

2014 Monitoring Summary



Panther Creek at Henry County Road 40 (31.54617/-85.39748)

BACKGROUND

Previous screening-level surveys of Panther Creek at PRCH-1 indicated potential stress to biological communities. In 2008, intensive monitoring to fully assess biological conditions within the reach could not be conducted due to a lack of stream flow.

In 2014, the Alabama Department of Environmental Management (ADEM) selected Panther Creek for biological and water quality monitoring as part of the Southeast Alabama (SEAL) Basin Assessment. The objectives of the SEAL Basin Assessments were to monitor biological integrity of each site and to estimate overall water quality within the SEAL basins.



Figure 1. Panther Creek at PRCH-1, May 15, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Panther Creek is a tributary to East Fork of Choctawhatchee River, which is a designated *Fish & Wildlife (F&W)* stream in the Southern Hilly Gulf Coastal Plain ecoregion (65d). Based on the 2011 National Land Cover Dataset, land use within the watershed is composed of forest (59%), shrub/scrub, with some cultivated crops and pasture/hay. Population density is low, and less than five percent of the watershed area is developed. As of April 1, 2016, no outfalls are active in 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. Panther Creek at PRCH-1 is a low gradient stream characterized by sand substrates (Figure 1). Overall habitat quality was rated as *sub-optimal*.

Table 1. Summary of watershed characteristics.

| Watershed Characteristics | | |
|----------------------------------|----------------------|-----|
| Basin | Choctawhatchee River | |
| Drainage Area (mi ²) | 12 | |
| Ecoregion ^a | 65D | |
| % Landuse ^b | | |
| Open water | | <1% |
| Wetland | Woody | 3% |
| | Emergent herbaceous | <1% |
| Forest | Deciduous | 24% |
| | Evergreen | 30% |
| | Mixed | 5% |
| Shrub/scrub | | 17% |
| Grassland/herbaceous | | 3% |
| Pasture/hay | | 6% |
| Cultivated crops | | 8% |
| Development | Open space | 2% |
| | Low intensity | <1% |
| | Moderate intensity | <1% |
| Population/km ^{2c} | 2 | |

a. Southern Hilly Gulf Coastal Plain
 b. 2011 National Land Cover Dataset
 c. 2010 US Census

Table 2. Physical characteristics of Panther Creek at PRCH-1, June 16, 2014.

| Physical Characteristics | |
|--------------------------|-------------------|
| Width (ft) | 25 |
| Canopy Cover | Mostly Shaded |
| Depth (ft) | |
| | Run 1.5 |
| | Pool 2.5 |
| % of Reach | |
| | Run 80 |
| | Pool 20 |
| % Substrate | |
| | Sand 88 |
| | Silt 2 |
| | Organic Matter 10 |

Table 3. Results of the habitat assessment conducted on Panther Creek at PRCH-1, June 16, 2014.

| Habitat Assessment | %Maximum Score | Rating |
|---------------------------------|----------------|----------------------------|
| Instream Habitat Quality | 45 | Marginal (31-<55) |
| Sediment Deposition | 38 | Marginal (31-<55) |
| Sinuosity | 53 | Marginal (31-<55) |
| Bank and Vegetative Stability | 65 | Sub-optimal (58-79) |
| Riparian Buffer | 90 | Optimal >84 |
| Habitat Assessment Score | 107 | |
| % Maximum Score | 63 | Sub-Optimal (57-80) |

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in coastal plain 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 in Panther Creek at PRCH-1 rated the site as *fair-poor*. Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Panther Creek at PRCH-1, June 16, 2014.

| Macroinvertebrate Assessment | | Results |
|---|---|------------------|
| Taxa richness and diversity measures | | |
| Total # Taxa | | 34 |
| | # EPT taxa | 5 |
| | # Highly-sensitive and Specialized Taxa | 0 |
| Taxonomic composition measures | | |
| | % EPC taxa | 21 |
| | % EPT minus Baetidae and Hydropsychidae | 1 |
| | % Chironomidae Individuals | 76 |
| | % Dominant Taxon | 22 |
| | % Individuals in Dominant 5 Taxa | 57 |
| Functional feeding group | | |
| | # Collector Taxa | 12 |
| | % Tolerant Filterer Taxa | 12 |
| Community tolerance | | |
| | # Sensitive EPT | 1 |
| | % Sensitive taxa | 12 |
| | % Nutrient Tolerant individuals | 29 |
| | WMB-I Assessment Score | 4- |
| | WMB-I Assessment Rating | Fair-Poor |

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, and semi-monthly (metals) from March through October of 2014, to help identify any stressors to the biological communities. *In situ* parameters suggested Panther Creek at PRCH-1 was meeting its *F&W* water use classification. *E.coli* exceeded human health criterion in June and may be due to a rain event before sampling. Median concentrations of ammonia nitrogen and dissolved manganese were higher than expected based on the 90th percentile of reference reaches within ecoregion 65d.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Bioassessment results indicated the macroinvertebrate community in Panther Creek at PRCH-1 to be in *fair-poor* condition. Habitat quality was rated as *sub-optimal*. Ammonia nitrogen, and dissolved manganese were higher than background conditions, based on least-impaired Ecoregional reference reaches. *E.coli* exceeded human health in June. Monitoring should continue to ensure that water quality and the biological community remain stable.

