

2015 Monitoring Summary



Luxapallila Creek at Marion County Road 69 (33.92726/-87.84342)

BACKGROUND

The Alabama Department of Environmental Management (ADEM), in consultation with the Environmental Protection Agency (EPA)- Region 4, identified Luxapallila Creek at LXPM-68 as having insufficient data and information to make a final use support determination for Alabama's 2014 Integrated Water Quality Report. Refinements to the macroinvertebrate index used to assess the communities were necessary to more accurately characterize the macroinvertebrate communities in ecoregion 65I. Additional biological, chemical, and physical data were collected in 2015 for use in refining the index and fully assessing the use support status of Luxapallila Creek for the 2016 Integrated Water Quality Report.



Figure 1. Luxapallila Creek at LXPM-68, June 9, 2015.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Luxapallila Creek is a *Fish and Wildlife (F&W)* stream that drains approximately 25 square miles in Marion County, near the town of Winfield. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (57%), shrub/scrub, and pasture/hay. The amount of developed land is less than ten percent. As of April 1, 2016, 17 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. Luxapallila Creek at LXPM-68 is a medium gradient stream (Figure 1). In-stream substrates were dominated by cobble, gravel, and sand. Habitat quality and availability were rated *sub-optimal* 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. Metric results indicated the macroinvertebrate community at LXPM-68 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tombigbee River	
Drainage Area (mi ²)	25	
Ecoregion ^a	65I	
Landuse ^b		
Open water		<1%
Wetland	Woody	3%
	Emergent herbaceous	<1%
Forest	Deciduous	33%
	Evergreen	14%
	Mixed	10%
Shrub/scrub	16%	
Grassland/herbaceous	3%	
Pasture/hay	10%	
Cultivated crops	2%	
Development	Open space	6%
	Low intensity	2%
	Moderate intensity	<1%
	High intensity	<1%
Barren	<1%	
Population/km ^{2c}	25	
# NPDES Permits ^d	TOTAL	17
	Construction	14
	Industrial Gen-	3

a. Fall Line Hills

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 Luxapallila Creek at LXPM-68, June 9, 2015.

Physical Characteristics	
Width (ft)	18
Canopy Cover	Mostly Shaded
Depth (ft)	
	Riffle 0.7
	Run 1.0
	Pool 1.5
% of Reach	
	Riffle 40
	Run 50
	Pool 10
% Substrate	
	Cobble 30
	Gravel 30
	Sand 25
	Silt 1
	Organic Matter 4

Table 3. Results of the habitat assessment conducted on Luxapallila Creek at LXPM-68, June 9, 2015.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	83	Optimal (>79)
Sediment Deposition	75	Sub-Optimal (55-79)
Riffle frequency	87.5	Optimal (>79)
Bank Vegetative Stability	65	Sub-Optimal (58-79)
Riparian Buffer	60	Sub-Optimal (60-84)
Habitat Assessment Score	148	
% of Maximum Score	78	Sub-Optimal (57-80)

Table 4. Results of the macroinvertebrate bioassessment conducted in Luxapallila Creek at LXPM-68, June 9, 2015.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPC taxa	31	55
% Dominant Taxon	31	44
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychi-	11	19
Functional feeding group		
# Collector Taxa	26	95
Community tolerance		
% Nutrient Tolerant individuals	58	11
WMB-I Assessment Score	---	45
WMB-I Assessment Rating		Fair (32-47)

WATER CHEMISTRY

Water samples and in situ measurements were collected monthly, from March through October 2015, to help identify stressors to the biological community of Luxapallila Creek at LXPM-68. Water chemistry results are summarized in Table 5. On July 6, 2015, pH exceeded the minimum criterion applicable to *F&W* streams (i.e., <6.0). Median conductivity and hardness were higher than the median of all reference reach data for the ecoregion (65I). Also, the median concentration of nitrate+nitrite nitrogen was higher than expected based on the 90th percentile of reference reaches in this ecoregion. On two dates (6/2/2015 and 7/6/2015), human health criterion exceedances were recorded for *E. coli*, though these values are estimates. No samples were collected for the analysis of pesticides, semi-volatile organics, or atrazine.

SUMMARY

The habitat assessment at LXPM-68 found the stream to have *sub-optimal* conditions for macroinvertebrates, and the results of the bioassessment indicated the macroinvertebrate community at this location to be in *fair* condition. On July 6, 2015, pH exceeded the minimum criterion applicable to *F&W* streams (i.e., <6.0). Median conductivity, hardness, and nitrate+nitrite nitrogen were higher than expected for ecoregion 65I. Human health criterion exceedances were recorded for *E. coli* on two occasions, though these values are estimates. The results from this report will be used to develop ecoregional criteria for 65I and to fully assess the use support status of Luxapallila Creek for the 2016 Integrated Water Quality Report.

