

2008 Monitoring Summary

Bottle Creek at Conecuh County Road 43 (31.26863/-86.76373)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bottle Creek watershed for biological and water quality monitoring as part of the [2008 Assessment of the Southeast Alabama \(SE AL\) River Basins](#). The objectives of the SE AL Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the SE AL basin group.

Bottle Creek is also among the least-disturbed watersheds in the Southeastern Floodplains and Low Terraces ecoregion (65p) based on land use, road density and population density. The 2008 data will be used to evaluate the use of Bottle Creek as a “*best attainable*” condition reference watershed for comparison with other streams in this ecoregion.

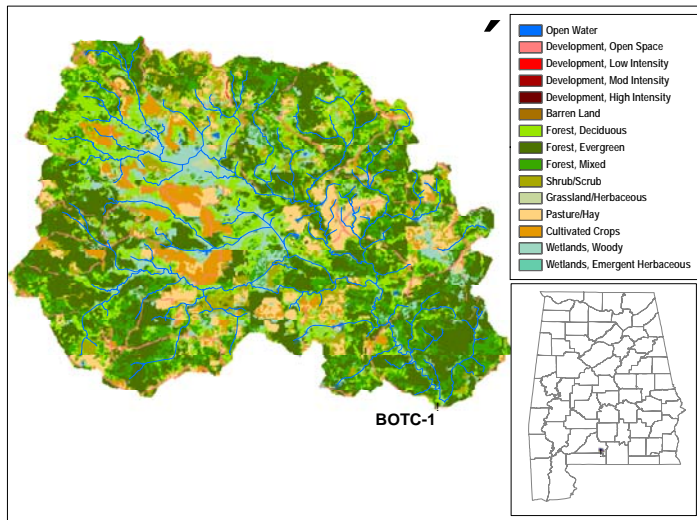


Figure 1. Sampling location and landuse within the Bottle Creek watershed upstream of BOTC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bottle Creek is a [Fish & Wildlife \(F&W\)](#) stream that drains a portion of southeast Conecuh County. It is a tributary of the Sepulga River. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (66%) and woody wetland with some shrub and pasture (Figure 1). Population density is very low. As of February 23, 2011, ADEM has issued three NPDES permits 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. Bottle Creek at BOTC-1 is a low gradient, riffle-run stream. Hardpan clay, boulder, and cobble substrates comprised 47% of the stream bottom.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled at BOTC-1 using ADEM’s [Intensive Multi-habitat Bioassessment methodology \(WMB-I\)](#). Table 4 summarizes results of taxonomic richness, community composition, and community tolerance metrics. Data collected at BOTC-1 may be used to develop and index of ADEM’s WMB-I for ecoregion 65p.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Perdido-Escambia River	
Drainage Area (mi ²)		41
Ecoregion ^a		65p
% Landuse		
Open water		<1
Wetland	Woody	10
	Emergent herbaceous	<1
	Forest	
	Deciduous	19
	Evergreen	30
	Mixed	17
Shrub/scrub		8
Grassland/herbaceous		<1
Pasture/hay		8
Cultivated crops		5
Development	Open space	3
	Low intensity	<1
Population/km ^{2b}		2
# NPDES Permits ^c	TOTAL	3
	Construction Stormwater	3

a. Southeastern Floodplains & Low Terraces

b. 2000 US Census

c. #NPDES permits downloaded from ADEM’s NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Bottle Creek at BOTC-1, May 20, 2008.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.4
	Run	1.0
	Pool	3.6
% of Reach		
	Riffle	2
	Run	93
	Pool	5
% Substrate		
	Hardpan clay	30
	Boulder	2
	Cobble	15
	Gravel	7
	Sand	36
	Silt	5
	Organic Matter	5

Table 3. Results of the habitat assessment conducted in Bottle Creek at BOTC-1, May 20, 2008.

Habitat Assessment	%Maximum Score
Instream Habitat Quality	55
Sediment Deposition	47
Sinuosity	53
Bank and Vegetative Stability	66
Riparian Buffer	83
Habitat Assessment Score	143
% Maximum Score	59

Table 4. Results of the macroinvertebrate bioassessment conducted in Bottle Creek at BOTC-1, May 20, 2008.

