

2014 Monitoring Summary



Cowarts Creek at Houston County Road 55 (31.10530/-85.25498)

BACKGROUND

The Upper Chipola River was identified as a Strategic Habitat Unit (SHU) by the Alabama Rivers and Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species. Upper Cowarts Creek, a sub-watershed of Upper Chipola River, was identified as a priority watershed due to potential impacts from excessive sedimentation, nutrients, and algae, detrimental runoff from urban and agricultural sources, and lack of riparian buffer areas.

The Alabama Department of Environmental Management (ADEM) selected the Cowarts Creek watershed for biological and water quality monitoring as part of the 2014 Southeastern Alabama (SE AL) River Basin Assessment Monitoring Program. The objectives of the SE AL River Basin Assessments were to provide data to assess the biological, chemical, and physical conditions within the reach, estimate overall water quality within the SE River basins, and to provide data to support restoration efforts.



Figure 1. Cowarts Creek at CWTH-4, June 11, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cowarts Creek at CWTH-4 is a *Fish & Wildlife (F&W)* stream located in Houston County, southeast of Dothan. Based on the 2011 National Land Cover Dataset, land use within the watershed is predominantly cultivated crops, and forest (~21%), and some development (<9%). As of April 1, 2016, 19 NPDES outfalls were 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. Cowarts Creek at CWTH-4 is a low gradient, sand-bottomed stream located in the Dougherty Plain ecoregion (65g) (Figure 1). Limited instream habitat and eroded banks were the primary issues noted within the reach.

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 CWTH-4 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics			Chipola R
Basin			
Drainage Area (mi²)			43
Ecoregion^a			65G
% Landuse^b			
Open water			<1%
Wetland		Woody	6%
		Emergent herbaceous	<1%
Forest		Deciduous	5%
		Evergreen	14%
		Mixed	2%
Shrub/scrub			14%
Grassland/herbaceous			<1%
Pasture/hay			15%
Cultivated crops			34%
Development		Open space	6%
		Low intensity	1%
		Moderate intensity	<1%
		High intensity	<1%
Population/km^{2c}			44
# NPDES Permits^d		TOTAL	19
		Construction	17
		Industrial General	2

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 Cowarts Creek at CWTH-4, July 1, 2014.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Shaded
Depth (ft)		
	Run	2.0
	Pool	1.5
% of Reach		
	Run	90
	Pool	10
% Substrate		
	Sand	83
	Silt	5
	Organic Matter	12

Table 3. Results of the habitat assessment conducted on Cowarts Creek at CWT4, July 1, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	44	Marginal (31-<55)
Sediment Deposition	73	Sub-Optimal (55-79)
Sinuosity	70	Sub-Optimal (55-79)
Bank Vegetative Stability	24	Poor (<31)
Riparian Buffer	86	Optimal (>84)
Habitat Assessment Score	99	
% Maximum Score	58	Sub-Optimal (57-80)

Table 4. Results of the macroinvertebrate bioassessment conducted in Cowarts Creek at CWT4, July 1, 2014.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPC taxa	31	56
% Trichoptera & Chironomidae Taxa	33	70
Taxonomic composition measures		
% EP Individuals	13	24
Functional feeding group		
% Collector-Filterer Individuals	35	40
Community tolerance		
% Nutrient Tolerant individuals	52	23
WMB-I Assessment Score	—	43
WMB-I Assessment Rating		Fair (31-45)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, *in situ* measurements and water samples were collected monthly from March-October of 2014 to help identify any stressors to the biological community. Atrazine was sampled once, on April 24. Median conductivity and hardness were higher than background, based on the median concentration of reference reach data for the Dougherty Plain ecoregion (65g). Also, median concentrations of alkalinity, pH, nitrate+nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, total phosphorus, and total and dissolved aluminum were higher than expected based on the 90th percentile of reference reaches in this ecoregion. Concentrations of *E. coli* exceeded summer single sample mean human health criterion for F&W streams in June (582 col/mL) and September (866 col/mL).

SUMMARY

Bioassessment results indicated the community to be in *fair* condition. While overall habitat assessment results scored Cowarts Creek at CWT4 as *sub-optimal*, bank instability and limited in-stream habitat were noted as concerns at the site. Specific conductance, hardness, alkalinity, pH, nitrate+nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, total phosphorus, and aluminum were elevated as compared to data from ADEM's least-impaired reference reaches in the Dougherty Plain ecoregion. 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	13.1	25.4	22.5	21.3	4.3	
Turbidity (NTU)	11	6.8	19.8	12.1	11.8	4.6	
Total Dissolved Solids (mg/L)	8	64.0	130.0	91.5	92.8	25.4	
Total Suspended Solids (mg/L)	8	< 1.0	29.0	12.5	11.0	9.6	
Specific Conductance (µmhos)	11	95.6	205.8	153.3 ^G	145.7	42.0	
Hardness (mg/L)	4	45.5	86.5	62.3 ^G	64.2	20.8	
Alkalinity (mg/L)	8	37.0	97.6	63.9 ^M	64.8	22.9	
Monthly Stream Flow (cfs)	7	15.1	59.2	23.6	27.7	14.6	
Stream Flow during Sample Collection (cfs)	7	15.1	59.2	23.6	27.7	14.6	
Chemical							
Dissolved Oxygen (mg/L)	11	6.7	9.0	7.1	7.3	0.7	
pH (su)	11	7.0	7.6	7.3 ^M	7.3	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.006	0.079	0.003	0.015	0.027	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.527	0.955	0.759 ^M	0.762	0.138	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.049	0.948	0.398	0.416	0.276	
Total Nitrogen (mg/L)	8	0.768	1.638	1.227 ^M	1.178	0.312	
Dissolved Reactive Phosphorus (mg/L)	8	0.019	0.121	0.030 ^M	0.042	0.033	
Total Phosphorus (mg/L)	8	0.058	0.199	0.074 ^M	0.089	0.047	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	5.1	6.1	5.7	5.6	0.3	
Atrazine (µg/L)	1				0.12		
Total Metals							
^J Aluminum (mg/L)	4	0.192	0.512	0.340 ^M	0.346	0.150	
Iron (mg/L)	4	0.517	1.200	0.850	0.854	0.279	
Manganese (mg/L)	4	0.059	0.079	0.076	0.072	0.009	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.050	0.212	0.118 ^M	0.118	0.078	
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1	
^J Arsenic (µg/L)	4	0.4	0.8 ^H	0.6	0.6	0.2	4
Cadmium (µg/L)	4	< 0.246	< 0.390	0.123	0.141	0.036	
^J Chromium (µg/L)	4	0.540	0.810	0.781	0.728	0.126	
^J Copper (mg/L)	4	0.0003	0.0004	0.0004	0.0004	0.0001	
Iron (mg/L)	4	0.300	0.681	0.504	0.497	0.159	
Lead (µg/L)	4	< 0.2	< 0.5	0.1	0.2	0.1	
^J Manganese (mg/L)	4	0.038	0.064	0.045	0.048	0.011	
^J Nickel (mg/L)	4	0.0003	0.0006	0.0004	0.0004	0.0002	
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0	
Silver (µg/L)	4	< 0.252	< 0.480	0.128	0.152	0.052	
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1	
^J Zinc (mg/L)	4	0.003	0.009	0.003	0.004	0.003	
Biological							
Chlorophyll a (µg/L)	8	< 0.10	14.42	1.07	2.40	4.88	
<i>E. coli</i> (col/100mL)	8	113	2420 ^H	724	1033	979	2

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

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