

2011 Monitoring Summary



Basin Assessment Site

Franklin Creek at Hall Road (30.47008/-88.38588)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Franklin Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and Tombigbee River Basins. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin. A habitat and macroinvertebrate assessment was conducted on Franklin Creek at FRAM-2 on May 4, 2011.



Figure 1. Franklin Creek at FRAM-2, July 19, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Franklin Creek at FRAM-2 is a *Fish & Wildlife (F&W)* stream located in Mobile County. Based on the 2000 National Land Cover Dataset, landuse within the watershed is a mix of pasture/hay, forest (29%), and developed areas (14%). As of September 1, 2012, ADEM has issued 44 NPDES permits for this 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. Franklin Creek at FRAM-2 is a low-gradient stream typical of the Gulf Coast Flatwoods ecoregion (Figure 1). The benthic substrate consisted primarily of sand and mud/muck. Due to optimal instream habitat quality, sediment deposition, and bank and vegetative stability scores, the overall habitat quality of this stream was categorized as *optimal*.

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. Metric results indicated the biological community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

| Watershed Characteristics | | Escatawpa River |
|---------------------------------------|-------------------------------|-----------------|
| Basin | | |
| Drainage Area (mi²) | | 27 |
| Ecoregion^a | | 75a |
| % Landuse | | |
| Open water | | <1 |
| Wetland | Woody | 17 |
| | Emergent herbaceous | 1 |
| Forest | Deciduous | <1 |
| | Evergreen | 10 |
| | Mixed | <1 |
| Shrub/scrub | | 13 |
| Grassland/herbaceous | | 3 |
| Pasture/hay | | 37 |
| Cultivated crops | | 7 |
| Development | Open space | 10 |
| | Low intensity | 2 |
| | Moderate intensity | 1 |
| | High intensity | <1 |
| Barren | | <1 |
| Population/km^{2b} | | 109 |
| # NPDES Permits^c | TOTAL | 44 |
| | Construction Stormwater | 24 |
| | Mining | 7 |
| | Industrial General | 3 |
| | Industrial Individual | 1 |
| | Municipal Individual | 7 |
| | Underground Injection Control | 2 |

a. Gulf Coast Flatwoods

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Franklin Creek at FRAM-2, May 4, 2011.

| Physical Characteristics | |
|--------------------------|-------------------|
| Canopy Cover | Open |
| Width (ft) | 20.0 |
| Depth (ft) | |
| | Run 2.0 |
| | Pool 3.0 |
| % of Reach | |
| | Run 70 |
| | Pool 30 |
| % Substrate | |
| | Mud/Muck 25 |
| | Sand 55 |
| | Silt 10 |
| | Organic Matter 10 |

Table 3. Results of the habitat assessment conducted on Franklin Creek at FRAM-2, May 4, 2011.

| Habitat Assessment | %Maximum Score | Rating |
|---------------------------------|----------------|-----------------------|
| GP | | |
| Instream Habitat Quality | 78 | Optimal >70 |
| Sediment Deposition | 78 | Optimal >70 |
| Sinuosity | 35 | Poor <45 |
| Bank and Vegetative Stability | 83 | Optimal >74 |
| Riparian Buffer | 71 | Sub-optimal (70-89) |
| Habitat Assessment Score | 165 | |
| % Maximum Score | 75 | Optimal >70 |

Table 4. Results of the macroinvertebrate bioassessment conducted in Franklin Creek at FRAM-2, May 4, 2011.

| Macroinvertebrate Assessment | | | |
|--|-----------|-----------|---------------------|
| | Results | Scores | Rating |
| Taxa richness measures | | | |
| # EPT genera | 22 | 88 | Excellent (>=79) |
| Taxonomic composition measures | | | |
| % Non-insect taxa | 14 | 56.3 | Poor (30.9-61.8) |
| % Plecoptera | 1 | 5.6 | Fair (3.8-5.6) |
| % Dominant taxa | 14 | 90.7 | Excellent (>=85.3) |
| Functional composition measures | | | |
| % Predators | 11 | 38.3 | Fair (30.2-45.2) |
| Tolerance measures | | | |
| Beck's community tolerance index | 12 | 54.5 | Good (31.9-65.9) |
| % Nutrient tolerant organisms | 19 | 84.6 | Good (76.3-88.1) |
| WMB-I Assessment Score | -- | 60 | Good (57-78) |

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected four times per year, or biannually (pesticides, and semi-volatile organics) during March through October to help identify any stressors to the biological communities.

Organics samples were collected at FRAM-2 on March 14 and September 28, with no results above the minimum detection limit. Stream pH was typical of coastal plain streams. Dissolved mercury was above aquatic life use and human health criteria applicable to the stream's *F&W* use classification on July 19.

SUMMARY

Franklin Creek at FRAM-2 was typical of other streams in the Gulf Coast Flatwoods, which are generally low gradient streams with sand and silt substrates (Griffith et al. 2001).

Bioassessment results indicated the macroinvertebrate community to be in *good* condition, while the habitat assessment score was optimal. However, the concentration of dissolved mercury was elevated on one occasion. Monitoring should continue to ensure that conditions remain stable.

