

Flint 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 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

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

Flint Creek, flows out of Lake Thonotosassa in Hillsborough County Florida, was sampled upstream for Highway 301 on May 17, 2016. Flint Creek discharges into the Hillsborough River. The watershed surrounding Flint Creek is dominated by Residential (37.4%), Agricultural (18.3%), and Natural (18.3%) land use. The Landscape Development Intensity Index of the watershed is 4.14.



Figure 1. 2016 Flint Creek Assessment Study Area Map

Habitat Assessment



Figure 2 Overview photograph of the Flint Creek at US Highway 301 sample site

Flint Creek at Highway 301 received a Habitat Assessment score of 115. The primary habitat components scored in the suboptimal category for Water Velocity and Habitat Smothering. Marginal scores were observed for Substrate Availability and poor scores for substrate diversity. The secondary habitat components showed optimal scores for artificial channelization. The left and right bank scored in the optimal range for Bank Stability and Riparian Buffer Width and scored suboptimal for Riparian Zone Vegetation Quality.

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 93%. The Secchi Disk Depth was measured as 0.51 meters at the 50 meter mark. The average water depth at the time of the assessment was 0.65 meters.

The Linear Vegetation Survey identified 2 species rooted in the water at the time of the assessment. Half of these species (1) are non-native, invasive species shown in bold in Table 1. The remaining 1 species are native to this region. No dominant species in the regions of the Linear Vegetation Survey were observed. The vegetation community along this sample location showed evidence of past disturbance resulting in the introduction of pioneering species. There were a total of 2 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 3.25 and the % FLEPPC metric for the study area was 50%. The mean CoC metric meets the FDEP thresholds of > 2.5 and does not meet the requirements of $< 25\%$ for % FLEPPC metric.

Table 1 Linear Vegetation Survey Results – Flint Creek at Hwy 301

Taxa Name	C of C Score	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Total Occurrences
<i>Colocasia esculenta</i>	0							1				1
<i>Saururus cernuus</i>	6.5									1		1



Figure 3. *Saururus crenuus* was one of the 2 species identified in the LVS that were rooted in water at the water levels present at the time of the assessment

Stream Condition Index Assessment

The SCI score for this site was 12 out of a possible 100 points, corresponding with an “Impaired” designation, lacking the expected community of a healthy stream. None of the taxa collected in each cohort were pollution-sensitive.

Baker Creek @ Thonotosassa SCI A	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	14.00	-0.42	0.00
Total Ephemeroptera	0.0	0.00	0.00
Total Trichoptera	0.0	0.00	0.00
% Filter Feeders	2.81	0.49	0.49
Total Clingers	0.00	0.00	0.00
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	45.00	3.80	3.80
% Tanytarsini	0.00	0.00	0.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	11.88	5.36	5.36

SCI Sum	9.65
Final SCI score	10.73

Baker Creek @ Thonotosassa SCI B	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	13.00	-0.83	0.00
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	1.0	1.43	1.43
% Filter Feeders	3.13	0.56	0.56
Total Clingers	1.00	1.43	1.43
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	50.63	2.68	2.68
% Tanytarsini	0.00	0.00	0.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	8.75	6.06	6.06

SCI Sum	12.15
Final SCI score	13.50

Water Quality Assessment

Long-term water quality data is available for Flint Creek at Highway 301 from the Hillsborough County Environmental Protection Commission and USF Water Institute. Table 3 provides a summary of the Physical/Chemical conditions recorded the sample site.

Table 2 Flint Creek Physical Water Quality (Field)

Depth (m)	Temp (c)	pH	DO (mg/L)	DO (% Sat)	Cond (umho/cm)	Salinity (ppt)	TDS (mg/L)
0.37	29.99	7.32	2.91	37.9	210.2	0.1	134.5

The chemical water quality analysis for the Flint Creek is shown in Table 4 along with geometric mean values for the past three years for available parameters. Three year Geomean Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/l, although the sample taken during this assessment exceeds this value at 0.711 mg/L. Three Year Geomean Total Nitrogen values (1.759 mg/L) were above the nutrient region threshold developed by FDEP of 1.65 mg/l. Total Nitrogen values for the sample taken with this assessment also exceed the FDEP threshold with a concentration of 2.397 mg/L. Chlorophyll-a values exceed the site specific evaluation range of 3.2 µg/l to 20 µg/l with a value of 84.6 for this assessment (56.7 mg/L 3-year geomean). For sites with Chlorophyll-a values in this range, the assessment is conclusive of conditions reflecting an imbalance in flora and does not meet the narrative nutrient standard at 62-302.531(2) (c).

