Little Fishhawk Creek at Fishhawk Boulevard

Methods

Study Area Analysis

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS 10.2. Using this software with 2016 Hillsborough County aerial, 2011 Land Use/ Land Cover (LULC) and Watershed boundary (WBID) layers courtesy of the Florida Department of Environmental Protection. The Landscape Development Intensity Index (LDI) was calculated for the WBID containing the stream. From FDEP "The Landscape Development Intensity index (LDI) is an estimate of how much humans have altered an area of interest around a waterbody. Various land use types (low density residential, row crops, industrial and natural) are assigned coefficients of land use intensity based on estimates of the amount of human energy that is put into those land use types. The LDI is calculated by multiplying each land use coefficient by the percentage of the area of interest occupied by that land use, and then summing the results. The Florida Department of Environmental Protection (DEP) uses the LDI as a tool to estimate potential land use impacts on streams, lakes, and wetlands. LDI values less than two (≤ 2) can be considered minimally disturbed." In the Florida framework, the maximum LDI index score is approximately 42.

Habitat/Vegetation Assessment

For small streams that are not easily navigated by Jonboat for bathymetric mapping and vegetation analysis, Hillsborough County requested the implementation of the Florida Department of Environmental Protection methods for Stream and River Habitat Assessment (FT 3100) (http://www.dep.state.fl.us/water/sas/sop/sops.htm) using forms FD 9000-3, FD 9000-4 and FD 9000-5, Rapid Periphyton Survey (FS 7230) using form FD 9000-25 and Linear Stream Vegetation Survey (FS 7320) using form FD 9000-32. These methods were utilized on two sampling locations on each stream, typically near access points along roadways.

Stream and River Habitat Assessment per FT3100 receives a score calculated in Form FD 9000-5. This score results from the ranking of the primary habitat components (substrate diversity, substrate availability, water velocity and habitat smothering) and secondary habitat components (Artificial channelization, bank stability, riparian buffer zone width and riparian zone vegetation quality). The maximum score possible in this method is a 160.

Two metrics are utilized in the Linear Vegetation Survey. The Mean Coefficient of Conservatism (CoC) applies a score of 0-10 to each species based on its ecological tolerances and fidelity to pre-settlement conditions. Species with higher scores show a high fidelity to native, undisturbed habitats and are typically sensitive to alterations. Available CoC scores can be obtained from LT 7000 from the Florida Department of Environmental Protection at:

http://www.dep.state.fl.us/water/sas/sop/sops.htm. The Percent Florida Exotic Pest Plant Council (% FLEPPC) metric calculates the percent invasive exotics as the number of occurrences of FLEPPC Category I or II in the 100 m reach divided by the total number of taxa occurrences in the 100 m reach. The FLEPPC list can be found at: http://www.fleppc.org/list/11list.html

Stream Condition Index Assessment

The Stream Condition Index (SCI) was sampled per DEP SOP FS7420 and calculated per DEP SOP LT7200. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, and identified to the lowest practical taxonomic level. The SCI is composed of ten metrics, eight of which decrease in response to human disturbance, with two metrics (% very tolerant and % dominant) increasing in response to human disturbance. According to DEP SOP LT 7000, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. Proposed biological health assessment criteria state that a site is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of those scores is less than 35.

Water Quality Assessment

Physical water quality samples were taken using a Eureka Manta Sub-2 multiprobe pre and post calibrated daily. Measurements taken with this device include: depth, conductivity, pH, Dissolved Oxygen (mg/l and % Saturation) and salinity. Chemical water parameters were collected and preserved on ice by USF Water Institute staff and analyzed at the Environmental Protection Commission of Hillsborough County Laboratory. Analysis include; Chlorophyll (a, b, c, t and corrected), Alkalinity, Color, Fecal Coliform, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

Little Fishhawk Creek is located south of the Alafia River in the town of Fishhawk, Hillsborough County Florida. The sample site selected for the study was located immediately downstream of the Fishhawk Boulevard Bridge and was assessed on March 23, 2017. Little Fishhawk Creek is located in FDEP WBID 1657 which contains 3,647 acres of land. Little Fishhawk Creek drains into the Alafia River south of Lithia Springs Park. The watershed surrounding Little Fishhawk Creek is dominated by Residential (40.93%), Natural Land/Open Water (23.61%) and Cropland and Pastureland (16.55%) land uses. The Landscape Development Intensity Index of the watershed is 4.84. The LDI value of the 100 meter buffer around the stream was 2.27.

