

Howell Branch

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

Howell Branch located in the town of Bealsville, Hillsborough County Florida was sampled on 4/13/17. The sampling site is located in Bealsville Park off of Nesmith Road and lies within the FDEP WBID 1568, which contains 5,843 acres of land. The watershed surrounding Howell Branch is dominated by Residential (29.60%), Field Pasture (22.90%), Forest/Natural (20.40%), and Agricultural (9.90%) land uses. The Landscape Development Intensity Index of the watershed is 4.49. The LDI was also calculated for the 100m buffer around the stream in the WBID to capture the land use that has the largest potential to alter the stream. The buffer LDI value was 3.07.

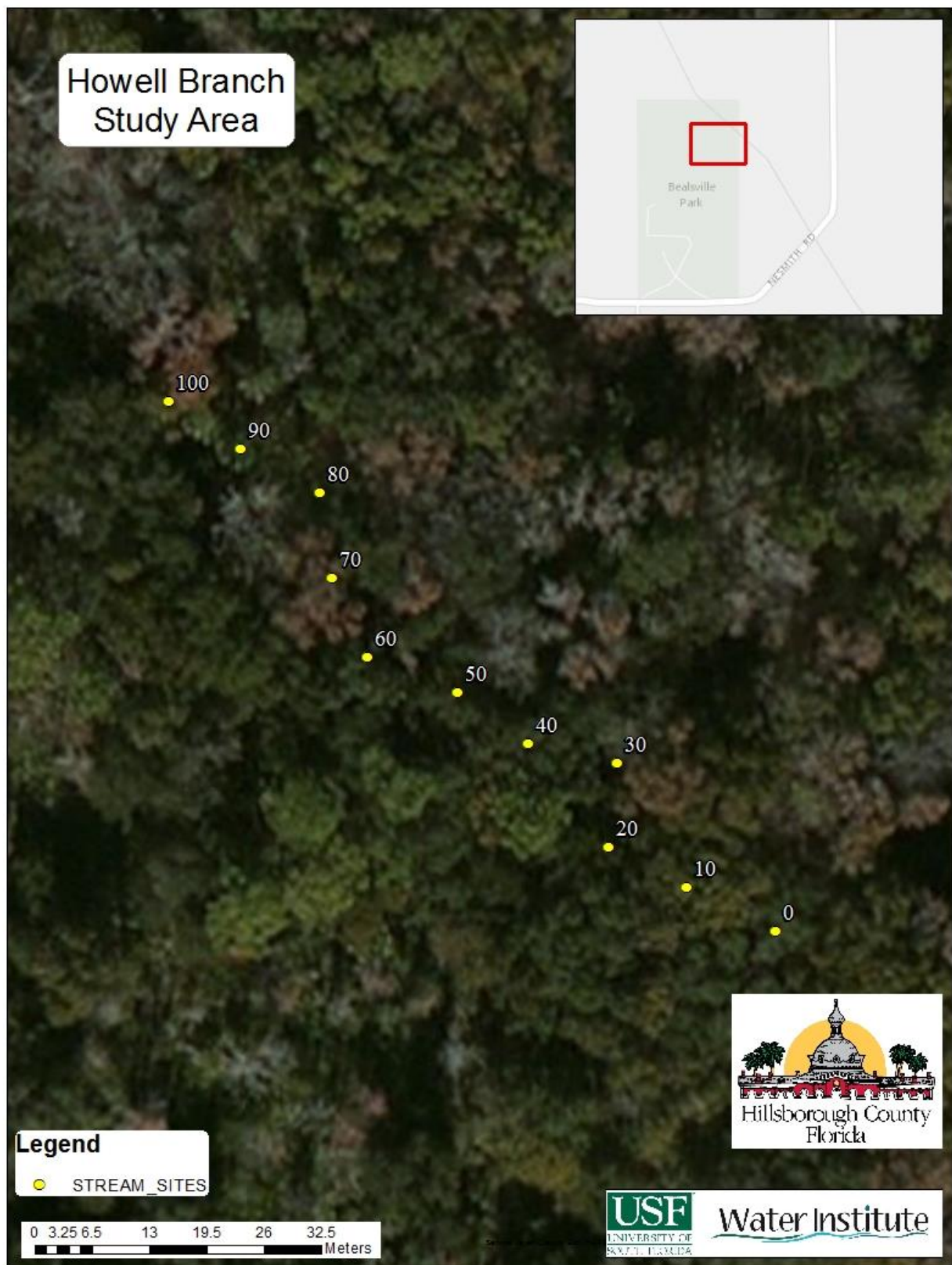


Figure 1. 2017 Howell Branch Assessment Study Area Map

Habitat Assessment

Howell Branch at Bealsville Park



Figure 2 Overview photograph of Howell Branch at Bealsville Park sample site

Howell Branch at Bealsville Park received an optimal Habitat Assessment score of 123. Primary habitat components received suboptimal scores for Substrate Diversity, Water Velocity, and Habitat Smothering, and a marginal score Substrate Availability (2.9% Snags, 3.75% Roots/undercut banks, 2.6% Leaf Packs/mats). Secondary habitat components received optimal scores for Artificial Channelization, Bank Stability, Riparian Buffer Zone Width, and 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 94.36%. The Secchi Disk Depth was measured as 0.6 meters visible on bottom at the 50 meter mark. The average water depth at the time of the assessment was 0.15 meters.

The Linear Vegetation Survey identified 3 species rooted in the water at the time of the assessment. Two of these species are non-native, invasive species (*Colocasia esculenta* and *Ruellia simplex*). The vegetation community along this sample location did not show evidence of frequent

disturbance resulting in the dominance by pioneering species. There were a total of 19 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 0.24 and the % FLEPPC metric for the study area was 94.7%.

Table 1 Linear Vegetation Survey Results

Plant Species	Sample Site										Observations/ Species	CoC
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
<i>Cicuta maculata</i>	1										1	4.54
<i>Colocasia esculenta</i>	1	1	1	1	1	1	1	1	1		9	0
<i>Ruellia simplex</i>	1	1	1	1	1	1	1	1	1		9	0
Observations/station	3	2	2	2	2	2	2	2	2	0	19	4.54
Total Observations	19											
Mean CoC	0.2389											
% FLEPPC	94.70%											



Figure 3. *Colocasia esculenta* and *Ruellia simplex* along the banks of Howell Branch

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 Howell Branch Creek was 29 out of a possible 100 points, corresponding with an “Impaired” designation, with disruption to 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 *Amnicola dalli* Sample A contained 18 total taxa, including 1 sensitive taxa and 15.13% very tolerant individuals. Sample B contained 20 total taxa, including no sensitive taxa and 7.53% very tolerant individuals. Both samples contained a long-lived taxa *Corbicula spp.*