Table 5. Summary of water quality data collected March-October, 2014. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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 | Q |
|--|---|----------|-------------------|--------------------|--------|--------|---|---|
| Physical | | | | | | | | |
| Temperature (°C) | 9 | 9.5 | 22.6 | 21.0 | 18.4 | 4.9 | | |
| Turbidity (NTU) | 9 | 14.4 | 82.7 | 20.5 | 27.1 | 21.3 | | |
| Total Dissolved Solids (mg/L) | 8 | 17.0 | 49.0 | 34.0 | 31.9 | 11.1 | | |
| Total Suspended Solids (mg/L) | 8 | < 1.0 | 43.0 | 10.5 | 13.6 | 13.3 | | |
| Specific Conductance (µmhos) | 9 | 28.7 | 40.6 | 35.0 | 34.2 | 4.2 | | |
| Hardness (mg/L) | 4 | 7.5 | 11.9 | 9.7 | 9.7 | 1.9 | | |
| Alkalinity (mg/L) | 8 | 5.9 | 9.9 | 7.6 | 7.8 | 1.5 | | |
| Monthly Stream Flow (cfs) | 8 | 3.4 | 19.6 | 9.5 | 10.1 | 5.4 | | |
| Stream Flow during Sample Collection (cfs) | 8 | 3.4 | 19.6 | 9.5 | 10.1 | 5.4 | | |
| Chemical | | | | | | | | |
| Dissolved Oxygen (mg/L) | 9 | 7.8 | 10.7 | 8.3 | 8.7 | 1.0 | | |
| pH (su) | 9 | 6.3 | 7.4 | 6.4 | 6.6 | 0.4 | | |
| Ammonia Nitrogen (mg/L) | 8 | < 0.006 | 0.109 | 0.065 ^M | 0.060 | 0.040 | | |
| Nitrate+Nitrite Nitrogen (mg/L) | 8 | 0.112 | 0.277 | 0.181 | 0.181 | 0.054 | | |
| Total Kjeldahl Nitrogen (mg/L) | 8 | 0.265 | 0.918 | 0.400 | 0.462 | 0.202 | | |
| Total Nitrogen (mg/L) | 8 | 0.477 | 1.130 | 0.589 | 0.644 | 0.221 | | |
| Dissolved Reactive Phosphorus (mg/L) | 8 | < 0.003 | 0.008 | 0.004 | 0.004 | 0.002 | | |
| Total Phosphorus (mg/L) | 8 | 0.012 | 0.049 | 0.016 | 0.021 | 0.012 | | |
| CBOD-5 (mg/L) | 8 | < 2.0 | < 2.0 | 1.0 | 1.0 | 0.0 | | |
| Chlorides (mg/L) | 8 | 3.3 | 5.5 | 3.9 | 4.2 | 0.8 | | |
| Total Metals | | | | | | | | |
| Aluminum (mg/L) | 4 | 0.054 | 0.715 | 0.227 | 0.306 | 0.285 | | |
| Iron (mg/L) | 4 | 2.330 | 4.670 | 2.970 | 3.235 | 1.052 | | |
| Manganese (mg/L) | 4 | 0.139 | 0.209 | 0.164 | 0.169 | 0.030 | | |
| Dissolved Metals | | | | | | | | |
| Aluminum (mg/L) | 4 | < 0.050 | 0.124 | 0.042 | 0.058 | 0.047 | | |
| Antimony (µg/L) | 4 | < 0.2 | < 0.4 | 0.1 | 0.1 | 0.1 | | |
| Arsenic (µg/L) | 4 | 0.7 | 1.1 | 0.8 | 0.9 | 0.2 | | 4 |
| Cadmium (µg/L) | 4 | < 0.246 | < 0.390 | 0.123 | 0.141 | 0.036 | | |
| Chromium (µg/L) | 4 | 0.400 | 0.927 | 0.650 | 0.657 | 0.270 | | |
| Copper (mg/L) | 4 | < 0.0003 | 0.0006 | 0.0003 | 0.0004 | 0.0001 | | |
| Iron (mg/L) | 4 | 0.760 | 1.730 | 0.918 | 1.082 | 0.439 | | |
| Lead (µg/L) | 4 | < 0.2 | < 0.5 | 0.1 | 0.2 | 0.1 | | |
| Manganese (mg/L) | 4 | 0.125 | 0.194 | 0.145 ^M | 0.152 | 0.032 | | |
| Nickel (mg/L) | 4 | < 0.0003 | 0.001 | 0.0005 | 0.0005 | 0.0002 | | |
| Selenium (µg/L) | 4 | < 0.4 | < 0.5 | 0.2 | 0.2 | 0.0 | | |
| Silver (µg/L) | 4 | < 0.252 | < 0.460 | 0.126 | 0.152 | 0.052 | | |
| Thallium (µg/L) | 4 | < 0.2 | < 0.6 | 0.1 | 0.2 | 0.1 | | |
| Zinc (mg/L) | 4 | 0.003 | 0.004 | 0.004 | 0.004 | 0.001 | | |
| Biological | | | | | | | | |
| Chlorophyll a (µg/L) | 8 | 1.07 | 66.75 | 1.20 | 9.98 | 22.98 | | |
| <i>E. coli</i> (col/100mL) | 8 | 167 | 2827 ^H | 318 | 666 | 900 | 1 | |

E=sample that exceeded criteria; H=*F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N= # samples; Q= # of uncertain exceedances.

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