Bell Creek

STREAM HABITAT ASSESSMENT, STREAM CONDITIONS INDEX, LINEAR VEGETATION SURVEY, RAPID PERIPHYTON SURVEY AND WATER QUALITY

David Eilers, Karina Gonthier | USF Water Institute | March 21, 2023

Methods

STUDY AREA ANALYISIS

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS Pro. Using this software with 2022 Hillsborough County aerial, 2017 Land Use/ Land Cover (LULC) and Waterbody ID (WBID) layers courtesy of the Florida Department of Environmental Protection (FDEP). The Landscape Development Intensity Index (LDI) was calculated for the WBID containing the stream. From FDEP (https://floridadep.gov/dear/bioassessment/content/bioassessment-ldi-hdg-bcg) "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 FDEP 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 AND 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 FDEP 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 one sampling location 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 (LVS). 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 Table LVI 1000-1 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 in FDEP LVI 1000-1.

STREAM CONDITION INDEX ASSESSMENT

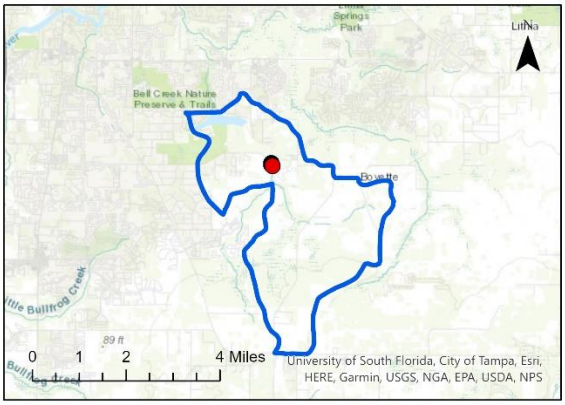
The Stream Condition Index (SCI) was sampled and calculated per DEP SOP SCI 1000. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, and identified to the lowest practical 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 SCI 1000, the SCI scores greater than 35 are considered healthy. Proposed biological health assessment criteria state that a WBID is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of the most recent 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 Hillsborough County Public Utilities Laboratory. Analysis include; Chlorophyll (a, b, c, t and corrected), Alkalinity, Color, E. Coli, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen. Results will be discussed in the Florida Department of Environmental Protection's Numeric Nutrient Criteria framework and combined with the monthly sampling from the Hillsborough County Environmental Protection Commission Monthly sampling data.

Study Area

Bell Creek is located in central Hillsborough County in the Alafia River Watershed. Its headwaters are located east of Balm Boyett Rd in Hillsborough County. The outfall of Bell Creek Reservoir is in Lake Grady. The assessment of Bell Creek was conducted on March 21st, 2023 and, at that time, water levels were low but normal for the dry season. The Bell Creek WBID covers 13.48 miles and is dominated by forest/natural (71.33%), field/pasture (13.77%) and residential (6.97%) land uses. The resulting calculated landscape development intensity (LDI) index score was 2.15.



Bell Creek
WBID 1669

Mouth - Hillsborough River
Area - 8,627.2 Acres (13.48 Sq Miles)
Landscape Development
Intensity - 2.15
Stream Habitat Assessment - 99
Rapid Peiphyton Survey -
% ranked 4-6 - 4%
Linear Vegetation Survey
Mean Coefficient of Conservatism - 4.25
% FLEPPC - 0.0%
Stream Condition Index - 74

