

# 2014 Monitoring Summary



## Flat Creek at Alabama Highway 54 in Geneva County (31.10913/-86.14587)

### BACKGROUND

Flat Creek is among the least disturbed watersheds within the Dougherty Plains ecoregion based on landuse, road density, and population density. These data will be used to evaluate the use of Flat Creek at FTCG-25 as a reference condition stream for comparison with other streams in this ecoregion. Additionally, Flat Creek was selected for biological and water quality monitoring as part of the 2014 Southeast Alabama Basin Assessment Monitoring. The objectives were to assess the biological integrity and to estimate overall water quality. A habitat and fish community assessment were conducted on Flat Creek at FTCG-25 on July 17, 2014.



Figure 1. Flat Creek at FTCG-25, October 8, 2014.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Flat Creek at FTCG-25 is a *Swimming and Fish & Wildlife (S/F&W)* stream located in Geneva County, approximately five miles west of Samson. According to the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (46%) with some shrub/scrub. As of April 1, 2016, eleven outfalls are active within this watershed.

### REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community 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. Flat Creek at FTCG-25 is a low-gradient sand-bottomed stream, typical of other streams within the Dougherty Plains ecoregion (Figure 1). Overall habitat quality was rated as *sub-optimal* due to large riparian buffer and instream habitat quality.

### BIOASSESSMENT RESULTS

The fish community in Flat Creek at FTCG-25 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for wadeable streams and rivers across the state. The data collected during this survey were used to score the overall health of the fish community, based on conditions expected for wadeable streams and rivers in the Southern Plains Ichthyoregion. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, and 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 Flat Creek at FTCG-25 was 48, indicating the fish community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
<b>Basin</b>		Choctawhatchee R
<b>Drainage Area (mi<sup>2</sup>)</b>		83
<b>Ecoregion<sup>a</sup></b>		65G
<b>% Landuse<sup>b</sup></b>		
Open water		<1%
Wetland	Woody	4%
	Emergent herbaceous	<1%
Forest	Deciduous	4%
	Evergreen	36%
	Mixed	6%
Shrub/scrub		19%
Grassland/herbaceous		5%
Pasture/hay		13%
Cultivated crops		7%
Development	Open space	5%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
<b>Population/km<sup>2c</sup></b>		9
<b># NPDES Permits<sup>d</sup></b>	<b>TOTAL</b>	11
	Construction	6
	Industrial General	5

a. Dougherty Plain

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 Flat Creek at FTCG-25, July 17, 2014.

Physical Characteristics		
<b>Width (ft)</b>		35
<b>Canopy cover</b>		Mostly Open
<b>Depth (ft)</b>	Run	2.5
	Pool	4
<b>% of Reach</b>	Run	45
	Pool	55
<b>% Substrate</b>	Mud/Muck	7
	Sand	60
	Organic Matter	33

**Table 3.** Results of the habitat assessment conducted in Flat Creek at FTFCG-25, July 17, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	68	Sub-Optimal (55-79)
Sediment Deposition	60	Sub-Optimal (55-79)
Sinuosity	68	Sub-Optimal (55-79)
Bank Vegetative Stability	73	Sub-Optimal (58-79)
Riparian Buffer	85	Optimal (>84)
<b>Habitat Assessment Score</b>	<b>129</b>	
<b>% of Maximum Score</b>	<b>76</b>	<b>Sub-Optimal (57-80)</b>

**Table 4.** Results of the fish community bioassessment conducted in Flat Creek at FTFCG-25, July 17, 2014.

Fish Community Assessment		
	Results	Score
<b>Species Richness &amp; Diversity</b>		
Total native species	23	5
Number shiner species	5	5
Number of sucker species	0	1
Number of centrarchid species	7	5
Number of darter+madtom species	7	5
<b>Tolerance &amp; Intolerance Measures</b>		
Percent of tolerant species	3.2	5
Percent Green Sunfish & Yellow Bullhead	0	5
<b>Trophic Measures</b>		
Percent insectivorous cyprinids	52.8	3
Percent invertivores	17.6	1
Percent top carnivores	1.6	3
<b>Abundance, Condition &amp; Reproductive Measures</b>		
Percent DELT+hybrids	0	5
Number of lithophilic spawners	13	5
<b>IBI Assessment Score</b>		<b>48</b>
<b>Condition</b>		<b>Good</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly or semi-monthly (metals) from March through October 2014, and organics were collected in April to help identify potential stressors to the biological communities. Median specific conductivity, hardness, alkalinity, and pH values were higher than expected based on data collected at reference reaches within the Dougherty Plains ecoregion (65g). All organics collected, with the exception of atrazine, were below the minimum detection limits. Summer *E. coli* counts exceeded F&W maximum single sample criteria during the September station visit.

