



Chaney Creek at Dallas County Road 3 (32.35439/-87.28939)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) currently uses Chaney Creek at CYD-1 as a “best attainable” watershed for comparison with other streams in the Blacklands Prairie ecoregion. Since 1992, it displays instream and habitat conditions that could be described as least disturbed as compared to other stream in the region.

Additionally, Chaney Creek was selected for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.



Figure 1. Chaney Creek at CYD-1, April 13, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Chaney Creek is a Fish and Wildlife (F&W) designated stream located in the Blackland Prairie Ecoregion of the Alabama River basin. Based on the 2006 National Land Cover Dataset, land use within the watershed is primarily a mixture of pasture/hay fields, cultivated crops, woody wetlands and forest. As of September 1, 2012, ADEM’s NPDES Management System database shows a total of three permitted discharges located within the 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. Chaney Creek at CYD-1 is a low-gradient stream characterized by hardpan clay and gravel substrates (Figure 1). Overall habitat quality was rated as *sub-optimal* with marginal instream habitat quality and poor sinuosity.

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Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
Drainage Area (mi²)		43
Ecoregion^a		65a
% Landuse		
Open water		<1
Wetland	Woody	19
	Emergent herbaceous	5
Forest	Deciduous	4
	Evergreen	10
	Mixed	4
Shrub/scrub		7
Grassland/herbaceous		1
Pasture/hay		35
Cultivated crops		11
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
# NPDES Permits^c	TOTAL	3
	Construction Stormwater	2
	Underground Injection Control	1

a.Blackland Prairie

b.#NPDES permits downloaded from ADEM’s NPDES Manage-

Table 2. Physical characteristics of Chaney Creek at CYD-1, May 26, 2005.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	20.0
Depth (ft)	
	Run
	0.5
	Pool
	2.0
% of Reach	
	Riffle
	2
	Run
	85
	Pool
	15
% Substrate	
	Bedrock
	71
	Boulder
	3
	Cobble
	5
	Gravel
	10
	Sand
	8
	Organic Matter
	3

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. The final score is an average of the score for each metric. Bioassessment results indicated the macroinvertebrate community in Chaney Creek at CYD-1 to be in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Chaney Creek at CYD-1, May 26, 2005.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	50	Marginal (40-52)
Sediment Deposition	76	Optimal >65
Sinuosity	40	Poor <45
Bank and Vegetative Stability	76	Optimal >74
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	142	
% Maximum Score	65	Sub-optimal (53-65)

Table 4. Results of macroinvertebrate assessment conducted on Chaney Creek at CYD-1, May 26, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	19	76	Good (57-78)
Taxonomic composition			
% Non-insect taxa	7	89	Fair (61.9-92.7)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	33	43	Poor (23.5-47.0)
Functional composition measures			
% Predators	5	19	Poor (15.1-30.1)
Tolerance measures			
Beck's community tolerance	7	32	Good (31.9-65.9)
% Nutrient tolerant organisms	42	46	Poor (25.4-50.8)
WMB-I Assessment Score	-	44	Fair (38-56)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities.

In situ measurements suggest that Chaney Creek at CYD-1 was meeting water quality criteria for its F&W use classification. Median hardness, dissolved reactive phosphorous and chloride concentrations were greater than the 90th percentile of verified reference reach samples. Fecal coliform levels were elevated during one sampling event (10,000 col/100mL), likely due to a heavy rain event.