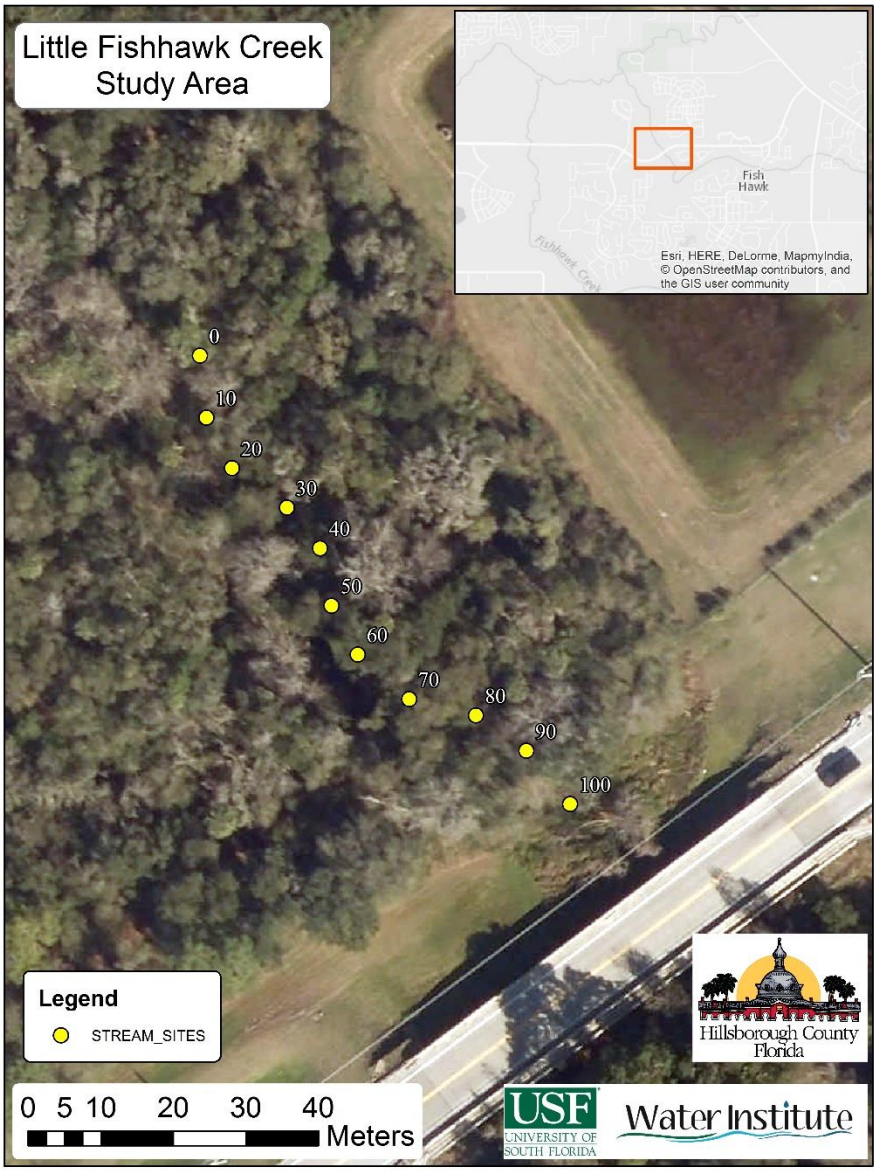

Figure 1. 2017 Little Fishhawk Creek at Fishhawk Boulevard Assessment Study Area Map

Habitat Assessment

Figure 2 Overview photograph of Little Fishhawk Creek at Fishhawk Blvd sample site

Little Fishhawk Creek at Fishhawk Blvd received a Habitat Assessment score of 121 due to Optimal scores for Habitat Smothering, Artificial Channelization, Riparian Buffer Zone Width and Riparian Zone Vegetation Quality. Suboptimal scores were recorded for substrate diversity, Water Velocity and Bank Stability. Marginal scores were achieved for Substrate Availability.

The major productive habitats found at the sample site were Snags (4.5%), Roots/Undercut Banks (1.5%) and Rock (1.8%). The water velocity was measured at the 60 meter mark and averaged 0.21m/s.

During the Rapid Periphyton Survey, periphyton was not observed in the 99 individual grab samples performed. The average canopy cover in the 100 meter region was 86%. The Secchi Disk Depth was measured as 1.2m at the 50 meter mark. The average water depth at the time of the assessment was .25m.