FOR MORE INFORMATION, CONTACT:

Joie Horn

Mobile Field Ops, Environmental Assessment Unit
2204 Perimeter Rd Mobile, AL 36615
(251) 450-3400 mjhorn@adem.state.al.us

Table 5. Summary of water quality data collected March-September, 2011 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 | E |
|--|---|------------------|---------------------|-------|-------|-------|---|
| Physical | | | | | | | |
| Temperature (°C) | 5 | 16.6 | 23.3 | 18.7 | 19.8 | 3.0 | |
| Turbidity (NTU) | 5 | 2.3 | 5.7 | 5.4 | 4.4 | 1.6 | |
| Total Dissolved Solids (mg/L) | 4 | 34.0 | 75.0 | 47.0 | 50.8 | 17.3 | |
| Total Suspended Solids (mg/L) | 4 | < 5.0 | 5.0 | 2.5 | 2.5 | 0.0 | |
| Specific Conductance (µmhos) | 5 | 48.0 | 62.0 | 52.1 | 54.0 | 5.3 | |
| Hardness (mg/L) | 4 | 8.0 | 14.8 | 11.6 | 11.5 | 2.8 | |
| ↓ Alkalinity (mg/L) | 4 | 4.0 | 6.0 | 4.5 | 4.8 | 1.0 | |
| Stream Flow (cfs) | 5 | 18.2 | 29.3 | 20.0 | 21.7 | 4.6 | |
| Chemical | | | | | | | |
| Dissolved Oxygen (mg/L) | 5 | 5.9 | 7.7 | 6.6 | 6.8 | 0.8 | |
| pH (su) | 5 | 5.3 ^C | 6.1 | 5.7 | 5.7 | 0.3 | 4 |
| ↓ Ammonia Nitrogen (mg/L) | 4 | < 0.014 | < 0.014 | 0.007 | 0.007 | 0.000 | |
| Nitrate-Nitrite Nitrogen (mg/L) | 4 | 0.531 | 0.846 | 0.690 | 0.690 | 0.129 | |
| ↓ Total Kjeldahl Nitrogen (mg/L) | 4 | 0.360 | 0.930 | 0.500 | 0.572 | 0.260 | |
| ↓ Total Nitrogen (mg/L) | 4 | 0.891 | 1.776 | 1.190 | 1.262 | 0.378 | |
| ↓ Dissolved Reactive Phosphorus (mg/L) | 4 | < 0.006 | 0.011 | 0.008 | 0.008 | 0.003 | |
| Total Phosphorus (mg/L) | 4 | 0.011 | 0.014 | 0.012 | 0.012 | 0.002 | |
| ↓ CBOD-5 (mg/L) | 4 | < 1.0 | < 1.0 | 0.5 | 0.5 | 0.0 | |
| ↓ Chlorides (mg/L) | 4 | 6.7 | 8.4 | 7.8 | 7.7 | 0.8 | |
| ↓ Atrazine (µg/L) | 3 | < 0.02 | < 0.02 | 0.01 | 0.01 | 0.00 | |
| Total Metals | | | | | | | |
| ↓ Aluminum (mg/L) | 4 | 0.129 | 0.331 | 0.252 | 0.241 | 0.087 | |
| Iron (mg/L) | 4 | 0.324 | 0.430 | 0.338 | 0.358 | 0.049 | |
| ↓ Manganese (mg/L) | 4 | 0.020 | 0.045 | 0.026 | 0.029 | 0.011 | |
| Dissolved Metals | | | | | | | |
| ↓ Aluminum (mg/L) | 4 | 0.080 | 0.185 | 0.144 | 0.138 | 0.044 | |
| ↓ Antimony (µg/L) | 4 | < 2.3 | < 2.3 | 1.2 | 1.2 | 0.0 | |
| Arsenic (µg/L) | 4 | < 1.9 | < 2.8 | 1.2 | 1.2 | 0.3 | |
| Cadmium (µg/L) | 4 | < 0.022 | < 0.130 | 0.065 | 0.052 | 0.027 | |
| ↓ Chromium (mg/L) | 4 | < 0.006 | < 0.006 | 0.003 | 0.003 | 0.000 | |
| Copper (mg/L) | 4 | < 0.005 | < 0.005 | 0.002 | 0.002 | 0.000 | |
| ↓ Iron (mg/L) | 4 | 0.146 | 0.211 | 0.185 | 0.182 | 0.031 | |
| ↓ Lead (µg/L) | 4 | < 0.8 | < 0.8 | 0.4 | 0.4 | 0.0 | |
| ↓ Manganese (mg/L) | 4 | 0.014 | 0.032 | 0.018 | 0.020 | 0.008 | |
| ↓ Mercury (µg/L) | 3 | < 0.105 | 0.122 ^{AH} | 0.052 | 0.078 | 0.040 | 1 |
| ↓ Nickel (mg/L) | 4 | < 0.007 | < 0.007 | 0.004 | 0.004 | 0.000 | |
| ↓ Selenium (µg/L) | 4 | < 0.8 | < 0.8 | 0.4 | 0.4 | 0.0 | |
| Silver (µg/L) | 4 | < 0.015 | < 0.200 | 0.100 | 0.077 | 0.046 | |
| Thallium (µg/L) | 4 | < 0.9 | < 1.2 | 0.6 | 0.5 | 0.1 | |
| ↓ Zinc (mg/L) | 4 | < 0.032 | < 0.032 | 0.016 | 0.018 | 0.000 | |
| Biological | | | | | | | |
| Chlorophyll a (µg/L) | 4 | < 1.00 | < 1.00 | 0.50 | 0.50 | 0.00 | |
| ↓ E. coli (col/100mL) | 4 | 7 | 120 | 57 | 60 | 49 | |

A=*F&W* aquatic life use criterion exceeded; C=*F&W* criterion violated; E=# samples that exceeded criteria; H= *F&W* human health criterion exceeded; J=estimate; N=# samples.