Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2016 Monitoring Summary

Excellent

Dry Creek at Calhoun County Road 55 in Talladega National Forest (33.84240/-85.59422)

BACKGROUND

Dry Creek is among the least-disturbed watersheds within the Ridge and Valley ecoregion, based on landuse, road density, and population density. Since 2000, it has been monitored by the Alabama Department of Environmental Management (ADEM) as a "high quality" reference watershed for comparison with other streams within the ecoregion. Data from reference watersheds are used to characterize natural or background conditions expected in different ecoregions throughout the state. Dry Creek was sampled in 2016 to provide high-quality reference reach data for Ridge and Valley streams.

Figure 1. Dry Creek at DRYC-2 on April 6, 2016.

Table 1. Summary of general watershed characteristics: DRYC-2 (2016)

Watershed Characteristics	
Basin	Coosa
Drainage Area (mi²)	5.1
Ecoregion[o]	67H
Assessment Unit	AL03150106-0502-700
Use Class	F&W
AU Category	1
12-digit Hydrologic Unit Code (HUC)	031501060502
Landuse Categories (2011 National Land Cover Dataset)	
Forested, Total (%)	99.2
Forested, Deciduous (%)	46.0
Forested, Evergreen (%)	32.6
Forested, Mixed (%)	20.7
Shrub/Scrub (%)	0.7
Grassland/Herbaceous (%)	0.1
Population/km² (2010 US Census)	1
Roads	
Road Density	0.0
# Road Crossings per Stream km	0.0
Watershed Disturbance Score*	1
Watershed Disturbance Category*	1

[o] Southern Sandstone Ridges

* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. A tributary of Choccolocco Creek, Dry Creek is a *Fish and Wildlife (F&W)* stream located within the Talladega National Forest. According to the 2011 National Land Cover Dataset, the watershed is 99% forested with no permitted outfalls. It is very sparsely populated. No roads cross the stream, although an old jeep trail meanders up the watershed alongside the creek. A forest service road dead ends in the headwaters to provide access to several recreational hiking trails in and near the watershed. Both EPA's Healthy Watershed Initiative (HWI) and ADEM's measure of watershed disturbance ranked the Dry Creek watershed as the best of 1,450 wadeable, flowing watersheds sampled by ADEM throughout the state.

REACH CHARACTERISTICS

General observations (Figure 1, Table 2) and a habitat survey (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. Like other streams in ecoregion 67H, Dry Creek at DRYC-2 is a medium-high gradient stream characterized by a diversity of stable habitat. Overall habitat quality and availability were rated as *optimal* for supporting the macroinvertebrate communities.

Table 2. Physical characteristics of Dry Creek at DRYC-2, April 26, 2016.

Physical Characteristics		
Width (ft)		10
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.8
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	80
	Run	15
	Pool	5
% Substrate		
	Bedrock	15
	Boulder	40
	Cobble	30
	Gravel	6
	Sand	1
	Silt	1
	Organic Matter	7

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Table 3. Results of the habitat assessment survey conducted on Dry Creek at DRYC-2, April 26, 2016.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	**91**	Optimal (80-100)
Sediment Deposition	**90**	Optimal (80-100)
Riffle Frequency	**88**	Optimal (80-100)
Bank Vegetative Stability	**74**	Sub-optimal/Optimal (73-79)
Riparian Zone Measurements	**65**	Sub-optimal (60-75)
Habitat Assessment Score	**164**	
% Maximum Score	**82**	**Optimal (81-100)**

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 pollution tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels ranging from 1, or *natural*, to 6, or *highly altered*. In 2016, the WMB-I score of the macroinvertebrate community in Dry Creek at DRYC-2 was 2, identifying the reach as a near natural site in *excellent* condition. Taxa richness and diversity are exceptional, with 106 total taxa and 63 pollution-sensitive taxa collected at the site. Twenty-two of the taxa are only found in the most pristine streams throughout Alabama and the Southeast. (Table 4)

Table 4. Results of the macroinvertebrate survey conducted on Dry Creek at DRYC-2, April 26, 2016.

Macroinvertebrate Assessment	
	Results
Taxonomic richness and diversity metrics	
Total # taxa	**106**
# rare and highly sensitive taxa	**22**
# sensitive taxa	**63**
# sensitive EPT taxa	**34**
Percent taxon metrics	
% sensitive EPT taxa	**32**
% sensitive taxa	**59**
% rare and highly sensitive taxa	**21**
% tolerant individuals	**8**
% tolerant taxa	**4**
Percent individual metrics	
% rare and highly sensitive individuals	**32**
% sensitive individuals	**54**
% sensitive EPT individuals	**47**
WMB-I Survey Score	**2**
WMB-I Survey Rating	**Excellent (1-2)**

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly and semi-monthly (metals), from March through October 2016 to help characterize water quality conditions within the reach. In situ parameters were well within ranges to protect "*fishable/swimmable*" uses. Water temperatures ranged from 12.0°C to 25.1°C (53.6°F to 77.2°F). Dissolved oxygen concentrations ranged from 8.4 to 10.8 mg/L, reflecting the cool temperatures and high percent riffle habitat. Turbidity was also low, ranging from 1.2 to 3.8 NTU. Individual *E. coli* counts did not exceed 145 colonies/100 mL of sample. Median sediment, nutrient, and metals concentrations were among the lowest measured throughout the Ridge and Valley ecoregion.