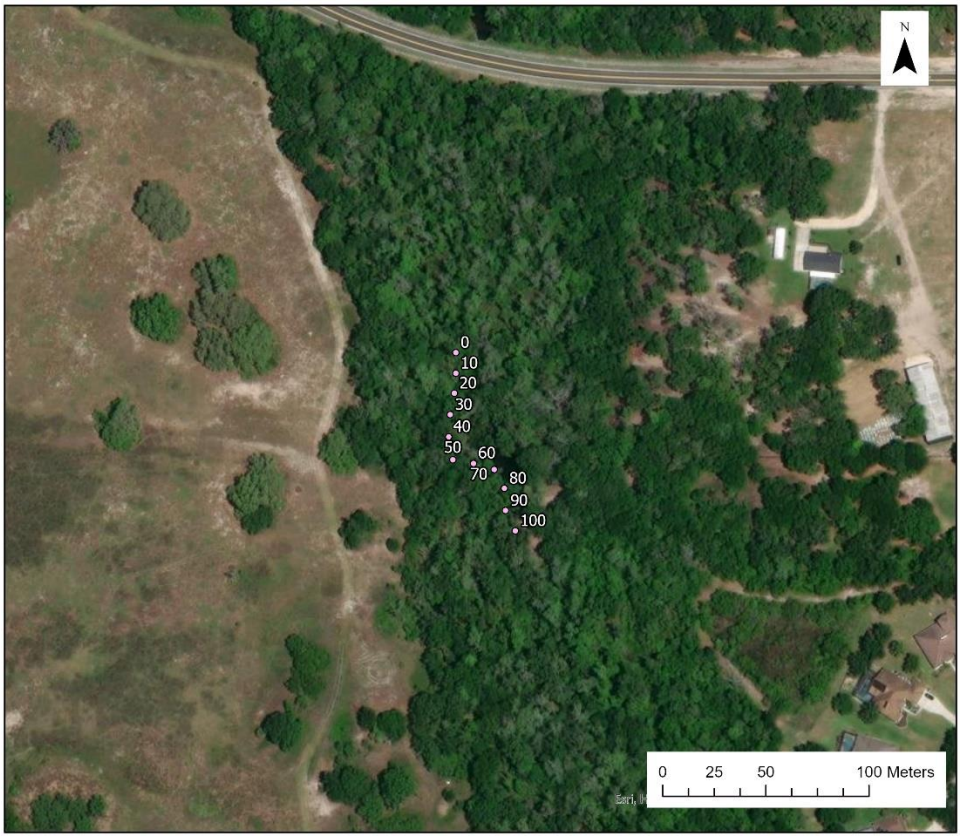


Figure 1 2023 Bell Creek Study Area Map

Figure 2 Photograph of the Bell Creek Sample Site showing the lush riparian vegetation.

Habitat and Vegetation Assessment

The region of Bell Creek where the assessment was conducted is in a forested area just off of Rhodine Road. The region was moderately shaded with a mean canopy cover measurement of 64.5%. Bell Creek averaged 0.25 meters in depth and approximately 2.875 meters wide with a flow of 0.06 m/s.

The primary habitat components of the FDEP Habitat Assessment focus on in-water habitats. The primary habitat components score in the suboptimal category for Habitat Smothering due to having an adequate number of stable pools with more than 25% of the habitats smothered by silt. Substrate Diversity (presence of two major productive habitats (snag, roots)) and Water Velocity (0.06 m/s) were scored as marginal. Substrate Availability was scored as poor for having major productive habitats in only 2.6% of the stream. Minor habitats included leaf packs/mats, aquatic macrophytes, and sand and silt deposits. The total score for the primary habitat components was a 29 out of 80.

The secondary habitat components of the FDEP Habitat Assessment focus on the surrounding features of the stream. The secondary habitat components scored in the optimal category for Artificial Channelization (expected sinuosity with no evidence of dredging), Bank Stability (both banks had gradual slopes and few raw/eroded areas), Riparian Buffer Zone Width for the left bank (width average of 18 meters), and Riparian Zone Vegetation Quality (minimal disturbance with expected plant-life present) for the left bank. Marginal category scores were recorded for Riparian Buffer Zone Width for the right bank (width average of 15 meters) and Riparian Zone Vegetation Quality for the right bank (some disturbance present with 50-80% of the riparian zone undisturbed). The secondary habitat components received a score of 70 out of 80. The resulting FDEP Habitat Assessment score was a 99.

Table 1 Scoring Summary for the Stream Habitat Assessment

Metric	Score
Primary Habitat Components	
Substrate Diversity	7
Substrate Availability	3
Water Velocity	7
Habitat Smothering	12
Primary Score	**29**
Secondary Habitat Components	
Artificial Channelization	19
Bank Stability - Right Bank	9
Bank Stability - Left Bank	10
Riparian Buffer Zone Width - Right Bank	7
Riparian Buffer Zone Width - Left Bank	9
Riparian Zone Vegetation Quality - Right Bank	7
Riparian Zone Vegetation Quality - Left Bank	9
Secondary Score	**70**
Habitat Assessment Score	**99**

Periphyton was encountered during 10 of the 99 samples taken during the Rapid Periphyton Survey. Four of these 10 samples were ranked 4-6 (>6 mm in length). The tree canopy in the assessment area averaged 64.5% reducing available light for periphyton to flourish.

The FDEP Linear Vegetation Survey (LVS) encountered more than two square meters of rooted herbaceous vegetation in Bell Creek at the time of the assessment. Dominance was only applied in one section of the survey and it was given to *Rumex verticillatus,* a native plant. The majority of the plants recorded in Bell Creek's LVS were native. The mean coefficient of conservatism metric was 4.25, passing the FDEP threshold of 2.5. The percent FLEPPC metric for the assessment was 0% which means the creek also passed this portion of the LVS, staying below FDEPs 25% requirement.