Table 2 SCI metric summaries for Howell 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	7.24	1.52	1.52
Total Clingers	2.00	2.86	2.86
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	41.45	4.51	4.51
% Tanytarsini	1.32	2.47	2.47
Total Sensitive Taxa	1.00	1.43	1.43
% Very Tolerant Individuals	15.13	4.80	4.80

SCI Sum	25.02
Final SCI score	27.81

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	20.00	2.08	2.08
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	2.00	2.86	2.86
% Filter Feeders	4.79	0.95	0.95
Total Clingers	3.00	4.29	4.29
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	36.30	5.54	5.54
% Tanytarsini	1.37	2.54	2.54
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	7.53	6.39	6.39

SCI Sum	27.98
Final SCI score	31.09

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

Howell Branch SCIA
Stream Condition Index (SCI)
Samples Collected 04/13/2017
Project #: 6063170278

Stream Condition Index Results for Howell Branch SCIA

Phylum	Class	Order	Family	Taxa	Abundance	Collapsed Abundance	Taxa Presence	Ephemeroptera		50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant
								Taxa	Taxa								Individuals
Armeida	Chelonia	Tubificia	Naididae	<i>Savina agenticulata</i>	1	1	1										
Mollusca	Gastropoda		Planorbidae	<i>Planorbis flaberratus</i>	6	6	1										
Mollusca	Gastropoda	Hydrobia	Ancylidae	<i>Ancylus</i> spp.	16												
Mollusca	Gastropoda	Hydrobia	Ancylidae	<i>Hebertella eximius</i>		17	1										17
Mollusca	Gastropoda	Hydrobia	Physidae	<i>Physella integra</i>	2	2	1										2
Mollusca	Gastropoda	Hydrobia	Planorbidae	<i>Planorbis</i> spp.	3	3	1										3
Mollusca	Gastropoda	Littorinomorpha	Hydrobiidae	<i>Hydrobia</i> spp.	22												
Mollusca	Gastropoda	Littorinomorpha	Hydrobiidae	<i>Amnicola</i> spp.	41	63	1								63		
Mollusca	Gastropoda		Thiaridae	<i>Melanoides tuberculata</i>	1	1	1										1
Mollusca	Bivalvia	Venerida	Corbiculidae	<i>Corbicula</i> spp.	5	5	1				5				1		
Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Chamaelea</i> spp.	5	5	1				5						
Arthropoda	Insecta	Trichoptera	Hydropsychidae	<i>Meconema</i> spp.	3	3	1										
Arthropoda	Insecta	Coleoptera	Elmidae	<i>Microvelia</i> spp.	31	31	1										
Arthropoda	Insecta	Diptera	Chironomidae	<i>Tanytarsus buckleyi</i>	2	2	1				1					2	
Arthropoda	Insecta	Diptera	Chironomidae	<i>Polypedilum flavum</i>	4	4	1										
Arthropoda	Insecta	Diptera	Chironomidae	<i>Pentaneura incognita</i>	2	2	1										
Arthropoda	Insecta	Diptera	Chironomidae	<i>Stenochironomus</i> spp.	2	2	1										
Arthropoda	Insecta	Diptera	Chironomidae	<i>Paratanytarsus</i> spp.	2	2	1										1
Arthropoda	Insecta	Diptera	Ceratopogonidae	<i>Atractodes</i> spp.	2	2	1										
Arthropoda	Insecta	Heteroptera	Veliidae	<i>Rhyacionia</i> spp.	1	1	1										

