

Campbell Branch Creek

Methods

Study Area Analysis

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS 10.2. Using this software with 2011 Hillsborough County aerial, Land Use/ Land Cover (LULC) and Watershed boundary layers courtesy of the Southwest Florida Water Management District, Landscape Development Intensity (LDI) Index values were calculated for each watershed following the procedures of Reiss & Brown 2012 (Reiss & Brown. 2012. Landscape Development Intensity (LDI) Index User's Manual. H.T. Odum Center for Wetlands, University of Florida. March 2012). According to Reiss and Brown "The LDI represents a human disturbance gradient for wetland systems. The LDI is an integrated measure of human activity, combining the effects from air and water pollutants, physical damage, changes in the suite of environmental conditions ... on the structure and processes of landscapes and ecosystems... Natural, undeveloped LU/LC classes have a LDI index value of zero. 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.

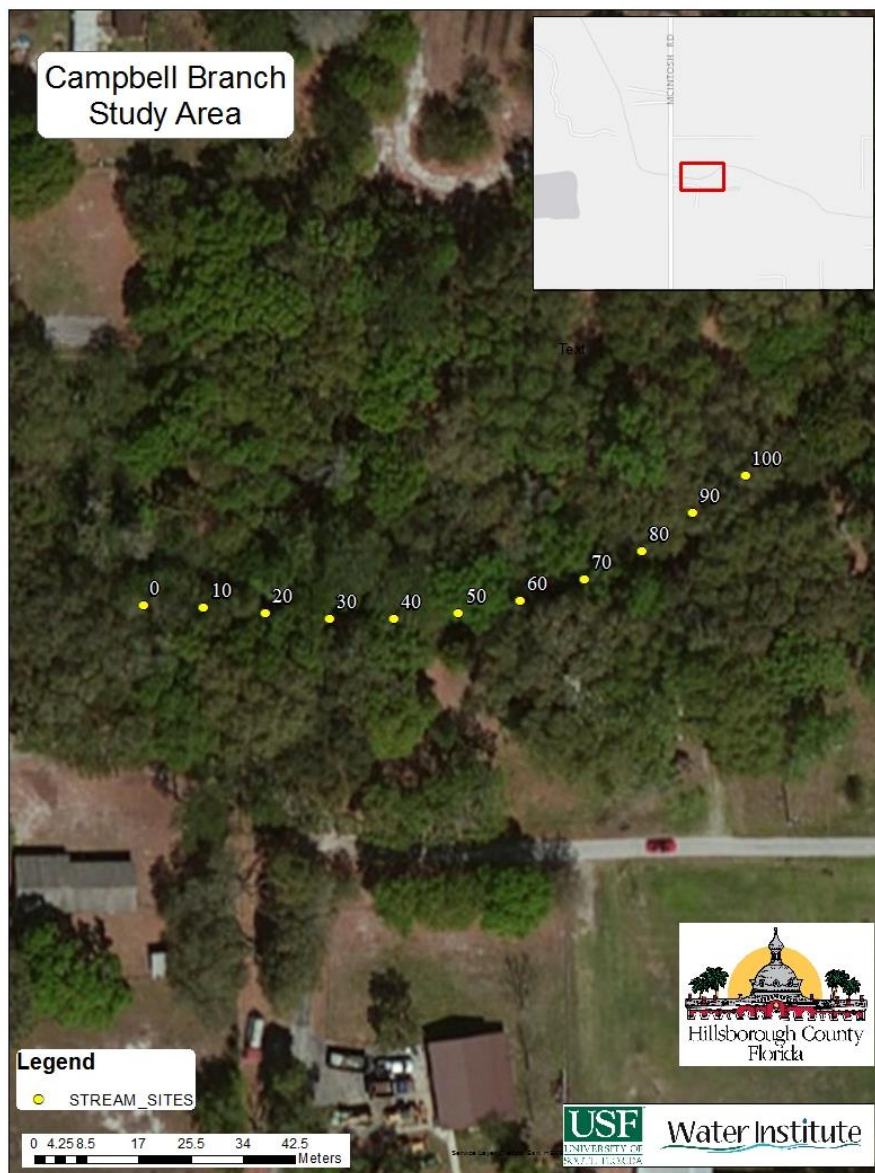
Water Quality Assessment

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

Campbell Branch Creek is located east of the Lake Thonotosassa with its mouth in Flint Creek. The sample site selected for the study was located upstream from the McIntosh Road bridge and was assessed on April 13, 2017. Campbell Branch Creek is located in FDEP WBID 1533 which contains 6,782 acres of land and drains into the Flint Creek. The watershed surrounding Campbell Branch Creek is dominated by Residential (42.42%), Field/Pasture (21.64%), Agriculture (12.78%) and Natural Land/Open Water (16.13%), land uses. The Landscape Development Intensity Index of the watershed is 4.57. The LDI value for the immediate 100 meter buffer around Rice Creek is 4.27 and dominated by Residential (41.54%), Natural Land (23.34%), and Cropland/Pastureland (15.82%)