FOR MONITORING INFORMATION, CONTACT:
Lisa Huff, ADEM Environmental Indicators Section
1350 Coliseum Boulevard, Montgomery AL 36109
(334) 260-2752 esh@adem.alabama.gov

Table 5. Summary of water quality data collected March-October, 2016. 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	12.0	25.1	18.8	19.2	4.8
Turbidity (NTU)	8	1.2	3.8	1.7	1.9	0.8
Total Dissolved Solids (mg/L)	6	13.0	29.0	23.5	21.8	6.2
Total Suspended Solids (mg/L)	6	< 1.0	2.0	1.2	1.2	0.8
Specific Conductance (µmhos/cm)	6	15.3	25.1	18.8	19.6	4.0
Hardness (mg/L)	3	3.6	6.0	4.6	4.7	1.2
Alkalinity (mg/L)	6	2.0	7.0	5.2	4.8	2.1
Monthly Stream Flow (cfs)	10	0.0	6.5	0.4	1.8	2.3
Measured Stream Flow (cfs)	8	0.2	6.5	1.3	2.2	2.4
Chemical						
Dissolved Oxygen (mg/L)	6	8.4	10.8	9.1	9.2	0.9
pH (SU)	6	6.4	7.2	6.9	6.8	0.4
J Ammonia Nitrogen (mg/L)	6	< 0.007	0.049	0.015	0.022	0.020
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.004	0.065	0.026	0.031	0.032
J Total Kjeldahl Nitrogen (mg/L)	6	< 0.050	0.329	0.138	0.147	0.119
J Dis Reactive Phosphorus (mg/L)	6	< 0.003	0.005	0.004	0.003	0.001
J Total Phosphorus (mg/L)	6	0.002	0.014	0.008	0.008	0.004
CBOD-5 (mg/L)	6	< 2.0	< 2.0	1.0	1.0	0.0
COD (mg/L)	6	< 2.7	8.2	4.0	4.1	2.6
J TOC (mg/L)	6	0.9	2.1	1.8	1.6	0.5
Chlorides (mg/L)	6	1.1	1.3	1.2	1.2	0.1
Sulfate (mg/L)	5	2.64	3.01	2.85	2.84	0.13
Total Metals						
Aluminum (mg/L)	3	< 0.106	< 0.106	0.053	0.053	0.000
J Iron (mg/L)	3	< 0.063	0.156	0.032	0.073	0.072
J Manganese (mg/L)	3	< 0.004	0.015	0.002	0.006	0.008
Dissolved Metals						
Aluminum (mg/L)	3	< 0.106	< 0.106	0.053	0.053	0.000
Antimony (µg/L)	3	< 0.342	< 0.383	0.192	0.185	0.012
Arsenic (µg/L)	3	< 0.276	< 0.415	0.208	0.184	0.040
Cadmium (µg/L)	3	< 0.311	< 0.385	0.192	0.180	0.021
Chromium (µg/L)	3	< 0.347	< 0.445	0.222	0.206	0.028
Copper (µg/L)	3	< 0.218	< 0.454	0.227	0.188	0.068
J Iron (mg/L)	3	< 0.063	0.091	0.032	0.051	0.034
Lead (µg/L)	3	< 0.362	< 0.428	0.181	0.192	0.019
J Manganese (mg/L)	3	< 0.004	0.014	0.002	0.006	0.007
Nickel (µg/L)	3	< 0.460	< 0.705	0.352	0.312	0.071
Selenium (µg/L)	3	< 0.395	< 0.505	0.252	0.234	0.032
Silver (µg/L)	3	< 0.365	< 0.478	0.239	0.220	0.033
Thallium (µg/L)	3	< 0.348	< 0.514	0.174	0.202	0.048
J Zinc (µg/L)	3	0.570	1.509	1.058	1.046	0.470
Biological						
Chlorophyll a (mg/m³)	6	< 0.10	3.74	0.56	1.05	1.44
J E. coli (MPN/DL)	6	2.0	145.0	26.0	42.6	53.3

J=estimate; ; N=# samples

SUMMARY

The ADEM monitors Dry Creek at DRYC-2 as a "high-quality" reference reach for comparison with other Ridge and Valley streams. Dry Creek at DRYC-2 is typical of streams in the region, characterized by moderate to high gradient riffles, and cobble, boulder, and bedrock substrates.

Located within the Talladega National Forest, the watershed is of exceptional quality, containing no permitted outfalls and almost entirely forested. Several recreational hiking trails run through the area. Water quality conditions are very high, exhibiting low water temperatures, and low concentrations of sediment, nutrients, and metals. Macroinvertebrate diversity and taxa richness within the reach are among the highest sampled in the state.