

2014 Monitoring Summary



Wrights Creek at Grant Road (Geneva County) (31.03400/-85.57204)

BACKGROUND

The Wrights Creek watershed was selected for biological and water quality monitoring as part of the 2014 Southeastern Alabama (SEAL) River Basin Assessment Monitoring. The objectives of the SEAL River Basin Assessments were to provide data to assess the biological, chemical, and physical conditions within the reach and to estimate overall water quality within the basin.



Figure 1. Wrights Creek at WRS-2, July 1, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wrights Creek at WRS-2 is a *Fish & Wildlife (F&W)* stream located in Geneva County. Based on the 2011 National Land Cover Dataset, land use within the watershed is predominantly forest (26%), cultivated crops, and pasture, with little development (<8%). Population density is low. As of April 1, 2016, one NPDES outfall was active in the watershed (ADEM NPDES Management System).

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. Wrights Creek at WRS-2 is a low gradient, glide-pool stream located in the Dougherty Plain ecoregion (65G) (Figure 1). Benthic substrate consists primarily of sand and organic matter. Overall habitat quality was rated as *marginal* for supporting the macroinvertebrate community.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was 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. The metric results indicated the macroinvertebrate community at WRS-2 to be in *fair* condition (Table 4). Relative abundance and numbers of pollution-sensitive taxa are lower than expected, and a few taxa appear to dominate the macroinvertebrate community.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Choctawhatchee River	
Drainage Area (mi ²)	17	
Ecoregion ^a	65G	
% Landuse ^b		
Open water		1%
Wetland	Woody	7%
	Emergent herbaceous	<1%
	Deciduous	6%
Forest	Evergreen	19%
	Mixed	1%
	Shrub/scrub	13%
Grassland/herbaceous	3%	
Pasture/hay	18%	
Cultivated crops	25%	
Development	Open space	6%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km ^{2c}	15	
# NPDES Permits ^d	TOTAL	1
Construction		1

a. Dougherty Plain

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Wrights Creek at WRS-2, July 1, 2014.

Physical Characteristics		
Width (ft)	20	
Canopy Cover	Estimate 50/50	
Depth (ft)	Run	2.0
	Pool	3.0
% of Reach	Run	50
	Pool	50
% Substrate	Sand	65
	Silt	5
	Organic Matter	30

Table 3. Results of the habitat assessment conducted on Wrights Creek at WRSG-2, July 1, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	59	Sub-Optimal (55-79)
Sediment Deposition	70	Sub-Optimal (55-79)
Simosity	78	Sub-Optimal (55-79)
Bank Vegetative Stability	35	Marginal (31-<58)
Riparian Buffer	54	Marginal (31-<60)
Habitat Assessment Score	101	
% Maximum Score	56	Marginal (31-<57)

Table 4. Results of the macroinvertebrate bioassessment conducted in Wrights Creek at WRSG-2, July 1, 2014.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	# EPT taxa	15
Taxonomic composition measures		
	% Non-insect taxa	16
	% Plecoptera	1
	% Dominant taxon	29
Functional feeding group		
	% Predators	15
Community tolerance		
	Becks community tolerance index	9
	% Nutrient tolerant individuals	11
	WMB-I Assessment Score	50
	WMB-I Assessment Rating	Fair (37-55)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, *in situ* measurements and water samples were collected monthly, semi-monthly (metals), or once (pesticides, atrazine and semi-volatile organics) from March through October of 2014 to help identify any stressors to the biological community. Median specific conductance and hardness were both higher than values recorded from all verified ecoregional reference reaches. Median pH, dissolved aluminum, dissolved iron, and chlorophyll *a* were higher than expected based on the 90th percentile of reference reaches for ecoregion 65G. Values for lead were less than MDL in two of four samples collected, with the MDL ranging from 0.23-0.54 µg/L. The sample collected in April resulted in a value of 0.4 µg/L (MDL=0.23µg/L) and was an uncertain exceedance. Concentrations of *E. coli* exceeded *F&W* human-health criteria in August (613 col/100mL), September (1732 col/100mL), as did the geometric mean of all summer samples (305 col/100mL). Samples collected for the analyses of pesticides, and semi-volatile organics in April were below detection limits while atrazine was detected.

