Pelleham Branch Creek

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

Pelleham Branch Creek, a tributary to Lake Grady, is located south of Boyette in Hillsborough County Florida. The sample site selected for the study was located in Stephen J Wortham Park and was assessed on April 17, 2017. Pelleham Branch Creek is located in FDEP WBID 1674 which contains 194 acres of land and drains into Lake Grady. The watershed surrounding Pelleham Branch Creek is dominated by Residential (59.1%), Natural Land/Open Water (25.4%) and Field/Pastureland (8.0%) land uses. The Landscape Development Intensity Index of the watershed is 5.42. The 100 meter buffer around the stream in the watershed was 62.7% Natural Land and 37.3% Residential land uses with a LDI of 3.46.

Figure 1. 2017 Pelleham Branch Creek Assessment Study Area Map

Habitat Assessment

Figure 2 Overview photograph of Pelleham Branch Creek at Stephen J Wortham Park sample site

Pelleham Branch received a Habitat Assessment score of 126. Primary habitat components received suboptimal scores for Substrate Diversity, Water Velocity, and Habitat Smothering, and received a marginal score for Substrate Availability. Secondary habitat components achieved optimal scores for Artificial Channelization, Bank Stability, Riparian Buffer Zone Width, and Riparian Zone Vegetation Quality.

The major productive habitats found at the sample site were Snags (6.3%), Roots/Undercut Banks (2.7%) and Leaf Packs/mats (1.6%). 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 98%. The Secchi Disk Depth was measured as 0.5m at the 50 meter mark. The average water depth at the time of the assessment was 0.25m.

The Linear Vegetation Survey identified 7 species rooted in the water at the time of the assessment. Two of these species are classified as non-native, invasive species. The remaining 5 species are native to this region. The vegetation community along this sample location showed little evidence of frequent disturbance. There were a total of 18 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 1.35 and the % FLEPPC metric for the study area was 44%.

Table 1 Linear Vegetation Survey Results – Pelleham Branch

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		
Alternanthera philoxeroides						1	1	1			3	0
Cicuta maculata										1	1	4.54
Colocasia esculenta					1	1	1	1	1	1	6	0
Commelina virginica						1				1	2	4.67
Hydrocotyle umbellata						1			1		2	1.92
Hygrophila polysperma	1								1		2	0
Limnophila sessiliflora									1		1	0
Saururus cernuus										1	1	6.5
Observations/station	1	0	0	0	1	4	2	2	4	4	18	

Total Observations	18
Mean CoC	1.35
% FLEPPC	67%

Figure 3. Root habitat along the banks of Pelleham Branch Creek at the 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 Pelleham Branch Creek was 40 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 different taxa. Sample A was dominated by *Polypedilum flavum* whereas Sample B was dominated by *Microcylloepus spp.* Sample A contained 18 total taxa, including 2 sensitive taxa and 10.46% very tolerant individuals. Sample B contained 22 total taxa, including 2 sensitive taxa and 9.80% very tolerant individuals. Both samples contained a long-lived taxa *Corbicula spp.*

Table 2 SCI metric summaries for Pelleham Branch Creek

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	18.00	1.25	1.25
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	2.00	2.86	2.86
% Filter Feeders	18.63	4.17	4.17
Total Clingers	3.00	4.29	4.29
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	33.33	6.13	6.13
% Tanytarsini	1.31	2.46	2.46
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	10.46	5.65	5.65

SCI Sum	33.00
Final SCI score	36.66

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	22.00	2.92	2.92
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	2.00	2.86	2.86
% Filter Feeders	15.69	3.49	3.49
Total Clingers	3.00	4.29	4.29
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	37.25	5.35	5.35
% Tanytarsini	2.61	3.78	3.78
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	9.80	5.80	5.80

SCI Sum	38.66
Final SCI score	42.96

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

Pelleham Branch SCIA
Stream Condition Index (SCI)
Samples Collected 04/17/2017
Project #: 6063170278

Stream Condition Index Results for Pelleham Branch 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
Nemertea	Enopla	Hoplonemertea	Tetrastemmatidae	*Prostoma* spp.	3	3	1										3
Annelida	Clitellata	Tubificida	Naididae	*Dero trifida*	1	1	1										1
Mollusca	Gastropoda	Hygrophila	Ancylidae	Ancylidae spp.	1	1	1										
Mollusca	Gastropoda	Hygrophila	Physidae	Physidae spp.	3												
Mollusca	Gastropoda	Hygrophila	Physidae	*Physella cubensis*	5	8	1										8
Mollusca	Bivalvia	Veneroida	Corbiculidae	*Corbicula* spp.	5	5	1				5		1				
Arthropoda	Malacostraca	Isopoda	Asellidae	*Caecidotea* spp.	1	1	1									1	
Arthropoda	Insecta	Odonata	Coenagrionidae	Coenagrionidae spp.	3												
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia sedula*	1	4	1										4
Arthropoda	Insecta	Trichoptera	Leptoceridae	Leptoceridae spp.	1												
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis* spp.	1	2	1		1								
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	3	3	1		1		3	1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* spp.	2	2	1										
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	45	45	1										
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Copelatus* spp.	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae spp.	3												
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* spp.	1	1	1			0.5					1		
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	48	51	1							51			
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus* spp.	1	1	1				1	1			1		
Arthropoda	Insecta	Diptera	Chironomidae	*Stenochironomus* spp.	3	3	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Corynoneura* spp.	2	2	1										
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium* spp.	19	19	1				19	1				1	

