ADEM
Alabama Department of Environmental Management

Basin Assessmnet Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

™

Fair

Cold Creek at U.S. Highway 43 in Mobile County (30.97626/-88.02725)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Cold Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, and 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.

Segments of Cold Creek have been on Alabama's Clean Water Act (CWA) §303(d) list since 1996 for mercury contaminated sediments. Data from this report will also support development of a Draft Total Maximum Daily Load (TMDL), which is scheduled for 2018.

Figure 1. Cold Creek at CLDM-40, May 5, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cold Creek at CLDM-40 is a *Fish &Wildlife (F&W)* stream located in Mobile County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is a mix of forest (43%), shrub/scrub, grassland, and woody wetland. (Table 1). As of April 1, 2016, three NPDES permitted outfalls are active 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. Cold Creek at CLDM-40 is typical of streams in ecoregion 75i, which are low-gradient streams characterized by sand and silt substrates (Figure 1). The overall habitat score was similar to reference reaches in other areas of the coastal plain.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled at CLDM-40 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. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Mobile River
Drainage Area (mi^2)		17
Ecoregion[a]		75I
% Landuse[b]		
Open water		1%
Wetland	Woody	10%
	Emergent herbaceous	1%
Forest	Deciduous	<1%
	Evergreen	39%
	Mixed	4%
Shrub/scrub		30%
Grassland/herbaceous		10%
Pasture/hay		3%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		14
# NPDES Permits[d]	**TOTAL**	3
Construction		3

a. Floodplains and Low Terraces
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 Cold Creek at CLDM-40, May 5, 2011.

Physical Characteristics		
Width (ft)		12
Canopy cover		Mostly Shaded
Depth (ft)	Run	1.5
	Pool	2.0
% of Reach	Run	70
	Pool	30
% Substrate	Clay	1
	Sand	64
	Organic Matter	35

Table 3. Results of the habitat assessment conducted on Cold Creek at CLDM-40, May 5, 2011.

Habitat Assessment	% Maximum Score	Rating
Instream habitat quality	43	Marginal (40-<53)
Sediment deposition	69	Optimal (>65
Sinuosity	40	Poor (<45)
Bank and vegetative stability	49	Marginal (35-<59)
Riparian buffer	81	Sub-optimal (70-90)
Habitat assessment score	**114**	
% Maximum score	**57**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Cold Creek at CLDM-40, May 5, 2011.

Macroinvertebrate Assessment	Results
Taxa richness and diversity measures	
# EPT taxa	13
Taxonomic composition measures	
% Non-insect taxa	4
% Plecoptera	3
% Dominant taxa	31
Functional feeding group measures	
% Predators	12
Tolerance measures	
Beck's community tolerance index	12
% Nutrient tolerant organisms	47
WMB-I Assessment Score	**50**
WMB-I Assessment Rating	**Fair (37-55)**

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. *In situ* measurements and water samples were collected in April, June, August, and October of 2011 to characterize water quality conditions in Cold Creek at CLDM-40. Additionally, field parameters were collected during the macroinvertebrate bioassessment on May 5. Estimated dissolved Thallium concentrations exceeded Human Health Criteria for fish consumption in April. Dissolved metals concentrations were generally below the detection limit. Organics were sampled twice (June and October), and results were also below detection limits.

SUMMARY

Cold Creek at CLDM-40 was typical of other streams in the Floodplains and Low Terraces ecoregion, which are generally low-gradient streams with sand and silt substrates (Griffith et al. 2001). Water chemistry analyses showed Thallium concentrations that exceeded Human Health criteria for *F&W* streams.

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Monitoring should continue to ensure that water quality and biological conditions meet current standards.