SUMMARY

Habitat assessment results scored Wrights Creek at WRSG-2 as *marginal* for supporting the macroinvertebrate community, while bioassessment results indicated the community to be in *fair* condition. However, concentrations of *E. coli* exceeded *F&W* human-health criteria in August, September, as did the geometric mean of all summer samples. Median specific conductance, hardness, alkalinity, pH, dissolved aluminum, dissolved iron, and chlorophyll *a* were also higher than expected compared to data from ADEM's least-impaired reference reaches in ecoregion 65G. Monitoring should continue to ensure that water quality and biological conditions 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) 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	Q	E
Physical								
Temperature (°C)	11	14.0	25.5	20.7	20.7	4.2		
Turbidity (NTU)	11	5.1	26.4	11.0	14.0	8.1		
Total Dissolved Solids (mg/L)	8	40.0	91.0	57.0	61.9	16.7		
Total Suspended Solids (mg/L)	7	< 1.0	6.0	2.0	2.6	2.4		
Specific Conductance (µmhos)	11	44.7	90.1	64.8 [?]	66.5	19.1		
Hardness (mg/L)	4	15.0	36.3	27.4 [?]	26.3	9.4		
Alkalinity (mg/L)	7	11.5	42.2	29.9 [?]	29.3	12.6		
Monthly Stream Flow (cfs)	5	7.2	56.6	30.6	33.2	22.8		
Stream Flow during Sample Collection (cfs)	5	7.2	56.6	30.6	33.2	22.8		
Chemical								
Dissolved Oxygen (mg/L)	11	7.0	9.3	7.9	8.0	0.9		
pH (su)	11	6.4	7.3	6.9 [?]	6.8	0.3		
¹ Ammonia Nitrogen (mg/L)	8	< 0.006	0.040	0.004	0.011	0.014		
Nitrate-Nitrite Nitrogen (mg/L)	8	0.099	0.735	0.150	0.186	0.051		
Total Kjeldahl Nitrogen (mg/L)	8	0.185	0.730	0.346	0.428	0.209		
Total Nitrogen (mg/L)	8	0.419	0.848	0.518	0.594	0.170		
¹ Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.007	0.006	0.006	0.001		
Total Phosphorus (mg/L)	8	0.016	0.059	0.028	0.032	0.016		
¹ CBOD-5 (mg/L)	8	< 2.0	2.0	1.0	1.0	0.0		
COD (mg/L)	7	9.5	21.6	10.9	13.6	4.9		
TOC (mg/L)	8	2.1	7.2	5.7	4.9	1.9		
Chlorides (mg/L)	8	2.7	4.5	3.8	3.5	0.6		
Atrazine (µg/L)	1				0.17			
Total Metals								
¹ Aluminum (mg/L)	4	< 0.050	0.705	0.216	0.290	0.294		
Iron (mg/L)	4	0.284	1.690	0.704	0.846	0.621		
Manganese (mg/L)	4	0.054	0.083	0.064	0.066	0.013		
Dissolved Metals								
¹ Aluminum (mg/L)	4	< 0.050	1.330	0.117 [?]	0.397	0.623		
Antimony (µg/L)	4	< 0.2	0.4	0.1	0.1	0.1		
¹ Arsenic (µg/L)	4	0.4	0.8 ¹	0.5	0.8	0.2	4	
Cadmium (µg/L)	4	< 0.246	0.390	0.123	0.141	0.036		
¹ Chromium (µg/L)	4	0.590	0.945	0.815	0.791	0.171		
¹ Copper (mg/L)	4	< 0.0003	0.0005	0.0003	0.0003	0.0001		
Iron (mg/L)	4	0.374	1.960	0.964 [?]	1.065	0.690		
¹ Lead (µg/L)	4	< 0.2	0.5 [?]	0.2	0.2	0.1	1	
¹ Manganese (mg/L)	4	0.037	0.079	0.050	0.054	0.018		
¹ Nickel (mg/L)	4	0.0002	0.0006	0.0003	0.0003	0.0002		
Selenium (µg/L)	4	< 0.4	0.5	0.2	0.2	0.0		
Silver (µg/L)	4	< 0.252	0.480	0.126	0.152	0.052		
Thallium (µg/L)	4	< 0.2	0.8	0.1	0.2	0.1		
¹ Zinc (mg/L)	4	0.004	0.005	0.004	0.004	0.000		
Biological								
Chlorophyll <i>a</i> (µg/L)	8	< 0.10	8.01	1.40 [?]	2.62	3.12		
<i>E. coli</i> (col/100mL)	8	75	1733 ¹	150	396	570	3	

E= # of samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 65G; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of collected samples in ecoregion 65G; N=# samples; S=*F&W* hardness-adjusted aquatic life use criteria exceeded; Q=# of uncertain exceedances.

FOR MORE INFORMATION, CONTACT:
 Tim Wynn, ADEM Aquatic Assessment Unit
 110 Vulcan Road, Birmingham AL 35209
 (205) 942-6168 timothy.wynn@adem.state.al.us