The Linear Vegetation Survey identified 7 species rooted in the water at the time of the assessment. One of these species are classified as non-native, invasive species. The remaining 6 species are native to this region. The vegetation community along this sample location showed little evidence of frequent disturbance. There were a total of 10 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 4.73 and the % FLEPPC metric for the study area was 10%.

Table 1 Linear Vegetation Survey Results – Little Fishhawk Creek at Fishhawk Blvd

Plant Species	Sample Site										Obsevations/ Species	CoC
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
Itea virginica		1							1	1	3	7.09
Commelina diffusa								1	1		2	2.02
Cicuta maculata									1		1	4.54
Crinum americanum									1		1	9
Hydrocotyle umbellata									1		1	1.92
Panicum maximum										1	1	0
Saururus cernuus										1	1	6.5
Observations/station	0	1	0	0	0	0	0	1	5	3	10	
Total Observations	10											
Mean CoC	4.73											
% FLEPPC	10%											

Figure 3. ***Saururus cernuus*** **along the banks of Little Fishhawk Creek at the Fishhawk Blvd sampling site**

Stream Condition Index

The analysis of the SCI sample involves splitting the sample into 2 aliquots for analysis. The SCI metrics are then calculated on each separately. The final SCI score is an average of the two scores. The SCI score for Little Fishhawk Creek was 65 out of a possible 100 points, corresponding with a "Healthy" designation, with the expected community of a healthy stream.

The summary of the metric scores for aliquot A (top) and aliquot B (bottom) are shown in Table 2. Both samples were dominated by *Microcylloepus spp.* Sample A contained 18 total taxa, including 4 sensitive taxa and 0.63% very tolerant individuals. Sample B contained 18 total taxa, including 4 sensitive taxa and 0.66% very tolerant individuals. Neither sample contained a long-lived taxa.

Table 2 SCI metric summaries for Little Fishhawk Creek

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	18.00	1.25	1.25
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	38.44	8.78	8.78
Total Clingers	5.00	7.14	7.14
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	28.75	7.05	7.05
% Tanytarsini	30.00	10.10	10.00
Total Sensitive Taxa	4.00	5.71	5.71
% Very Tolerant Individuals	0.63	10.54	10.00

SCI Sum	58.22
Final SCI score	64.69

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	18.00	1.25	1.25
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	30.92	7.03	7.03
Total Clingers	5.00	7.14	7.14
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	25.66	7.67	7.67
% Tanytarsini	28.95	10.00	10.00
Total Sensitive Taxa	4.00	5.71	5.71
% Very Tolerant Individuals	0.66	10.49	10.00

SCI Sum	59.09
Final SCI score	65.65

The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for Little Fishhawk Creek.

Little Fishhawk SCIA

Stream Condition Index (SCI)

Samples Collected 03/23/2017

Project #: 6063170278

Stream Condition Index Results for Little Fishhawk SCIA

Phylum	Class	Order	Family	Taxa	Abundance	Collapsed Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Mollusca	Gastropoda	Hygrophila	Physidae	*Physella cubensis*	1	1	1										1
Arthropoda	Malacostraca	Isopoda	Asellidae	*Caecidotea* spp.	15	15	1									1	
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	*Hyalella azteca* sp. complex	2	2	1										
Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetidae spp.	5												
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Acentrella alachua*	1	6	1	1									
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Heptageniidae spp.	1	1	1	1				1				1	
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia* spp.	1	1	1										
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Triaenodes* spp.	1	1	1		1							1	
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	6	6	1		1		6	1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptila* spp.	4	4	1		1			1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	46	46	1							46			
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* spp.	7	7	1			3.5					7		
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	11	11	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	41	41	1				41	1			41		
Arthropoda	Insecta	Diptera	Chironomidae	*Ablabesmyia mallochi*	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Pentaneura inconspicua*	3	3	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Labrundinia* spp.	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Tvetenia* spp.	2	2	1										
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium* spp.	11	11	1				11	1				1	

Table 3 SCI full results for Sample A

Little Fishhawk SCIB

Stream Condition Index (SCI)