## SUMMARY

Fish community sampling indicated the fish community to be in *good* condition, and the habitat assessment was rated *sub-optimal*. Some physical and chemical parameters were higher than expected based on data collected at reference reaches within the ecoregion (65g). *E. coli* exceeded F&W criteria in September. Based on the water chemistry results and the fish community assessment, it appears it may meet the "best attainable condition" within ecoregion 65g; however, monitoring should continue to ensure water quality and biological conditions remain stable and continue to meet standards.

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**Table 5.** Summary of water quality data collected March-October, 2014. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value for non-metals parameters. 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
<b>Physical</b>								
Temperature (°C)	10	13.6	25.5	21.8	20.4	4.6		
Turbidity (NTU)	10	4.2	21.3	8.3	9.3	5.5		
Total Dissolved Solids (mg/L)	8	47.0	125.0	62.5	69.1	24.2		
Total Suspended Solids (mg/L)	8	< 1.0	9.0	2.5	2.9	2.8		
Specific Conductance (µmhos)	10	31.9	70.0	59.7 <sup>G</sup>	53.2	14.8		
Hardness (mg/L)	4	14.4	28.1	23.9 <sup>G</sup>	22.6	5.8		
Alkalinity (mg/L)	8	9.4	26.9	23.9 <sup>M</sup>	19.9	7.4		
Monthly Stream Flow (cfs)	5	5.4	62.8	11.4	21.2	23.5		
Measured Stream Flow (cfs)	5	5.4	62.8	11.4	21.2	23.5		
<b>Chemical</b>								
Dissolved Oxygen (mg/L)	9	6.9	9.4	7.7	8.0	0.8		
pH (su)	10	6.4	7.1	6.9 <sup>M</sup>	6.8	0.2		
Ammonia Nitrogen (mg/L)	8	< 0.006	< 0.010	0.003	0.004	0.001		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.118	0.350	0.242	0.246	0.090		
Total Kjeldahl Nitrogen (mg/L)	8	0.168	0.807	0.354	0.396	0.199		
Total Nitrogen (mg/L)	8	0.492	0.925	0.646	0.641	0.144		
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.004	0.003	0.003	0.001		
<sup>J</sup> Total Phosphorus (mg/L)	8	0.009	0.028	0.016	0.018	0.008		
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
COD (mg/L)	8	13.0	27.0	16.6	17.3	4.3		
TOC (mg/L)	8	3.1	7.4	5.5	5.4	1.5		
Chlorides (mg/L)	8	2.8	4.3	3.8	3.6	0.6		
Atrazine (µg/L)	1				0.16			
<b>Total Metals</b>								
Aluminum (mg/L)	4	< 0.050	0.357	0.120	0.156	0.162		
Iron (mg/L)	4	0.538	1.370	0.810	0.882	0.372		
Manganese (mg/L)	4	0.050	0.121	0.064	0.075	0.032		
<b>Dissolved Metals</b>								
<sup>J</sup> Aluminum (mg/L)	4	< 0.050	0.275	0.045	0.098	0.120		
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1		
<sup>J</sup> Arsenic (µg/L)	4	< 0.3	0.6 <sup>H</sup>	0.4	0.4	0.2		3
Cadmium (µg/L)	4	< 0.246	< 0.390	0.123	0.141	0.036		
<sup>J</sup> Chromium (µg/L)	4	0.522	1.086	0.575	0.690	0.266		
<sup>J</sup> Copper (µg/L)	4	< 0.270	0.504	0.138	0.229	0.184		
Iron (mg/L)	4	0.340	0.932	0.493	0.564	0.275		
<sup>J</sup> Lead (µg/L)	4	< 0.2	< 0.5	0.2	0.2	0.1		
<sup>J</sup> Manganese (mg/L)	4	0.022	0.104	0.046	0.054	0.038		
<sup>J</sup> Nickel (µg/L)	4	0.310	< 0.570	0.310	0.314	0.028		
Selenium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0		
Silver (µg/L)	4	< 0.252	< 0.460	0.126	0.152	0.052		
Thallium (µg/L)	4	< 0.2	< 0.6	0.1	0.2	0.1		
<sup>J</sup> Zinc (mg/L)	4	0.003	0.013	0.004	0.006	0.005		
<b>Biological</b>								
Chlorophyll a (ug/L)	8	< 0.10	6.10	1.16	2.00	2.44		
<sup>J</sup> <i>E. coli</i> (col/100mL)	8	99	727 <sup>H</sup>	154	277	247	1	

E=# of samples that exceeded criteria; G=value higher than median of all ecoregional reference reach data collected in ecoregion 65g; H=F&W human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65g; N=# samples; Q=# of samples that it is uncertain if an exceedance of criteria occurred.