

2016 Monitoring Summary



Use Support Assessment

Cypress Creek at Alabama Highway 133/Cox Creek Parkway (Lauderdale County) (34.83055/-87.70418)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Cypress Creek at CPSL-3 to provide biological, chemical, and physical data to fully assess the use support status of the stream reach for the biannual Integrated Report to EPA. Habitat and fish community surveys were conducted on Cypress Creek at CPSL-3, May 2, 2016 to assess habitat and biological conditions. Monthly water quality sampling was also conducted, March-October 2016.

Cypress Creek is within one of 50 Strategic Habitat Units (SHU) designated by the U.S. Fish and Wildlife Service (USFWS) and the Alabama Rivers & Streams Network (ARSN). SHUs are recognized as high quality habitats occupied by federally listed and state imperiled species.



Figure 1. Cypress Creek at CPSL-3, May 2, 2016.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cypress Creek at CPSL-3 is a *Public Water Supply (PWS) / Fish and Wildlife (F&W)* stream, located in Lauderdale County. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily agriculture (37.8%) and forest (35.8%). Approximately eight percent of the watershed is developed. As of January 1, 2016, there are 21 permitted outfalls in the watershed.

REACH CHARACTERISTICS

General observations (Figure 1, Table 2) and a habitat survey (Table 3) were completed during the fish community survey. 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. Cypress Creek, at CPSL-3, is predominantly run habitat and cobble-gravel substrates. Overall habitat quality and availability have been rated as *optimal* for supporting biological communities (Table 3).

Table 1. Summary of general watershed characteristics: CPSL-3 (2016).

Watershed Characteristics	
Basin	Tennessee
Drainage Area (mi ²)	190.4
Ecoregion ^o	71F
Assessment Unit	AL06030005-0605-102
Use Class	PWS/F&W
AU Category	1
12-digit Hydrologic Unit Code (HUC)	060300050605
Conservation Status	
Strategic Habitat Unit †	3 Cypress Creek
Landuse Categories (2011 National Land Cover Dataset)	
Open Water (%)	0.2
Wetland, Total (%)	3.7
Wetlands, Woody (%)	3.7
Wetlands, Emergent Herbaceous (%)	0.1
Forested, Total (%)	35.8
Forested, Deciduous (%)	30.1
Forested, Evergreen (%)	4.0
Forested, Mixed (%)	1.7
Shrub/Scrub (%)	12.8
Grassland/Herbaceous (%)	1.9
Pasture/Hay (%)	25.6
Crops, Cultivated (%)	12.2
Developed, Total (%)	7.7
Developed, Open Space (%)	6.2
Developed, Low Intensity (%)	1.3
Developed, Medium Intensity (%)	0.2
Developed, High Intensity (%)	<1
Barren Land (Rock, Sand, Clay) (%)	<1
Population/km ² (2010 US Census)	33
NPDES outfalls (NPDES database, Jan 1, 2016)	
Total # of Permitted Outfalls	21
# of Construction Stormwater Permits	8
# of Industrial General	9
# of Industrial Individual	1
# of Municipal Permits	1
# of UIC	2
Roads	
Road Density	1.7
# Road Crossings per Stream km	0.7
Watershed Disturbance Score*	252
Watershed Disturbance Category*	5

^o Western Highland Rim

† 12-digit HUC located in a Strategic Habitat Unit.

* Measure of watershed disturbance based on landuse, population, and road density summarized in this table.

BIOASSESSMENT RESULTS

The fish community in Cypress Creek at CPSL-3 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), a fish community bioassessment tool for wadeable streams and rivers across the state. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Cypress Creek at CPSL-3 was 42. Based on conditions expected for wadeable streams and rivers in the Tennessee Valley Ichthyoregion, this score indicates the fish community to be in *good* condition (Table 4).

Table 2. Physical characteristics of Cypress Creek at CPSL-3, May 2, 2016.

Physical Characteristics	
Width (ft)	100
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	0.8
Run	2.0
Pool	3.0
% of Reach	
Riffle	5
Run	70
Pool	25
% Substrate	
Boulder	10
Clay	1
Cobble	35
Mud/Muck	2
Gravel	45
Organic Matter	7

Table 3. Results of the habitat assessment survey conducted on Cypress Creek at CPSL-3, May 2, 2016.

Habitat Survey	% Max Score	Rating
Instream Habitat Quality	85	Optimal (80-100)
Sediment Deposition	89	Optimal (80-100)
Riffle Frequency	83	Optimal (80-100)
Bank Vegetative Stability	79	Sub-optimal (58-79)
Riparian Zone Measurements	88	Optimal (85-100)
Habitat Assessment Score	170	
% Maximum Score	85	Optimal (81-100)

Table 4. Results of the fish survey conducted on Cypress Creek at CPSL-3, May 2, 2016.

