

2006 Monitoring Summary



Basin Assessment Site

Chickasaw Creek at T2S, R2W, S21 in Mobile County (30.8543/-88.1778)

BACKGROUND

The Alabama Department Environmental Management (ADEM) selected the Chickasaw Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Lower Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.

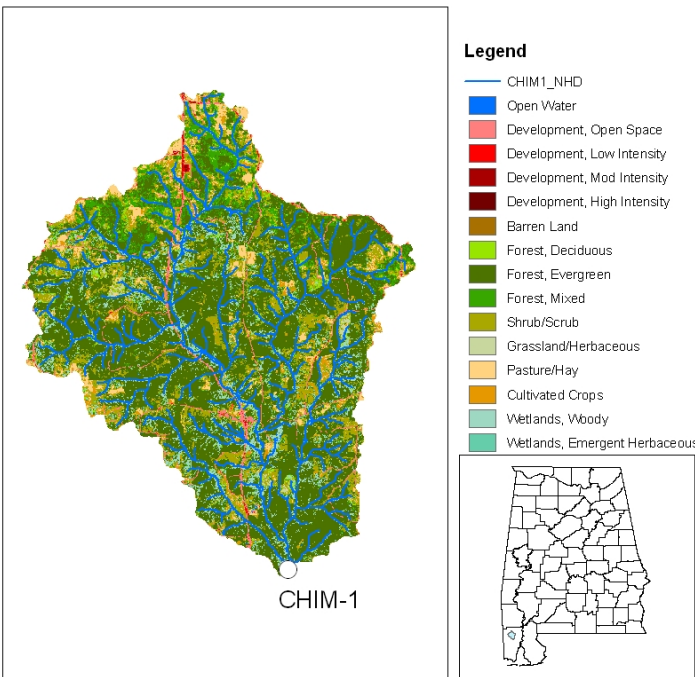


Figure 1. Sampling location and landuse within the Chickasaw Creek watershed at CHIM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Chickasaw Creek at CHIM-1 is a *Fish & Wildlife (F&W)* stream located in the Southern Pine Plains and Hills ecoregion (65f) (Griffith et al.2001) in Mobile County. Landuse within the watershed is mainly forest and woody wetlands (75%) (Fig.1). Ten construction permits have been located in 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. Chickasaw Creek at CHIM-1 is a low-gradient stream with predominantly sand substrate (Figure 2). Instream habitat and bank stability were rated as *marginal*.

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 all individual metric scores. The final score indicated the biological community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile Bay Area
Drainage Area (mi ²)		88
Ecoregion ^a		65f
% Landuse		
Open water		1
Wetland	Woody	10
	Emergent herbaceous	<1
Forest	Deciduous	2
	Evergreen	54
	Mixed	9
Shrub/scrub		14
Grassland/herbaceous		<1
Pasture/hay		4
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km ² ^b		13
# NPDES Permits ^c	TOTAL	10
	Construction Stormwater	7
	Industrial Individual	3

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sep. 2009.

Table 2. Physical characteristics of Chickasaw Creek at CHIM-1, May 23, 2006.

Physical Characteristics		
Width (ft)		25
Canopy cover		Mostly Shaded
Depth (ft)	Run	1.0
	Pool	2.0
% of Reach	Run	70
	Pool	30
% Substrate	Gravel	2
	Sand	83
	Organic Matter	15

Table 3. Results of the habitat assessment conducted on Chickasaw Creek at CHIM-1, May 23, 2006

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	42	Marginal (40-52)
Sediment deposition	61	Sub-optimal (53-65)
Sinuosity	38	Poor (<45)
Bank and vegetative stability	50	Marginal (35-59)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	123	
% Maximum score	56	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Chickasaw Creek at CHIM-1, May 23, 2006.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	14	56	Fair (38-56)
Taxonomic composition measures			
% Non-insect taxa	7	90	Fair (61.9-92.7)
% Plecoptera	13	63	Excellent (>52.8)
% Dominant taxa	16	84	Good (70.6-85.2)
Functional composition measures			
% Predators	36	100	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance index	12	55	Good (31.9-65.9)
% Nutrient tolerant organisms	33	61	Fair (50.9-76.2)
WMB-I Assessment Score	---	73	Good (57-78)