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Table 5. Summary of water quality data collected April, May, June, August and October 2011. 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 (ºC)	5		20.0		28.4	23.2	23.8	3.5	
	Turbidity (NTU)	5		3.0		8.6	6.5	5.8	2.6	
	Total Dissolved Solids (mg/L)	4		24.0		52.0	37.0	37.5	11.5	
	Total Suspended Solids (mg/L)	4	<	1.0		4.0	2.0	2.1	1.4	
	Specific Conductance (µmhos)	5		23.9		26.0	24.2	24.5	0.8	
	Hardness (mg/L)	4		5.6		6.9	5.7	6.0	0.6	
	Alkalinity (mg/L)	4	<	2.4		3.7	3.2	2.8	1.1	
	Monthly Stream Flow (cfs)	5		4.3		15.3	11.6	11.3	4.2	
	Stream Flow during sample collection (cfs)	5		4.3		15.3	11.6	11.3	4.2	
Chemical										
	Dissolved Oxygen (mg/L)	5		7.2		8.6	8.1	8.0	0.6	
	pH (su)	5		6.2		6.7	6.3	6.4	0.2	
	Ammonia Nitrogen (mg/L)	4	<	0.005	<	0.005	0.002	0.002	0.000	
J	Nitrate+Nitrite Nitrogen (mg/L)	4		0.019		0.127	0.065	0.069	0.054	
	Total Kjeldahl Nitrogen (mg/L)	4	<	0.076		0.407	0.219	0.221	0.202	
J	Total Nitrogen (mg/L)	4	<	0.072		0.487	0.300	0.290	0.202	
J	Dissolved Reactive Phosphorus (mg/L)	4		0.004		0.007	0.006	0.006	0.002	
J	Total Phosphorus (mg/L)	4		0.006		0.009	0.008	0.008	0.001	
J	CBOD-5 (mg/L)	4	<	2.0	<	2.0	1.0	1.0	0.0	
	Chlorides (mg/L)	4		3.3		3.4	3.3	3.3	0.1	
	Atrazine (µg/L)	2	<	0.02	<	0.02	0.01	0.01	0.00	
Total Metals										
J	Aluminum (mg/L)	4		0.107		0.284	0.130	0.162	0.082	
	Iron (mg/L)	4		0.358		0.669	0.548	0.530	0.154	
J	Manganese (mg/L)	4		0.012		0.021	0.016	0.016	0.004	
Dissolved Metals										
J	Aluminum (mg/L)	4	<	0.043		0.061	0.022	0.031	0.020	
	Antimony (µg/L)	4	<	1.9	<	1.9	0.9	0.9	0.0	
	Arsenic (µg/L)	4	<	1.4	<	1.4	0.7	0.7	0.0	
	Cadmium (mg/L)	4	<	0.000	<	0.000	0.000	0.000	0.000	
	Chromium (mg/L)	4	<	0.009	<	0.009	0.004	0.004	0.000	
	Copper (mg/L)	4	<	0.020	<	0.020	0.010	0.010	0.000	
J	Iron (mg/L)	4		0.174		0.229	0.200	0.201	0.030	
	Lead (µg/L)	4	<	0.9	<	0.9	0.5	0.5	0.0	
J	Manganese (mg/L)	4	<	0.004		0.018	0.006	0.009	0.007	
	Mercury (µg/L)	4	<	0.035	<	0.035	0.018	0.018	0.000	
	Nickel (mg/L)	4	<	0.042	<	0.042	0.021	0.021	0.000	
	Selenium (µg/L)	4	<	1.3	<	1.3	0.7	0.7	0.0	
	Silver (mg/L)	4	<	0.000	<	0.000	0.000	0.000	0.000	
J	Thallium (µg/L)	4	<	1.1		1.5[H]	0.5	0.8	0.5	1
	Zinc (mg/L)	4	<	0.012	<	0.012	0.006	0.006	0.000	
Biological										
	Chlorophyll a (mg/L)	4	<	0.53		2.67	0.80	1.20	1.01	
	Fecal Coliform (col/100 mL)	4		12		38	18	22	13	

E=#samples that exceeded criteria; H=*F&W* human health criteria exceeded; J=estimate; N= # samples.