Table 2 Linear Vegetation Survey Results – Bell Creek

Taxa Name	C of C Score	Sample Site										Total Occurrences
		0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	
Rorippa teres	4.2	1	1	1	1	1	1	1	1		1	9
Rumex verticillatus	3.17	1	1	1	D	1			1	1		7
Micranthemum umbrosum	5.66	1	1				1	1	1			5
Cicuta maculata	4.54				1	1	1	1				4
Symphyotrichum carolinianum	3.93	1	1			1		1				4
Hydrocotyle	2		1	1			1					3
Ludwigia palustris	4.77		1	1			1					3
Orontium aquaticum	8.39						1		1		1	3
Pontedaria cordata	5.38			1		1			1			3
Landoltia punctata	0						1			1		2
Lemna	1						1			1		2
Ludwigia repens	3.2	1										1
Luziola fluitans	4		1									1
Persicaria hydropiperoides	2.5			1								1

Figure 3 Snag and roots were the most abundant major productive habitats in Bell Creek.

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 Bell Creek was 74 out of a possible 100 points, corresponding with a "Category 1 Exceptional" designation, with an increase in taxa diversity as well as high % Tanytarsini values. Both 2023 subsamples contained average total taxa values with 32 in subsample A and 34 in subsample B. High scores (above 7.0) were achieved for the Total Taxa (both samples), Total Trichoptera (Sample B), % Filter Feeders (Sample A), Total Clingers (Sample B), % Dominance (both samples), % Tanytarsini (both samples), and % Very Tolerant Individuals (Sample B). A low score (less than 3.0) was achieved for the Total Sensitive Taxa in Sample A. The full results of the SCI sampling are shown in Table 4 (Sample A) and Table 5 (Sample B) for Bell Creek.

Table 3 SCI metric summaries for Bell Creek Sample A (top) and Sample B (bottom)

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	32.00	7.08	7.08
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	32.57	7.41	7.41
Total Clingers	4.00	5.71	5.71
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	21.05	8.59	8.59
% Tanytarsini	32.24	10.30	10.00
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	8.55	6.11	6.11

SCI Sum	59.38
Final SCI score	65.98

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	34.00	7.92	7.92
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	5.00	7.14	7.14
% Filter Feeders	30.13	6.84	6.84
Total Clingers	6.00	8.57	8.57
Total Long-lived Taxa	2.00	6.67	6.67
% Dominance	12.58	10.28	10.00
% Tanytarsini	21.85	9.20	9.20
Total Sensitive Taxa	3.00	4.29	4.29
% Very Tolerant Individuals	4.64	7.43	7.43