Table 3 SCI full results for Sample A

Pelleham Branch SCIB
Stream Condition Index (SCI)
Samples Collected 04/17/2017
Project #: 6063170278

Stream Condition Index Results for Pelleham Branch 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
Nemertea	Enopla	Hoplonemertea	Tetrastemmatidae	*Prostoma* spp.	1	1	1										1
Annelida	Clitellata	Tubificida	Naididae	*Dero trifida*	3	3	1										3
Annelida	Clitellata	Tubificida	Naididae	*Slavina appendiculata*	1	1	1										
Mollusca	Gastropoda	Hygrophila	Physidae	Physidae spp.	6												
Mollusca	Gastropoda	Hygrophila	Physidae	*Physella cubensis*	4	10	1										10
Mollusca	Bivalvia	Veneroida	Corbiculidae	*Corbicula* spp.	3	3	1				3		1				
Arthropoda	Insecta	Collembola		*Collembola* spp.	1	1	1										
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis* spp.	1	1	1	1									
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Acerpenna pygmaea*	1	1	1	1								1	
Arthropoda	Insecta	Odonata	Coenagrionidae	Coenagrionidae spp.	1	1	1										
Arthropoda	Insecta	Trichoptera	Leptoceridae	Leptoceridae spp.	1												
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis avara*	1	2	1		1								
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	3	3	1		1		3	1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* spp.	2	2	1										
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	57	57	1							57			
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Copelatus* spp.	1	1	1										
Arthropoda	Insecta	Diptera		Diptera spp.	1												
Arthropoda	Insecta	Diptera	Chironomidae	*Cryptochironomus* spp.	1	1	1										1
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	42	43	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus* spp.	4	4	1				4	1			4		
Arthropoda	Insecta	Diptera	Chironomidae	*Corynoneura* spp.	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Cricotopus* or *Orthocladius*	1	1	1										
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium* spp.	14	14	1				14	1				1	
Arthropoda	Arachnida	Trombidiformes	Sperchonidae	*Sperchon* spp.	1	1	1										
Arthropoda	Arachnida	Sarcoptiformes		Oribatida spp.	1	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 Grady Lake. The data that is available was collected by the Hillsborough County Environmental Protection Commission from June 2005 to September 2006. 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 Pelleham Branch Creek Physical Water Quality (Field)

Pelleham Branch Creek at Stephen J Wortham Park								
Date	**Depth (m)**	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (m)**
5/11/2017	0.17	20.72	8.08	6.11	67.4	194.8	0.09	0.5 Visible on Bottom

The chemical water quality analysis for Pelleham 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 – 2006). 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 (2005-2006) 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 (2005-2006). For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora.

Table 6 Pelleham Branch Creek Water Quality (Laboratory)

Parameter	Stephen Wortham Park	POR Mean Value	Units
Alkalinity	24.0		mg/LCaCO3
Nitrates/Nitrites	0.052		mg/L
Fecal Coliform	460	317	#/100 ml
Enterococci	1,260	449	#/100 ml
Chlorophyll a	3.7	1.16	ug/L
Chlorophyll b	2.6	0.07	ug/L
Chlorophyll c	1.8	0.16	ug/L
Chlorophyll t	6.6		ug/L
Chlorophylla Corr	3.4	3.98	ug/L
Chlorophyll-pheo	6.6		ug/L
Ammonia	0.013	0.029	mg/L
Kjeldahl Nitrogen	0.208	0.558	mg/L
Total Nitrogen	0.260	0.698	mg/L
Total Phosphorus	0.008	0.090	mg/L
Color(345)F.45	13.4		Pt/Co

Conclusion

Pelleham Branch Creek at Stephen Wortham Park is located with a significant buffer of natural, undeveloped land surrounding it. The stream itself was free from physical alterations to the stream flow, buffer and banks in the region assessed. At the time of the habitat assessment, the water levels were low, corresponding to the end of the dry season, however sufficient habitat for macroinvertebrates was observed. Due to these factors, the Habit Assessment resulted in an Optimal score of 126. Some disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with Pelleham Branch Creek not meeting either metric for Average Coefficient of Conservatism or the Percent FLEPPC. The limited historical water quality record for Pelleham Branch Creek showed normal concentrations of Total Phosphorous and Total Nitrogen. The results of the SCI sampling indicate a "Healthy" stream based on the macroinvertebrate community. 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		Wortham Park	POR Mean	Threshold
Total Phosphorous (mg/l)		0.008	0.09	< 0.49
Total Nitrogen (mg/l)		0.26	0.698	< 1.65
RPS (% Rank 4-6)		0		< 25%
LVS	Avg C of C	1.35		≥ 2.5
	FLEPPC %	67.00%		< 25%
Chlorophyll (µg/l)		3.4	1.16	< 20 µg/l
Habitat Assessment		126		> 34
Stream Condition Index		40		> 34