Fish Assessment	Results	Scores
Taxonomic richness and diversity metrics		
Total Native Species	27	3
Number of shiner species	5	3
Number of Sucker Species	1	1
Number of darter+madtom species	10	3
Tolerance metrics		
Number of intolerant species	3	5
Percent of tolerant species	25	3
Percent Lepomis	16	3
Trophic metrics		
Percent invertivores	23	3
Percent omnivores	13	5
Percent top carnivores	3	5
Abundance, condition, and reproductive metrics		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	18	3
IBI Survey Score		42
IBI Survey Rating		Good (41-49)

Table 5. Summary of water quality data collected March-October, 2016. 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)	9	14.1	26.3	21.2	20.8	4.5	
Turbidity (NTU)	9	2.8	9.5	4.1	4.4	2.0	
Total Dissolved Solids (mg/L)	8	47.0	98.0	74.0	72.1	16.7	
Total Suspended Solids (µmhos/cm)	8	3.0	11.0	6.0	5.9	2.7	
Specific Conductance (µmhos/cm)	9	78.0	144.0	110.0 ^G	109.8	23.2	
Hardness (mg/L)	4	34.5	67.2	52.4	51.6	15.9	
Alkalinity (mg/L)	8	18.6	65.6	38.1	40.2	16.8	
Monthly Stream Flow (cfs)	7	49.3	208.4	116.4	122.6	64.3	
Measured Stream Flow (cfs)	7	49.3	208.4	116.4	122.6	64.3	
Chemical							
Dissolved Oxygen (mg/L)	9	8.8	11.1	10.2	10.0	0.7	
pH (SU)	9	5.3 ^C	7.9	7.6	7.3	0.8	1
Ammonia Nitrogen (mg/L)	8	< 0.018	0.034	0.009	0.012	0.009	
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.327	0.572	0.474	0.459	0.100	
^J Total Kjeldahl Nitrogen (mg/L)	8	0.103	0.787	0.208	0.340	0.272	
^J Dis Reactive Phosphorus (mg/L)	8	0.007	0.024	0.010	0.012	0.005	
Total Phosphorus (mg/L)	8	0.013	0.029	0.016	0.018	0.005	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
^J Chlorides (mg/L)	8	1.6	2.4	1.8	1.8	0.3	
^J Sulfate (mg/L)	8	3.92	19.50	11.33	12.22	5.43	
Total Metals							
^J Aluminum (T) (mg/L)	4	< 0.014	0.174	0.060	0.075	0.071	
^J Iron (T) (mg/L)	4	0.110	0.171	0.124	0.132	0.028	
^J Manganese (T) (mg/L)	4	0.016	0.042	0.031	0.030	0.012	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.012	1.010	0.007	0.258	0.502	
^J Antimony (µg/L)	4	< 2.920	< 2.920	1.460	1.460	0.000	
Arsenic (µg/L)	4	< 0.699	< 0.699	0.350	0.350	0.000	
Cadmium (µg/L)	4	< 0.839	< 0.839	0.420	0.420	0.000	
Chromium (µg/L)	4	< 1.050	10.700	0.525	3.069	5.088	
Copper (µg/L)	4	< 3.620	< 3.620	1.810	1.810	0.000	
^J Iron (mg/L)	4	0.039	0.142	0.048	0.069	0.049	
Lead (µg/L)	4	< 3.440	< 3.440	1.720	1.720	0.000	
^J Manganese (mg/L)	4	0.010	0.051	0.018	0.024	0.018	
Nickel (µg/L)	4	< 3.260	6.640	1.630	2.882	2.505	
Selenium (µg/L)	4	< 1.440	< 1.440	0.720	0.720	0.000	
Silver (µg/L)	4	< 0.905	< 0.905	0.452	0.452	0.000	
Thallium (µg/L)	4	< 1.080	< 1.080	0.540	0.540	0.000	
^J Zinc (µg/L)	4	< 10.600	10.600	5.300	10.600	9.600	
Biological							
Chlorophyll a (mg/m ³)	8	< 1.00	2.94	0.50	0.80	0.86	
E. coli (MPN/DL)	8	41.0	387.3 ^H	56.5	116.6	119.4	1

C=PWS/F&W criterion violated; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 71F; H=PWS/F&W human health criterion exceeded; J=estimate; N=# samples

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly and semi-monthly (metals), March through October, 2016, to help characterize water quality conditions within the reach. The *E. coli* count reached 387.3 colonies/100mL, after a rain event in August. In October, stream flow was 49.3 cfs, and pH was 5.3 s.u. Median specific conductance was higher than ecoregional reference data collected for other streams in ecoregion 71F. Metals and other physical and chemical parameters were within normal limits.

SUMMARY

Cypress Creek at CPSL-3 in Lauderdale County was selected for sampling by the ADEM to provide biological, chemical, and physical data to fully assess the use support status of the stream reach. Overall habitat quality and availability for Cypress Creek were rated as *optimal* for supporting biological communities. Fish survey results indicated the fish community to be in *good* condition. Metals and all other physical and chemical parameters were within normal limits. However, median specific conductance and pH were outside of ranges expected of streams located within the Western Highland Rim ecoregion (71F). Monitoring should continue to ensure that biological conditions are maintained.

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