Figure 2. Chickasaw Creek at CHIM-1, March 21, 2010

WATER CHEMISTRY

Results of water chemistry 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 2006 to help identify any stressors to the biological communities. The slightly acidic stream pH is a naturally occurring condition in coastal blackwater streams of Alabama. Median concentrations of all parameters were similar to values obtained at reference reaches within ecoregion 65f. Pesticides, semi-volatile organics and atrazine were not detected in the two samples collected (March 29 and September 20, 2006).

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Habitat, bioassessment, and water quality data indicate the Chickasaw Creek at CHIM-1 to be in *good* condition although availability of instream habitat was limited within the reach.

Table 5. Summary of water quality data collected March-October, 2006. 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	Median	Avg	SD
Physical						
Temperature (°C)	9	16.0	27.2	22.2	22.6	3.9
Turbidity (NTU)	9	1.9	8.2	3.0	4.0	2.3
Total Dissolved Solids (mg/L)	8	6.0	57.0	43.5	37.9	19.0
Total Suspended Solids (mg/L)	8	< 1.0	21.0	2.5	5.9	6.7
Specific Conductance (µmhos)	9	29.3	48.1	32.5	33.9	5.7
Hardness (mg/L)	3	13.0	35.0	22.0	23.3	11.1
Alkalinity (mg/L)	8	1.3	10.0	4.2	4.5	2.9
Stream Flow (cfs)	8	13.8	76.3	29.0	38.7	26.3
Chemical						
Dissolved Oxygen (mg/L)	9	6.4	9.3	7.5	7.5	0.9
pH (su)	9	5.7 ^c	6.9	6.2	6.2	0.4
Ammonia Nitrogen (mg/L)	8	< 0.010	0.040	0.008	0.012	0.012
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.003	0.309	0.035	0.067	0.102
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.830	0.348	0.420	0.238
Total Nitrogen (mg/L)	8	0.077	0.859	0.404	0.488	0.275
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.014	0.008	0.008	0.005
Total Phosphorus (mg/L)	8	< 0.004	0.050	0.017	0.019	0.015
CBOD-5 (mg/L)	8	< 1.0	2.0	1.5	1.2	0.6
Chlorides (mg/L)	8	< 1.4	6.8	3.0	3.9	2.1
Atrazine (µg/L)	2	0.01	0.05	0.01	0.01	0.02
Total Metals						
Aluminum (mg/L)	3	< 0.05	0.15	0.150	0.108	0.072
Iron (mg/L)	3	0.873	1.61	1.31	1.264	0.371
Manganese (mg/L)	3	0.021	0.04	0.025	0.029	0.010
Dissolved Metals						
Aluminum (mg/L)	3	< 0.1	0.14	0.140	0.110	0.052
Antimony (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	< 5	< 5	2.5	2.5	0.0
Cadmium (mg/L)	3	< 0.0003	< 0.0003	0.0001	0.0001	0.000
Chromium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Copper (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	3	0.270	1.130	0.365	0.588	0.471
Lead (µg/L)	3	< 5	< 5	2.5	2.5	0.0
Manganese (mg/L)	3	0.019	0.03	0.020	0.023	0.006
Mercury (µg/L)	3	< 0.5	< 0.5	0.3	0.3	0.0
Nickel (mg/L)	3	< 0.005	0.009	0.0025	0.0047	0.004
Selenium (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Silver (mg/L)	3	< 0.001	< 0.001	0.0004	0.0004	0.000
Thallium (µg/L)	3	< 9	< 9	4.5	4.5	0.0
Zinc (mg/L)	3	< 0.005	< 0.006	0.003	0.004	0.002
Biological						
Chlorophyll a (µg/L)	8	< 1.00	13.35	1.34	3.08	4.45
^j Fecal Coliform (col/100 mL)	6	10	1900	74	410	742

J=estimate; N= # of samples; C=value exceeds established criteria for *Fish & Wildlife* water use classification.

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