Table 3 SCI full results for Sample A

Water Quality Assessment

Limited long-term water quality data is available for Howell Branch. The data that is available was collected by the Hillsborough County Environmental Protection Commission. Values for the physical water parameters begin in 2005 and continue through present. Values for the laboratory water parameters begin in 2005 but end in 2012, aside from the sample taken along with this assessment. 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 site.

Table 5 Howell Branch Physical Water Quality (Field)

Howell Branch								
Date	Depth (m)	Temp (°C)	pH	DO (mg/L)	DO (% Sat)	Cond (UMHO/cm)	Salinity (PPT)	Secchi Depth (m)
05/04/17	0.11	23.51	9.39	5.83	68	403	0.19	0.75
Mean POR		20.56	7.50	5.58	60.16	369.5	0.19	

The chemical water quality analysis for Howell Branch is shown in Table 6 along with mean values for the period of record for available parameters. Period of record mean Total Phosphorous values were more than 3.5 times the nutrient region threshold developed by FDEP of 0.49 mg/L with a mean value of 1.796 mg/L (2005-2012). Total Phosphorous values for the sample from this assessment were also elevated above the threshold with a value of 0.652 mg/L. Total Nitrogen values for the period of record were also above the nutrient region threshold developed by FDEP of 1.65 mg/L with a mean value of 2.577 mg/L. The Total Nitrogen value from the assessment was below the threshold with a concentration of 0.665 mg/L. Chlorophyll-a values fall within the acceptable value range with a period of record mean value of 1.72 ug/L.

Table 6 Howell Branch Water Quality (Laboratory)

Parameter	Howell Branch	POR Mean	Units
Alkalinity	128.0		mg/LCaCO ₃
Nitrates/Nitrites	0.476		mg/L
Fecal Coliform	2,100	1,731	#/100 ml
Enterococci	1,040	1,500	#/100 ml
Chlorophyll a	5.6	1.64	ug/L
Chlorophyll b	2.6		ug/L
Chlorophyll c	0.5		ug/L
Chlorophyll t	6.8		ug/L
Chlorophylla Corr	3.4	1.72	ug/L
Chlorophyll-pheo	6.6		ug/L
Ammonia	0.025	0.069	mg/L
Kjeldahl Nitrogen	0.189	0.886	mg/L
Total Nitrogen	0.665	2.577	mg/L
Total Phosphorus	0.652	1.796	mg/L
Color(345)F.45	11.7	63.55	Pt/Co

Conclusion

Howell Branch at Bealsville 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 123. Some disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with Howell Branch not meeting either metric for Average Coefficient of Conservatism or the Percent FLEPPC. The historical water quality record for Howell Branch showed elevated concentrations of Total Phosphorous and Total Nitrogen. The results of the SCI sampling indicate that the stream is impaired 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		Bealsville	Mean POR	Threshold
Total Phosphorous (mg/l)		0.652	1.796	< 0.49
Total Nitrogen (mg/l)		0.665	2.577	< 1.65
RPS (% Rank 4-6)		0		< 25%
LVS	Avg C of C	0.24		≥ 2.5
	FLEPPC %	94.70%		< 25%
Chlorophyll (µg/l)		3.4	1.72	< 20 µg/l
Habitat Assessment		123		> 34
SCI		29		> 34