Figure 1. 2017 Rice Creek at McIntosh Road Assessment Study Area Map



Habitat Assessment



Figure 2 Overview photograph of Campbell Branch Creek at McIntosh Road sample site

Campbell Branch Creek achieved a Habitat Assessment score of 96. Primary habitat components received suboptimal scores for Substrate Diversity and Water Velocity. Habitat Smothering and Substrate Availability earned suboptimal scores. Secondary habitat components received suboptimal scores for Bank Stability and Riparian Buffer Zone Width and Riparian Zone Vegetation Quality. Artificial Channelization scored in the marginal range with clear evidence of prior straightening. The major productive habitats found at the sample site were Snags (1.7%), Roots/Undercut Banks (1.0%) Leaf pack/mats (3.2%), and Rock (5.9%). The water velocity was measured at the 30 meter mark and averaged 0.16m/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 92%. The Secchi Disk Depth was measured as 0.3m Visible on Bottom at the 50 meter mark. The average water depth at the time of the assessment was 0.25m.

Table 1 Linear Vegetation Survey Results – Campbell Branch Creek

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Figure 3. Example of the shoreline conditions at Campbell Branch Creek at the time of the assessment

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 Campbell Branch Creek was 51 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. Sample A was dominated by *Cheumatopsyche* spp. Sample A contained 24 total taxa, including 2 sensitive taxa and 20.25% very tolerant individuals. Sample B was dominated by *Microcyloepus* spp. Sample B contained 23 total taxa, including 2 sensitive taxa and 17.50% very tolerant individuals. Both samples contained a long-lived taxa *Corbicula* spp.

Table 2 SCI metric summaries for Campbell Branch Creek

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	24.00	3.75	3.75
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	22.47	5.06	5.06
Total Clingers	3.00	4.29	4.29
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	18.99	9.00	9.00
% Tanytarsini	3.16	4.20	4.20
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	20.25	4.11	4.11
SCI Sum			44.88
Final SCI score			49.87

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	23.00	3.33	3.33
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	17.81	3.98	3.98
Total Clingers	3.00	4.29	4.29
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	19.38	8.93	8.93
% Tanytarsini	4.38	4.95	4.95
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	17.50	4.46	4.46
SCI Sum			46.40
Final SCI score			51.56

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

Stream Condition Index Results for Campbell Branch SCI A

Phylum	Class	Order	Family	Taxa	Abundance	Collapsed Abundance	Taxa Presence	Ephemeroptera		Trichoptera		50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant
Nemertea	Enopla	Hydromeretae	Tetrasemidae	<i>Prostoma</i> spp.	2	2	1												2
Mollusca	Gastropoda	Hydrophila	Ancylidae	<i>Ancylus</i> spp.	7	7	1												
Mollusca	Gastropoda	Hydrophila	Physidae	<i>Physella</i> <i>calensis</i>	2	2	1												2
Mollusca	Gastropoda	Littoridinophila	Hydrobiidae	<i>Hydrobia</i> spp.	18														
Mollusca	Gastropoda	Littoridinophila	Hydrobiidae	<i>Pygostolus</i> <i>platyrachis</i>	3	21	1												21
Mollusca	Bivalvia	Vermetida	Corbiculidae	<i>Corbicula</i> spp.	2	2	1						2						
Arthropoda	Insecta	Ephemeroptera	Ceratidae	<i>Ceratix</i> spp.	1	1	1		1										
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	<i>Heptagenia</i> spp.	2														
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	<i>Mesochorella</i> <i>exigua</i>	8	10	1		1					1					1
Arthropoda	Insecta	Coenagrionidae	Coenagrionidae	<i>Agia</i> <i>setula</i>	2	2	1												2
Arthropoda	Insecta	Coenagrionidae	Coenagrionidae	<i>Ephemerella</i> <i>occum</i>	2	2	1												2
Arthropoda	Insecta	Trichoptera	Lepoceridae	<i>Lepocerus</i> spp.	1														
Arthropoda	Insecta	Trichoptera	Lepoceridae	<i>Mesochorella</i> <i>condolexensis</i>	4	5	1			1									
Arthropoda	Insecta	Trichoptera	Chamaetypidae	<i>Chamaetypa</i> spp.	30	30	1			1			30	1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	<i>Hydroptila</i> spp.	2	2	1				1								
Arthropoda	Insecta	Coeloptera	Elmidae	<i>Quadrula</i> spp.	1	1	1												
Arthropoda	Insecta	Coeloptera	Elmidae	<i>Microvelinus</i> spp.	22	22	1												
Arthropoda	Insecta	Diptera	Chironomidae	<i>Tanytarsus</i> spp.	3														
Arthropoda	Insecta	Diptera	Chironomidae	<i>Tanytarsus</i> spp.	5	5	1					2.5							
Arthropoda	Insecta	Diptera	Chironomidae	<i>Polysiphium</i> <i>flavum</i>	23	23	1												5
Arthropoda	Insecta	Diptera	Chironomidae	<i>Polysiphium</i> <i>lineare</i> group	2	2	1												2
Arthropoda	Insecta	Diptera	Chironomidae	<i>Abietinus</i> spp.	1	4	1												
Arthropoda	Insecta	Diptera	Chironomidae	<i>Pentaneura</i> <i>incrustata</i>	3	3	1												
Arthropoda	Insecta	Diptera	Chironomidae	<i>Streblospio</i> spp.	5	5	1												
Arthropoda	Insecta	Diptera	Chironomidae	<i>Coronula</i> spp.	3	3	1												
Arthropoda	Insecta	Diptera	Ceratopogonidae	<i>Atrichopogon</i> spp.	1	1	1												
Arthropoda	Insecta	Diptera	Empididae	<i>Hemerosoma</i> spp.	2	2	1											1	
Arthropoda	Insecta	Leptoptera	Cramidae	<i>Neoglyptis</i> <i>strossmayeri</i>	1	1	1						1						1