Macroinvertebrate Assessment	
	Results
Taxa richness measures	
# Ephemeroptera (mayfly) genera	12
# Plecoptera (stonefly) genera	2
# Trichoptera (caddisfly) genera	7
Taxonomic composition measures	
% Non-insect taxa	11
% Non-insect organisms	5
% Plecoptera	0
Tolerance measures	
Beck's community tolerance index	16
WMB-I Assessment Score	--

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. [In situ measurements](#) and [water samples](#) were collected to help identify any stressors to the biological communities. The 2008 data did not indicate any exceedances of *F&W* criteria for temperature, dissolved oxygen, pH, or ammonia. Dissolved metals were generally below detection limits with the exception of dissolved manganese. No pesticides, herbicides (atrazine) or semi-volatile organics samples were collected.

SUMMARY

Bottle Creek is also among the least-disturbed watersheds in the Southeastern Floodplains and Low Terraces ecoregion (65p) based on land use, road density and population density. In situ measurements and water quality data suggest the reach to be in good condition. However, to be used for comparison with other streams, "best-attainable" reference reaches must be representative of other streams in the ecoregion. Hardpan clay comprised 30% of the bottom substrate of Bottle Creek at BOTC-1. Streams in the Southeastern Floodplains and Low Terraces (65p), which are generally more sinuous, sand bottomed, glide-pool streams. Additional sampling should be conducted to help characterize streams in this ecoregion.

Table 5. Summary of water quality data collected March-October, 2008. 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)	4	22.6	29.9	26.0	26.1	3.2
Turbidity (NTU)	4	1.2	14.5	7.5	7.7	6.8
Total Dissolved Solids (mg/L)	3	82.0	134.0	126.0	114.0	28.0
Total Suspended Solids (mg/L)	3	< 1.0	26.0	16.0	14.2	12.8
Specific Conductance (µmhos)	4	186.8	266.5	248.2	237.4	35.4
Hardness (mg/L)	3	87.9	145.0	139.0	124.0	31.4
Alkalinity (mg/L)	3	83.8	125.7	116.0	108.5	21.9
Stream Flow (cfs)	3	2.2	10.9	5.3	6.1	4.4
Chemical						
Dissolved Oxygen (mg/L)	4	7.9	10.2	9.2	9.2	1.0
pH (su)	4	7.8	8.2	8.1	8.0	0.2
Ammonia Nitrogen (mg/L)	3	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	3	0.003	0.149	0.005	0.052	0.084
Total Kjeldahl Nitrogen (mg/L)	3	< 0.150	0.348	0.075	0.166	0.158
Total Nitrogen (mg/L)	3	< 0.078	0.353	0.224	0.218	0.138
Dissolved Reactive Phosphorus (mg/L)	3	0.008	0.009	0.009	0.009	0.001
Total Phosphorus (mg/L)	3	0.022	0.030	0.023	0.025	0.004
CBOD-5 (mg/L)	3	< 1.0	1.6	0.5	0.9	0.6
Chlorides (mg/L)	3	2.8	4.1	3.1	3.4	0.7
Total Metals						
Aluminum (mg/L)	3	< 0.015	0.534	0.208	0.250	0.266
Iron (mg/L)	3	0.063	1.040	0.322	0.475	0.506
Manganese (mg/L)	3	0.014	0.251	0.090	0.118	0.121
Dissolved Metals						
Aluminum (mg/L)	3	< 0.015	< 0.019	0.010	0.009	0.001
Antimony (µg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0
Arsenic (µg/L)	3	< 2.2	< 2.2	1.1	1.1	0.0
Cadmium (mg/L)	3	< 0.003	< 0.005	0.002	0.002	0.001
Chromium (mg/L)	3	< 0.004	< 0.013	0.002	0.004	0.003
Copper (mg/L)	3	< 0.005	< 0.013	0.002	0.004	0.002
Iron (mg/L)	3	< 0.005	< 0.014	0.007	0.006	0.003
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0
Manganese (mg/L)	3	< 0.005	0.040	0.026	0.023	0.019
Mercury (µg/L)	3	< 0.0	< 0.0	0.0	0.0	0.0
Nickel (mg/L)	3	< 0.004	< 0.006	0.003	0.003	0.001
Selenium (µg/L)	3	< 1.5	< 1.6	0.8	0.8	0.0
Silver (mg/L)	3	< 0.002	< 0.003	0.002	0.001	0.000
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0
Zinc (mg/L)	3	< 0.003	< 0.006	0.003	0.002	0.001
Biological						
Chlorophyll a (µg/L)	3	0.36	6.41	3.74	3.50	3.03
Fecal Coliform (col/100 mL)	3	10	1,400	20	477	800 J

J=estimate; N=# samples

FOR MORE INFORMATION, CONTACT:
 Hugh Cox, ADEM Environmental Indicator Section
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2753 hec@adem.state.al.us