SUMMARY

The condition of the macroinvertebrate community residing in Chaney Creek at CYD-1 was rated as *fair*. Results of intensive water quality sampling and a habitat assessment suggest limited instream habitat quality and lack of sinuosity to be negatively impacting the macroinvertebrate community. The community may also be limited by intermittent stream flows, and hardpan clay substrate characteristic of streams in this ecoregion. The macroinvertebrate community has been relatively stable since 1992. However, hardness, dissolved reactive phosphorous and chlorides were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 65a. Monitoring should continue to ensure that water quality and biological conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2005. 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	E
Physical							
Temperature (°C)	8	20.5	26.0	23.5	23.6	2.1	
Turbidity (NTU)	8	4.8	50.2	11.4	17.7	16.9	
Total Dissolved Solids (mg/L)	6	50.0	146.0	128.5	114.2	34.6	
Total Suspended Solids (mg/L)	6	5.0	44.0	16.0	20.2	13.7	
Specific Conductance (µmhos)	8	61.9	211.9	193.6	175.8	51.1	
Hardness (mg/L)	3	27.1	75.9	73.9 ^G	59.0	27.6	
Alkalinity (mg/L)	6	30.0	84.5	68.7	64.9	18.9	
Stream Flow (cfs)	7	0.2	30.0	0.6	5.6	11.0	
Chemical							
Dissolved Oxygen (mg/L)	8	6.0	9.9	8.0	7.9	1.6	
pH (su)	8	6.8	8.2	7.8	7.6	0.4	
Ammonia Nitrogen (mg/L)	6	<0.015	<0.015	0.008	0.008	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	6	0.014	0.123	0.092	0.080	0.045	
Total Kjeldahl Nitrogen (mg/L)	6	0.236	0.762	0.536	0.524	0.226	
Total Nitrogen (mg/L)	6	0.324	0.885	0.605	0.604	0.233	
Dissolved Reactive Phosphorus (mg/L)	6	0.019	0.121	0.038 ^M	0.048	0.036	
Total Phosphorus (mg/L)	6	0.048	0.248	0.100	0.115	0.073	
CBOD-5 (mg/L)	6	<1.0	3.8	2.0	2.0	1.1	
COD (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
⁻² Chlorides (mg/L)	6	3.6	12.6	8.7 ^M	8.2	3.8	
Atrazine (µg/L)	1				2.20		
Total Metals							
Aluminum (mg/L)	3	0.053	1.160	0.796	0.670	0.564	
Iron (mg/L)	3	0.397	1.590	1.230	1.072	0.612	
Manganese (mg/L)	3	<0.005	<0.005	0.002	0.002	0.000	
Dissolved Metals							
Aluminum (mg/L)	3	<0.015	0.114	0.097	0.073	0.057	
Antimony (µg/L)	3	<2.0	<2.0	1.0	1.0	0.0	
Arsenic (µg/L)	3	<10.0	<10.0	5.0	5.0	0.0	
Cadmium (µg/L)	3	<5.0	<5.0	2.500	2.500	0.000	
Chromium (µg/L)	3	<4.0	<4.0	2.000	2.000	0.000	
Copper (mg/L)	3	<0.005	<0.005	0.002	0.002	0.000	
Iron (mg/L)	3	<0.005	0.387	0.065	0.152	0.206	
Lead (µg/L)	3	<2.0	<2.0	1.0	1.0	0.0	
Manganese (mg/L)	3	<0.005	<0.005	0.002	0.002	0.000	
Mercury (µg/L)	3	<0.3	<0.3	0.150	0.150	0.000	
Nickel (mg/L)	3	<0.006	<0.006	0.003	0.003	0.000	
Selenium (µg/L)	3	<10.0	<10.0	5.0	5.0	0.0	
Silver (µg/L)	3	<3.0	<3.0	1.500	1.500	0.000	
Thallium (µg/L)	3	<1.0	<1.0	0.5	0.5	0.0	
Zinc (mg/L)	3	<0.006	<0.006	0.003	0.003	0.000	
Biological							
⁻² Chlorophyll a (ug/L)	6	<0.27	3.20	1.34	1.60	1.42	
⁻² Fecal Coliform (col/100 mL)	6	1	10000 ^C	91	1740	4047	1

C= value exceeds established criteria for F&W water use classification; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65a/b; J=estimate; N=# samples; M=value > 90% of ADEM's 65(a) reference reach samples.

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