Table 5. Summary of water quality data collected March-October, 2015. 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	Q
Physical								
Temperature (°C)	8	14.8	24.2	20.2	20.1	2.9		
Turbidity (NTU)	7	2.1	23.8	5.0	8.0	7.5		
Total Dissolved Solids (mg/L)	7	22.0	45.0	33.0	31.8	8.0		
Total Suspended Solids (mg/L)	7	< 1.0	17.0	3.0	5.4	6.0		
Specific Conductance (µmhos/	8	27.0	35.3	30.8	31.0	3.0	G	
Hardness (mg/L)	4	8.5	10.1	9.1	9.2	0.7	G	
Alkalinity (mg/L)	7	4.1	6.9	5.6	5.6	1.0		
Monthly Stream Flow (cfs)	7	8.2	67.7	21.3	25.2	20.0		
Measured Stream Flow (cfs)	7	8.2	67.7	21.3	25.2	20.0		
Chemical								
Dissolved Oxygen (mg/L)	8	7.2	9.9	8.5	8.6	0.8		
pH (SU)	8	5.8 ^C	7.0	6.5	6.5	0.4		1
Ammonia Nitrogen (mg/L)	7	< 0.007	0.035	0.005	0.009	0.011		
Nitrate+Nitrite Nitrogen (mg/L)	7	0.306	0.613	0.440	0.442	0.105	M	
Total Kjeldahl Nitrogen (mg/L)	7	< 0.064	0.443	0.245	0.234	0.153		
Total Nitrogen (mg/L)	7	< 0.463	0.948	0.753	0.676	0.184		
Dis Reactive Phosphorus (mg/L)	7	< 0.003	0.005	0.004	0.004	0.001		
Total Phosphorus (mg/L)	7	0.011	0.032	0.015	0.018	0.007		
CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0		
Chlorides (mg/L)	7	2.0	3.2	2.4	2.5	0.5		
Total Metals								
Aluminum (mg/L)	4	< 0.106	1.040	0.316	0.432	0.476		
Iron (mg/L)	4	0.336	1.010	0.716	0.694	0.350		
Manganese (mg/L)	4	0.049	0.077	0.050	0.057	0.014		
Dissolved Metals								
Aluminum (mg/L)	4	< 0.106	< 0.106	0.053	0.053	0.000		
Antimony (µg/L)	4	< 0.328	< 0.342	0.171	0.210	0.078		
Arsenic (µg/L)	4	< 0.276	0.288	0.138	0.176	0.075		1
Cadmium (µg/L)	4	< 0.311	< 0.311	0.156	0.156	0.000		
Chromium (µg/L)	4	< 0.347	0.827	0.612	0.556	0.290		
Copper (µg/L)	4	0.243	0.674	0.332	0.395	0.193		
Iron (mg/L)	4	0.171	0.283	0.240	0.234	0.048		
Lead (µg/L)	4	< 0.428	< 0.428	0.214	0.214	0.000		
Manganese (mg/L)	4	0.026	0.074	0.040	0.045	0.020		
Nickel (µg/L)	4	0.680	1.826	1.472	1.362	0.527		
Selenium (µg/L)	4	< 0.395	< 0.395	0.198	0.198	0.000		
Silver (µg/L)	4	< 0.365	< 0.365	0.182	0.182	0.000		
Thallium (µg/L)	4	< 0.514	0.514	0.257	0.257	0.000		
Zinc (µg/L)	4	3.030	9.761	3.736	5.066	3.189		
Biological								
Chlorophyll a (mg/m ³)	7	< 0.10	11.70	0.67	2.40	4.16		
<i>E. coli</i> (MPN/DL)	7	129.6	866.4	360.9	371.3	237.8		2

E=# samples that exceeded criteria; Q=# of uncertain exceedances; J=estimate; N=# samples; C=*F&W* criterion exceeded; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 65I; G=value higher than median of all verified ecoregional reference reach data collected in ecoregion 65I; H=*F&W* human health criterion exceeded.

FOR MONITORING INFORMATION, CONTACT:
 Tim Wynn, ADEM Environmental Indicators Section
 110 Vulcan Road, Birmingham AL 35209
 (205) 942-6168 timothy.wynn@adem.alabama.gov