/L) | 8 | 0.013 | 0.089 | 0.016 | 0.026 | 0.026 |
| ^J CBOD-5 (mg/L) | 8 | < 2.0 | < 2.0 | 1.0 | 1.0 | 0.0 |
| Chlorides (mg/L) | 8 | 1.3 | 2.4 | 1.8 | 1.8 | 0.4 |
| Atrazine (µg/L) | 1 | | | < | 0.10 | |
| Total Metals | | | | | | |
| ^J Aluminum (mg/L) | 4 | < 0.106 | 4.630 | 0.576 | 1.459 | 2.171 |
| Iron (mg/L) | 4 | 0.238 | 2.180 | 0.516 | 0.862 | 0.915 |
| ^J Manganese (mg/L) | 4 | 0.017 | 0.059 | 0.024 | 0.031 | 0.019 |
| Dissolved Metals | | | | | | |
| Aluminum (mg/L) | 4 | < 0.106 | 0.239 | 0.053 | 0.100 | 0.093 |
| Antimony (µg/L) | 4 | < 0.342 | < 0.342 | 0.171 | 0.171 | 0.000 |
| Arsenic (µg/L) | 4 | < 0.276 | < 0.276 | 0.138 | 0.138 | 0.000 |
| Cadmium (µg/L) | 4 | < 0.311 | < 0.311 | 0.156 | 0.156 | 0.000 |
| ^J Chromium (µg/L) | 4 | < 0.347 | 0.669 | 0.282 | 0.352 | 0.235 |
| ^J Copper (µg/L) | 4 | 0.313 | 0.572 | 0.430 | 0.436 | 0.106 |
| ^J Iron (mg/L) | 4 | 0.097 | 0.178 | 0.155 | 0.146 | 0.039 |
| Lead (µg/L) | 4 | < 0.428 | < 0.428 | 0.214 | 0.214 | 0.000 |
| ^J Manganese (mg/L) | 4 | < 0.004 | 0.054 | 0.009 | 0.018 | 0.024 |
| ^J Nickel (µg/L) | 4 | < 0.460 | 0.870 | 0.478 | 0.514 | 0.333 |
| Selenium (µg/L) | 4 | < 0.395 | < 0.395 | 0.198 | 0.198 | 0.000 |
| Silver (µg/L) | 4 | < 0.365 | < 0.365 | 0.182 | 0.182 | 0.000 |
| Thallium (µg/L) | 4 | < 0.514 | < 0.514 | 0.257 | 0.257 | 0.000 |
| ^J Zinc (µg/L) | 4 | 0.565 | 7.169 | 3.120 | 3.494 | 2.832 |
| Biological | | | | | | |
| ^J Chlorophyll a (mg/m ³) | 8 | < 0.10 | 1.00 | 0.50 | 0.47 | 0.31 |
| ^J E. coli (MPN/DL) | 8 | 46.4 | 920.8 | 124.4 | 221.5 | 287.8 |

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65i; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65i; N=# samples; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion (65i).

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