

2013 Monitoring Summary



Brushy Creek at Lawrence County Road 73 (34.33070/-87.28620)

BACKGROUND

A segment of Brushy Creek within the Bankhead National Forest is one of the stream reaches that the Alabama Department of Environmental Management (ADEM) monitors as a "best attainable condition" reference watershed for comparison with streams throughout the Dissected Plateau ecoregion (68e). Landuse, road density, and population density categorize Brushy Creek among the least-disturbed watersheds in ecoregion 68e.



Figure 1. Brushy Creek at BRSL-3, May 11, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Brushy Creek at BRSL-3 is a *Fish and Wildlife (F&W)* stream located in Lawrence County within the Bankhead National Forest. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested (97%). No NPDES permits have been issued in the Brushy Creek watershed as of May 13, 2013.

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. Brushy Creek at BRSL-3 is characterized primarily by boulder, cobble, and gravel substrates with some sand present (Figure 1). Overall habitat quality was categorized as *optimal* for this stream type.

Table 1. Summary of watershed characteristics.

| Watershed Characteristics | | | | | |
|-----------------------------|------------|---------------------|--|--|--|
| Basin | | Black Warrior River | | | |
| Drainage Area (mi²) | | 9 | | | |
| Ecoregion ^a | | 68e | | | |
| % Landuse | | | | | |
| Forest | Deciduous | 56 | | | |
| | Evergreen | 22 | | | |
| | Mixed | 19 | | | |
| Shrub/scrub | | 1 | | | |
| Grassland/herbaceous | | <1 | | | |
| Pasture/hay | | 1 | | | |
| Development | Open space | 1 | | | |
| Population/km ^{2b} | | 1 | | | |

- a. Dissected Plateau
- b. 2000 US Census

Table 2. Physical characteristics of Brushy Creek at BRSL-3, June 12, 2013.

| Physical Character | ristics |
|--------------------|---------|
| Width (ft) | 30 |
| Canopy Cover | Shaded |
| Depth (ft) | |
| Riffle | 0.3 |
| Run | 1.2 |
| Pool | 2.5 |
| % of Reach | |
| Riffle | 25 |
| Run | 50 |
| Pool | 25 |
| % Substrate | |
| Boulder | 40 |
| Cobble | 20 |
| Gravel | 20 |
| Sand | 10 |
| Silt | 5 |
| Organic Matter | 5 |

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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Brushy Creek at BRSL-3, June 12, 2013.

| Habitat Assessment | %Maximum | Score Rating |
|---------------------------------|----------|----------------------|
| Instream Habitat Quality | 84 | Optimal (>70) |
| Sediment Deposition | 84 | Optimal (>70) |
| Sinuosity | 90 | Optimal (>84) |
| Bank and Vegetative Stability | 46 | Marginal (35-59) |
| Riparian Buffer | 90 | Optimal (>89) |
| Habitat Assessment Score | 189 | |
| % Maximum Score | 79 | Optimal (>70) |

Table 4. Results of macroinvertebrate bioassessment conducted in Brushy Creek at BRSL-3, June 12, 2013.

| Macroinvertebrate Assessment | | | | | | |
|-----------------------------------|---------|-------------------|--|--|--|--|
| Taxa richness measures | Results | Scores (0-100) | | | | |
| # EPT taxa | 22 | 78 | | | | |
| Taxonomic composition measures | | | | | | |
| % Non-insect taxa | 6 | 82 | | | | |
| % Dominant taxon | 19 | 80 | | | | |
| % EPC taxa | 33 | 62 | | | | |
| Functional feeding group measures | | | | | | |
| % Predators | 12 | 48 | | | | |
| Tolerance measures | | | | | | |
| % Taxa as Tolerant | 22 | 79 | | | | |
| WMB-I Assessment Score | | 72 | | | | |
| WMB-I Assessment Rating | | Good (59-79) | | | | |

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected semi-monthly January though October of 2013 to help identify any stressors to the biological communities. E. coli collected at BRSL-3 exceeded the geometric mean human health criterion for its *Fish & Wildlife* use classification during the summer months; additionally, an E. coli sample collected on June 6, 2013 exceeded the summer single sample maximum criteria (1046 col/100mL). Median Chlorides were slightly higher than values expected based on data collected at reference reaches within the Dissected Plateau ecoregion (68e).