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Stream Condition Index Results for Campbell Branch SCS

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Water Quality Assessment

Limited long-term water quality data is available for this tributary to Flint Creek. The data that is available was collected by the Hillsborough County Environmental Protection Commission from 2005 to present however, nutrient data is only available until 2012. This assessment, which took place during April 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 Campbell Branch Creek Physical Water Quality (Field)

Campbell Branch at McIntosh Road								
Date	Depth (m)	T (°C)	pH	DO mg/L	DO Sat %	Cond. (UMHO/cm)	Salinity (ppt)	Secchi Depth (m)
4/13/2017	0.1	25.78	7.67	7.52	91.5	719.5	0.35	0.25 Visible on Bottom
Mean POR		20.8	7.65	7.44	82	411.8	0.2	

The chemical water quality analysis for Campbell Branch Creek is shown in Table 6 along with mean values for the period of record for available parameters. Total Phosphorous values were below 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 bacterial sampling show contamination in both the current sample and the long term dataset.

Table 6 Campbell Branch Creek Water Quality (Laboratory)

Campbell Branch Creek		
Parameter	McIntosh Road	Period of Record Mean
Ammonia	0.023 mg/L	No Data
Nitrates/Nitrites	0.075 mg/L	No Data
Kjeldahl Nitrogen	0.215 mg/L	0.819 mg/L
Total Nitrogen	0.290 mg/L	1.175 mg/L
Total Phosphorous	0.340 mg/L	0.351 mg/L
Alkalinity	160.0 mg/LCaCO ₃	159.7 mg/L CaCO ₃
Chlorophyll - a	20.3 ug/L	2.10 ug/L
Chlorophyll - a Corrected	15.0 ug/L	1.55 ug/L
Color	16.2 Pt/Co	35.94 Pt/Co
Fecal Coliform	2,800 #/100 ml	1,055 #/100ml
Enterococci	3,400 #/100 ml	1,245 #/100ml

Conclusion

The Flint Creek Tributary that was assessed during this study does not show impairment based on water quality, although the bacteria sampling indicates a stressed and potentially contaminated system. The system does show impairment in the vegetation communities through the linear vegetation survey results with a high percentage of non-native invasive species and low average Coefficient of Conservatism. The habitat assessment performed on the sample site shows suitable habitat for macroinvertebrates with a Habitat Assessment score of 96. The SCI score of 51 indicates a healthy macroinvertebrate community.

Table 5 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		McIntosh Road	Threshold
Total Phosphorous (mg/l)		0.34	< 0.49
Total Nitrogen (mg/l)		0.29	< 1.65
RPS (% Rank 4-6)		0%	< 25%
LVS	Avg C of C	0.79	≥ 2.5
	FLEPPC %	60.00%	< 25%
Chlorophyll a (µg/l)		15	< 20 µg/l
Habitat Assessment		96	> 34
SCI		51	> 34