Table 3 Flint Creek Creek Water Quality (Laboratory)

Parameter	Highway 301	3-Year Geomean	Units
Alkalinity	54.0		mg/LCaCO ₃
Nitrates/Nitrites	0.006		mg/L
Fecal Coliform	100		#/100 ml
Enterococci	2000		#/100 ml
Chlorophyll a	105.1		ug/L
Chlorophyll b	3.6		ug/L
Chlorophyll c	5.9		ug/L
Chlorophyll t	114.6		ug/L
Chlorophylla Corr	84.6	56.7	ug/L
Chlorophyll-pheo	29.0		ug/L
Ammonia	0.028		mg/L
Kjeldahl Nitrogen	2.391		mg/L
Total Nitrogen	2.397	1.759	mg/L
Total Phosphorus	0.711	0.318	mg/L
Color(345)F.45	60.6		Pt/Co

Conclusion

The Flint Creek region that was assessed during this study shows impairment based on water quality alone using the three year geomeans for Total Nitrogen and Chlorophyll-a values, although the Total Phosphorous geomean is below the threshold, the sample taken with this assessment is elevated above this value. The system does show impairment in the vegetation communities through the linear vegetation survey results with a high percentage of non-native invasive species. The habitat assessment performed on the site shows habitat is sufficient for biotic use. The results of the SCI shows that the system is impaired.

Table 4 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		HWY 301	Threshold
Total Phosphorous (mg/l)		0.711	< 0.49
Total Nitrogen (mg/l)		2.397	< 1.65
RPS (% Rank 4-6)		0.00%	< 25%
LVS	Avg C of C	3.25	≥ 2.5
	FLEPPC %	50.00%	< 25%
Chlorophyll (µg/l)		84.6	< 20 µg/l
Habitat Assessment		115	> 34
SCI		12	> 34

Flint @ 301 SCI A
Stream Condition Index (SCI)
Samples Collected 5/17/2018
Project #: 8067180115

Stream Condition Index Results for Flint @ 301 SCI A

Phylum	Class	Order	Family	Genus Species	Abundance	Collapsed/Reduced Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Platyhelminthes				Platyhelminthes spp.	21	19	1	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Tubificinae spp.	7	0	0	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Limnodrilus hoffmeisteri	2	8	1	0	0	0	0	0	0		0	0	8
Annelida	Clitellata	Tubificida	Naididae	Naidinae spp.	9	0	0	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Pristina americana	3	3	1	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Dero spp.	1	1	0	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Dero botrytis	1	9	1	0	0	0	0	0	0		0	0	2
Annelida	Clitellata	Tubificida	Naididae	Bratistavia unidentata	1	1	1	0	0	0	0	0	0		0	0	1
Annelida	Clitellata	Tubificida	Naididae	Haemonais waldvogeli	4	3	1	0	0	0	0	0	0		0	0	0
Mollusca	Gastropoda	Hygrophila	Planorbidae	Planorbella spp.	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae spp.	32	25	1	0	0	0	0	0	0		0	0	0
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	Hyalella azteca sp. complex	287	72	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Polypedium scalaenum group	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Glyptotendipes spp.	2	2	1	0	0	0	0	0	0		0	0	2
Arthropoda	Insecta	Diptera	Chironomidae	Dicrotendipes spp.	10	9	1	0	0	4.5	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Ascheum beckae	6	5	1	0	0	0	0	0	0		0	0	5
Arthropoda	Arachnida	Trombidiformes	Unionicolidae	Neumania spp.	1	1	1	0	0	0	0	0	0		0	0	0

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Total Clingers	0.00	0.00	0.00
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	45.00	3.80	3.80
% Tanytarsini	0.00	0.00	0.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	11.88	5.36	5.36

Source: Amec Foster Wheeler, 2016
Prepared by: SEM
Checked by: MAE

SCI Sum	9.65
Final SCI score	10.73

Flint @ 301 SCI B
Stream Condition Index (SCI)
Samples Collected 5/17/2016
Project #: 8067180115

Stream Condition Index Results for Flint @ 301 SCI B

Phylum	Class	Order	Family	Genus Species	Abundance	Collapsed/Reduced Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Platyhelminthes				Platyhelminthes spp.	5	5	1	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Tubificida	Naididae	Tubificinae spp.	4	3	1	0	0	0	0	0	0		0	0	0
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Annelida	Clitellata	Tubificida	Naididae	Nais pardalis	1	1	1	0	0	0	0	0	0		0	0	4
Annelida	Clitellata	Tubificida	Naididae	Haemonais waldvogeli	1	1	1	0	0	0	0	0	0		0	0	0
Annelida	Clitellata	Rhynchobdellida	Glossiphoniidae	Helobdella stagnalis	1	1	1	0	0	0	0	0	0		0	0	1
Annelida	Clitellata	Rhynchobdellida	Glossiphoniidae	Flacobdella phalera	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae spp.	47	46	1	0	0	0	0	0	0		0	0	0
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	Hyalella azteca sp. complex	282	81	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche spp.	1	1	1	0	1	0	1	1	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Polypedium halterale group	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Glyptotendipes spp.	7	6	1	0	0	0	0	0	0		0	0	6
Arthropoda	Insecta	Diptera	Chironomidae	Dirotendipes spp.	9	8	1	0	0	4	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	Ascheum beckae	3	2	1	0	0	0	0	0	0		0	0	2

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