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Table 5. Summary of water quality data collected January-October 2013. 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.

| Physical S. S | the MDL by 0.5 when results were less than this value. | | | | | | | | |
|---|--|---|---|--------|---|-------------------|-------------------|-------|-------|
| Temperature (°C) | Parameter | N | | Min | | Max | Med | Avg | SD E |
| Turbidity (NTU) 9 2.8 12.7 4.5 5.6 3.3 1 J Total Dissolved Solids (mg/L) 8 < 1.0 48.0 18.0 21.6 16.5 Total Suspended Solids (mg/L) 8 < 1.0 2.0 0.5 0.9 0.7 Specific Conductance (μmhos) 9 16.8 38.4 19.7 23.6 7.2 Hardness (mg/L) 4 5.9 6.7 6.2 6.3 0.4 J Alkalinity (mg/L) 8 2.3 10.2 4.3 5.2 2.7 Stream Flow (cfs) 9 0.4 34.1 11.8 11.8 10.3 Chemical Dissolved Oxygen (mg/L) 9 7.9 12.1 10.9 10.0 1.6 pH (su) 9 6.5 7.6 7.1 7.0 0.3 Ammonia Nitrogen (mg/L) 8 < 0.008 < 0.018 0.004 0.006 0.002 J Nitrate+Nitrite Nitrogen (mg/L) 8 < 0.002 0.035 0.010 0.015 0.012 J Total Kjeldahi Nitrogen (mg/L) 8 < 0.002 0.035 0.010 0.015 0.012 J Total Kjeldahi Nitrogen (mg/L) 8 < 0.004 0.006 0.000 0.005 0.005 0.006 0.004 0.006 0.005 J Dissolved Reactive Phosphorus (mg/L) 8 0.004 0.017 0.006 0.008 0.005 0.006 0.004 0.006 0.005 0.005 0.006 0.004 0.006 0.00 | Physical | | | | | | | | |
| J Total Dissolved Solids (mg/L) Total Suspended Solids (mg/L) Total Suspended Solids (mg/L) Specific Conductance (μmhos) Hardness (mg/L) J Alkalinity (mg/L) J Alkalinity (mg/L) J Alkalinity (mg/L) J Alkalinity (mg/L) Steam Flow (cfs) 9 0.4 34.1 11.8 11.8 10.3 Chemical Dissolved Oxygen (mg/L) PH (su) PO 0.03 Ammonia Nitrogen (mg/L) J Nitrate+Nitrite Nitrogen (mg/L) J Solite Hollingen (mg/L) Solite Hollingen (mg/L) Solite Hollingen (mg/L) J Total Kjeldahl Nitrogen (mg/L) B 0.004 D 0.005 CBDD-5 (mg/L) TOC (mg/L) CDD (mg/L) A 1.1 A 1.3 B 0.004 CDD (mg/L) A 2.0 CDD (mg/L) A 3.6 CDD (mg/L) A 4 0.003 CDD (mg/L) CDD (mg/L) A 5 0.004 CDD (mg/L) A 6 0.005 CDD (mg/L) A 7 0.005 CDD (mg/L) CDD (mg/L) A 1.1 CDC (mg/L) CDD (mg/ | Temperature (°C) | 9 | | 5.4 | | 22.2 | 10.3 | 13.3 | 6.5 |
| Total Suspended Solids (mg/L) | | 9 | | 2.8 | | 12.7 | 4.5 | | 3.3 |
| Specific Conductance (μmhos) 9 16.8 38.4 19.7 23.6 7.2 Hardness (mg/L) 4 5.9 6.7 6.2 6.3 0.4 J Alkalinity (mg/L) 8 2.3 10.2 4.3 5.2 2.7 Stream Flow (cfs) 9 0.4 34.1 11.8 11.8 10.3 Chemical | | 8 | < | 1.0 | | 48.0 | 18.0 | 21.6 | 16.5 |
| Hardness (mg/L) | Total Suspended Solids (mg/L) | 8 | < | 1.0 | | 2.0 | 0.5 | 0.9 | 0.7 |
| J Alkalinity (mg/L) | Specific Conductance (µmhos) | 9 | | 16.8 | | 38.4 | 19.7 | 23.6 | 7.2 |
| Stream Flow (cfs) 9 0.4 34.1 11.8 11.8 10.3 | Hardness (mg/L) | 4 | | 5.9 | | 6.7 | 6.2 | 6.3 | 0.4 |