Samples Collected 03/23/2017

Project #: 6063170278

Stream Condition Index Results for Little Fishhawk SCIB

Phylum	Class	Order	Family	Taxa	Abundance	Collapsed Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Arthropoda	Malacostraca	Isopoda	Asellidae	*Caecidotea* spp.	17	17	1									1	
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	*Hyalella azteca* sp. complex	1	1	1										
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis hilaris*	1	1	1	1									
Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetidae spp.	6	6	1	1									
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Maccaffertium exiguum*	1	1	1	1				1				1	
Arthropoda	Insecta	Odonata	Coenagrionidae	*Enallagma coecum*	1	1	1										1
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Triaenodes* spp.	3	3	1		1							1	
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	6	6	1		1		6	1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptila* spp.	9	9	1		1			1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* spp.	3	3	1										
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	39	39	1							39			
Arthropoda	Insecta	Diptera		Diptera spp.	1												
Arthropoda	Insecta	Diptera	Chironomidae	*Cladotanytarsus* spp.	1	1	1			0.5					1		
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* spp.	11	11	1			5.5					11		
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	12	12	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	31	32	1				32	1			32		
Arthropoda	Insecta	Diptera	Chironomidae	*Pentaneura inconspicua*	5	5	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Tvetenia* spp.	1	1	1										
Arthropoda	Insecta	Diptera	Simulidae	*Simulium* spp.	3	3	1				3	1				1	

Table 4 SCI full results for Sample B

Water Quality Assessment

Limited long-term water quality data is available for this tributary to the Alafia River. The data that is available was collected by the Hillsborough County Environmental Protection Commission from 2005 to present. This assessment, which took place during March of 2017, occurred near the end of the dry season. As such the input of water from surrounding uplands and wetlands was greatly reduced. Values for the 2017 USF Water Institute Assessment fall within the range of the previous data collections. Table 5 provides a summary of the Physical/Chemical conditions recorded at the sample site.

Table 5 Little Fishhawk Creek Physical Water Quality (Field)

Little Fishhawk Creek at Fishhawk Blvd								
Date	**Depth (m)**	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (m)**
3/30/2017	0.26	19.74	7.91	7.75	84	299.9	0.14	1.2 Visible on Bottom
Mean POR		21.75	7.29	6.85	76.04	243.7	0.12	

The chemical water quality analysis for Little Fishhawk Creek is shown in Table 6 along with mean values for the period of record for available parameters. Total Phosphorous values were above the nutrient region threshold developed by FDEP of 0.49 mg/l for both the most recent sample and the mean value of the period of record (2005 – 2012). Total Nitrogen values were below the nutrient region threshold developed by FDEP of 1.65 mg/l for both most current and period of record (2005-2012) values. Chlorophyll-a corrected values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l for the most recent sample, but below this threshold for the period of record (2005-2012). For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora. The results of sampling during the dry season can be seen in the significant variation of the Color parameter.

Table 6 Little Fishhawk Creek Water Quality (Laboratory)

Little Fishhawk Creek		
Parameter	**Fishhawk Blvd**	**Period of Record Mean**
Ammonia	0.013 mg/L	0.264 mg/L
Nitrates/Nitrites	0.453 mg/L	No Data
Kjeldahl Nitrogen	0.375 mg/L	0.592 mg/L
Total Nitrogen	0.828 mg/L	0.695 mg/L
Total Phosphorous	0.558 mg/L	0.474 mg/L
Alkalinity	72.0 mg/LCaCO3	No Data
Chlorophyll - a	1.3 ug/L	1.66 ug/L
Chlorophyll - a Corrected	3.4 ug/L	1.58 ug/L
Color	18.3 Pt/Co	73.18 Pt/Co
Fecal Coliform	560 #/100 ml	750 #/100ml
Enterococci	800 #/100 ml	1,634 #/100ml

Conclusion

The region of Little Fishhawk Creek that was assessed during this study does shows elevated total phosphorous concentrations at the time of assessment exceeding the FDEP threshold value, however the period of record value is below the threshold. The system does not show impairment in the vegetation communities through the linear vegetation survey and rapid periphyton survey results. The habitat assessment performed on the sample site shows suitable habitat for biotic use with an optimal Habitat Assessment score of 121. Table 7 Summarizes the results of the nutrient sampling, floristic sampling, habitat assessment and SCI.

Table 7 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Fishhawk Blvd	Threshold
Total Phosphorous (mg/l)		0.558	< 0.49
Total Nitrogen (mg/l)		0.828	< 1.65
RPS (% Rank 4-6)		0	< 25%
LVS	Avg C of C	4.73	≥ 2.5
	FLEPPC %	10.00%	< 25%
Chlorophyll (µg/l)		3.4	< 20 µg/l
Habitat Assessment		121	> 34
SCI		65	> 34