| Chemical Dissolved Oxygen (mg/L) 9 7.9 12.1 10.9 10.0 1.6 pH (su) 9 6.5 7.6 7.1 7.0 0.3 Ammonia Nitrogen (mg/L) 8 < 0.008 | J Alkalinity (mg/L) | 8 | | 2.3 | | 10.2 | 4.3 | 5.2 | 2.7 |
| Dissolved Oxygen (mg/L) | Stream Flow (cfs) | 9 | | 0.4 | | 34.1 | 11.8 | 11.8 | 10.3 |
| pH (su) 9 6.5 7.6 7.1 7.0 0.3 Ammonia Nitrogen (mg/L) 8 0.008 0.018 0.004 0.006 0.002 J Nitrate+Nitrite Nitrogen (mg/L) 8 0.002 0.035 0.010 0.015 0.012 J Total Kjeldahl Nitrogen (mg/L) 8 0.041 0.309 0.096 0.129 0.117 J Total Nitrogen (mg/L) 4 0.003 0.006 0.004 0.004 0.001 J Dissolved Reactive Phosphorus (mg/L) 4 0.003 0.006 0.004 0.004 0.001 J Total Phosphorus (mg/L) 4 0.003 0.006 0.004 0.001 0.00 CBOD-5 (mg/L) 4 2.0 2.0 1.0 1.0 0.0 COD (mg/L) 4 13.6 21.4 16.4 17.0 3.6 TOC (mg/L) 4 1.1 3.2 1.9 2.0 0.9 Chlorides (mg/L) 4 0.085 | Chemical | | | | | | | | |
| Ammonia Nitrogen (mg/L) 8 < 0.008 < 0.018 0.004 0.004 0.006 0.002 | Dissolved Oxygen (mg/L) | | | | | 12.1 | 10.9 | | 1.6 |
| J Nitrate+Nitrite Nitrogen (mg/L) | pH (su) | 9 | | 6.5 | | | 7.1 | 7.0 | 0.3 |
| J Total Kjeldahl Nitrogen (mg/L) 8 < 0.041 | Ammonia Nitrogen (mg/L) | 8 | < | 0.008 | < | 0.018 | 0.004 | 0.006 | 0.002 |
| J Total Nitrogen (mg/L) 8 0.028 0.341 0.105 0.144 0.128 J Dissolved Reactive Phosphorus (mg/L) 4 0.003 0.006 0.004 0.004 0.001 J Total Phosphorus (mg/L) 8 0.004 0.017 0.006 0.008 0.005 CBOD-5 (mg/L) 4 2.0 < 2.0 1.0 1.0 0.0 COD (mg/L) 4 13.6 21.4 16.4 17.0 3.6 TOC (mg/L) 4 1.1 3.2 1.9 2.0 0.9 Chlorides (mg/L) 8 0.9 1.2 1.09 ^M 1.1 0.1 Total Metals J Aluminum (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.013 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 < 0.02 < 0.2 0.1 0.1 0.0 Cadmium (μg/L) 4 < 0.046 < 0.046 0.023 0.023 0.000 Chromium (μg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Copper (mg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Copper (mg/L) 4 < 0.016 < 0.016 0.000 0.000 Lead (μg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.016 < 0.016 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Cinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 | | 8 | < | 0.002 | | 0.035 | 0.010 | 0.015 | 0.012 |
| J Dissolved Reactive Phosphorus (mg/L) 4 0.003 0.006 0.004 0.001 0.005 J Total Phosphorus (mg/L) 8 0.004 0.017 0.006 0.008 0.005 CBOD-5 (mg/L) 4 < 2.0 | J Total Kjeldahl Nitrogen (mg/L) | 8 | < | 0.041 | | 0.309 | 0.096 | 0.129 | 0.117 |
| J Total Phosphorus (mg/L) 8 0.004 0.017 0.006 0.008 0.005 CBOD-5 (mg/L) 4 < 2.0 | J Total Nitrogen (mg/L) | 8 | | 0.028 | | 0.341 | 0.105 | | 0.128 |
| CBOD-5 (mg/L) 4 < 2.0 2.0 1.0 1.0 0.0 COD (mg/L) 4 13.6 21.4 16.4 17.0 3.6 TOC (mg/L) 4 1.1 3.2 1.9 2.0 0.9 Chlorides (mg/L) 8 0.9 1.2 1.09 ^M 1.1 0.1 Total Metals J Iron (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.013 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (µg/L) 4 < 0.2 0.1 0.0 Cadmium (µg/L) 4 < 0.02 0.1 0.0 Chromium (µg/L) 4 < 0.046 0.003 16.000 16.000 0.000 Copper (mg/L) 4 </td <td>J Dissolved Reactive Phosphorus (mg/L)</td> <td>4</td> <td></td> <td>0.003</td> <td></td> <td>0.006</td> <td>0.004</td> <td>0.004</td> <td>0.001</td> | J Dissolved Reactive Phosphorus (mg/L) | 4 | | 0.003 | | 0.006 | 0.004 | 0.004 | 0.001 |
| COD (mg/L) 4 13.6 21.4 16.4 17.0 3.6 TOC (mg/L) 4 1.1 3.2 1.9 2.0 0.9 Chlorides (mg/L) 8 0.9 1.2 1.09 ^M 1.1 0.1 Total Metals J Iron (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (µg/L) 4 0.02 0.2 0.1 0.1 0.0 Cadmium (µg/L) 4 0.046 0.023 0.023 0.000 Chromium (µg/L) 4 0.031 0.016 0.000 0.000 Copper (mg/L) 4 0.031 0.016 0.016 0.000 Lead (µg/L) 4 0.016 | J Total Phosphorus (mg/L) | 8 | | 0.004 | | 0.017 | 0.006 | 0.008 | 0.005 |
| TOC (mg/L) 4 1.1 3.2 1.9 2.0 0.9 Chlorides (mg/L) 8 0.9 1.2 1.09 ^M 1.1 0.1 Total Metals J Aluminum (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 < 0.02 < 0.2 0.1 0.1 0.0 Cadmium (μg/L) 4 < 0.046 < 0.046 0.023 0.023 0.000 Chromium (μg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Copper (mg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Lead (μg/L) 4 < 0.016 < 0.016 0.000 0.000 Lead (μg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.017 < 0.017 0.008 0.000 0.000 Biological | | 4 | < | 2.0 | < | 2.0 | 1.0 | 1.0 | 0.0 |
| Chlorides (mg/L) 8 0.9 1.2 1.09 ^M 1.1 0.1 Total Metals J Aluminum (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (µg/L) 4 < 0.2 | COD (mg/L) | 4 | | 13.6 | | 21.4 | 16.4 | 17.0 | 3.6 |
| Total Metals J Aluminum (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 < 0.2 | TOC (mg/L) | 4 | | 1.1 | | 3.2 | | 2.0 | 0.9 |
| J Aluminum (mg/L) 4 0.085 0.141 0.109 0.111 0.025 J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 < 0.02 < 0.2 0.1 0.1 0.0 Cadmium (μg/L) 4 < 0.046 < 0.046 0.023 0.023 0.000 Chromium (μg/L) 4 < 32.000 < 32.000 16.000 16.000 0.000 Copper (mg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Lead (μg/L) 4 < 1.1 < 1.1 0.5 0.5 0.0 Nickel (mg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.215 < 0.215 0.108 0.108 0.000 Zinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 Biological | Chlorides (mg/L) | 8 | | 0.9 | | 1.2 | 1.09 [™] | 1.1 | 0.1 |
| J Iron (mg/L) 4 0.133 0.250 0.178 0.185 0.049 J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 < 0.02 < 0.2 0.1 0.1 0.0 Cadmium (μg/L) 4 < 0.046 < 0.046 0.023 0.023 0.000 Chromium (μg/L) 4 < 32.000 < 32.000 16.000 16.000 0.000 Copper (mg/L) 4 < 0.031 < 0.031 0.016 0.016 0.000 Lead (μg/L) 4 < 1.1 < 1.1 0.5 0.5 0.0 Nickel (mg/L) 4 < 0.016 < 0.016 0.008 0.000 Silver (μg/L) 4 < 0.215 < 0.215 0.108 0.108 0.000 Zinc (mg/L) 4 < 0.017 < 0.017 0.008 0.000 | Total Metals | | | | | | | | |
| J Manganese (mg/L) 4 0.011 0.017 0.015 0.014 0.003 Dissolved Metals Arsenic (μg/L) 4 0.2 0.2 0.1 0.1 0.0 Cadmium (μg/L) 4 0.046 0.023 0.023 0.000 Chromium (μg/L) 4 32.000 16.000 16.000 0.000 Copper (mg/L) 4 0.031 0.016 0.016 0.000 Lead (μg/L) 4 1.1 1.1 0.5 0.5 0.0 Nickel (mg/L) 4 0.016 0.016 0.008 0.008 0.000 Silver (μg/L) 4 0.215 0.215 0.108 0.008 0.000 Zinc (mg/L) 4 0.017 0.017 0.008 0.008 0.000 | , , | 4 | | 0.085 | | 0.141 | 0.109 | 0.111 | 0.025 |
| Dissolved Metals Arsenic (μg/L) 4 < 0.2 < 0.2 < 0.2 0.1 0.1 0.1 0.0 | | | | | | | | | |
| Arsenic (μg/L) | | 4 | | 0.011 | | 0.017 | 0.015 | 0.014 | 0.003 |
| Cadmium (μg/L) 4 < 0.046 < 0.046 < 0.023 | | | | | | | | | |
| $ \begin{array}{llllllllllllllllllllllllllllllllllll$ | | 4 | < | | | | | | |
| Copper (mg/L) 4 < 0.031 < 0.031 | , | 4 | < | 0.046 | < | 0.046 | 0.023 | | |
| Lead (μg/L) 4 < 1.1 < 1.1 < 0.5 0.5 0.0 | | 4 | < | 32.000 | < | 32.000 | 16.000 | | 0.000 |
| Nickel (mg/L) $4 < 0.016 < 0.016 & 0.008 & 0.008 & 0.000$ Silver (µg/L) $4 < 0.215 < 0.215 & 0.108 & 0.108 & 0.000$ Zinc (mg/L) $4 < 0.017 < 0.017 & 0.008 & 0.008 & 0.000$ Biological | Copper (mg/L) | 4 | < | 0.031 | < | 0.031 | 0.016 | | 0.000 |
| Silver (μ g/L) 4 < 0.215 < 0.215 0.108 0.108 0.000 Zinc (m g/L) 4 < 0.017 < 0.017 0.008 0.008 0.000 Biological | , , , | 4 | < | | | | | | |
| Zinc (mg/L) 4 < 0.017 < 0.017 0.008 0.008 0.000 Biological | . 9 . | 4 | < | 0.016 | < | 0.016 | 0.008 | 0.008 | 0.000 |
| Biological | Silver (µg/L) | 4 | < | 0.215 | < | 0.215 | 0.108 | 0.108 | 0.000 |
| | | 4 | < | 0.017 | < | 0.017 | 0.008 | 0.008 | 0.000 |
| E. coli (col/100mL) 4 31 1046 ^H 181 360 470 2 | Biological | | | | | | | | |
| | E. coli (col/100mL) | 4 | | 31 | | 1046 ^H | 181 | 360 | 470 2 |

E=# samples 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 68e; N=# samples.

SUMMARY

ADEM is currently monitoring Brushy Creek at BRSL-3 as a "best attainable" condition reference watershed. Landuse, road density, and population density categorize Brushy Creek among the least-disturbed watersheds in the Dissected Plateau ecoregion (68e). Overall habitat quality for Brushy Creek at BRSL-3 was categorized as *optimal*. Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Water quality criteria were met for its *Fish & Wildlife* use classification except for two exceedances of the human health criterion for E. coli in the summer months. Median Chlorides were higher than values expected based on data collected at reference reaches within the Dissected Plateau ecoregion (68e). Further sampling may be required to get a representative assessment of E. coli and to ensure that water quality and biological conditions remain stable.