SCI Sum	74.06
Final SCI score	82.29

Table 4 SCI full results for Sample A

Stream Condition Index Results for Bell Creek SCIA

Phylum	Subphylum	Class	Subclass	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	Specimen Notes
Mollusca		Gastropoda	Caenogastropoda	Littorinimorpha	Amnicolidae	*Amnicola dalli*	4	4	1	0	0	0	0	0	0		0	0	0	
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Physidae	*Physa acuta*	2	2	1	0	0	0	0	0	0		0	0	2	
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	*Menetus dilatatus*	2	2	1	0	0	0	0	0	0		0	0	2	
Mollusca		Bivalvia	Autobranchia	Sphaeriida	Sphaeriidae	Sphaeriidae spp.	1	1	1	0	0	0	1	0	0		0	0	0	
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Decapoda	Cambaridae	Cambaridae spp.	1	1	1	0	0	0	0	0	1		0	0	0	Juvenile
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Caenidae	*Caenis* spp.	1		0	0	0	0	0	0	0		0	0	0	Eary instar; like C.diminuta
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Caenidae	*Caenis diminuta*	1	2	1	1	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Baetidae	*Acerpenna pygmaea*	5	5	1	1	0	0	0	0	0		0	1	0	Damaged; ID by mouthparts
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata		Anisoptera spp.	1	1	1	0	0	0	0	0	0		0	0	0	Very early instar; legs like Macromiidae, Not Cordulegastridae
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	Coenagrionidae spp.	3		0	0	0	0	0	0	0		0	0	0	Early instar/Damaged
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	*Argia* spp.	2	5	1	0	0	0	0	0	0		0	0	0	Damaged; Early instar, maybe A.sedula
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	11	11	1	0	1	0	11	1	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	Hydroptilidae spp.	1	1	1	0	1	0	0	0	0		0	0	0	Pupa=1; Like Oxyethira's tube
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Neotrichia* spp.	4	4	1	0	1	0	0	1	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Dubiraphia* spp.	2	2	1	0	0	0	0	0	0		0	0	0	Larvae=2
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Stenelmis* spp.	2	2	1	0	0	0	0	1	0		0	0	0	Larvae=2
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Microcylloepus* spp.	13	13	1	0	0	0	0	0	0		0	0	0	Larvae=8; Adult=5
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironomidae spp.	12		0	0	0	0	0	0	0		0	0	0	Pupae=12
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Tanytarsini spp.	2		0	0	0	0	0	0	0		0	0	0	damaged
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cladotanytarsus* spp.	2	2	1	0	0	0	1	0	0		2	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* spp.	4		0	0	0	0	0	0	0		0	0	0	sp. T or M, 1 damaged
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus buckleyi*	1	1	1	0	0	0.5	0	0	0		1	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. M	1	1	1	0	0	0.5	0	0	0		1	1	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. T	23	32	1	0	0	16	0	0	0		32	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum scalaenum* group	3	4	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum flavum*	16	18	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum illinoense* group	2	3	1	0	0	0	0	0	0		0	0	3	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus* spp.	10	13	1	0	0	0	13	1	0		13	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Ablabesmyia mallochi*	4	5	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Dicrotendipes* spp.	1	1	1	0	0	0.5	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cryptotendipes* spp.	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Pentaneura inconspicua*	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Stenochironomus* spp.	2	2	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Thienemanniella xena*	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Labrundinia* spp.	3	4	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cricotopus* or *Orthocladius*	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Lepidoptera	Crambidae	Crambidae spp.	3		0	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Lepidoptera	Crambidae	*Neargyractis slossonalis*	3	6	1	0	0	0	6	0	0		0	0	6	

Table 5 SCI full results for Sample B

Stream Condition Index Results for Bell Creek SCIB

Phylum	Subphylum	Class	Subclass	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	Specimen Notes
Annelida		Clitellata	Oligochaeta	Tubificida	Naididae	*Slavina appendiculata*	2	2	1	0	0	0	0	0	0		0	0	0	
Mollusca		Gastropoda	Caenogastropoda	Littorinimorpha	Amnicolidae	*Amnicola dalli*	7	7	1	0	0	0	0	0	0		0	0	0	
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Ancylidae	Ancylidae spp.	1	1	1	0	0	0	0	0	0		0	0	0	Damaged
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Physidae	*Physa acuta*	1	1	1	0	0	0	0	0	0		0	0	1	
Mollusca		Bivalvia	Autobranchia	Venerida	Cyrenidae	*Corbicula* spp.	2	2	1	0	0	0	2	0	1		0	0	0	
Mollusca		Bivalvia	Autobranchia	Sphaeriida	Sphaeriidae	Sphaeriidae spp.	5	5	1	0	0	0	5	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Caenidae	*Caenis diminuta*	1	1	1	1	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Baetidae	*Acerpenna pygmaea*	4	4	1	1	0	0	0	0	0		0	1	0	Damaged; ID by mouthparts
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Heptageniidae	Heptageniidae spp.	2	2	1	1	0	0	0	1	0		0	1	0	No Gill 7
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Macromiidae	*Macromia* spp.	1	1	1	0	0	0	0	0	1		0	1	0	Early instar; no posterior 1/2
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	Coenagrionidae spp.	6	6	1	0	0	0	0	0	0		0	0	0	Damaged; Early instar; Not Argia
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	*Argia* spp.	1	1	1	0	0	0	0	0	0		0	0	0	Early instar
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Polycentropodidae	Polycentropodidae spp.	1	1	1	0	1	0.5	0	1	0		0	0	0	Early instar
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	12	12	1	0	1	0	12	1	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	Hydroptilidae spp.	2		0	0	0	0	0	0	0		0	0	0	Pupa=2 (one was mid-metamorphosis, but pupal case closed); like Oxyethira
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Oxyethira* spp.	5	7	1	0	1	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Hydroptila* spp.	1	1	1	0	1	0	0	1	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Neotrichia* spp.	5	5	1	0	1	0	0	1	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Dubiraphia* spp.	5	5	1	0	0	0	0	0	0		0	0	0	Larvae=2; Adult=3
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Microcylloepus* spp.	12	12	1	0	0	0	0	0	0		0	0	0	Larvae=5; Adult=7
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Hydraenidae	*Hydraena marginicollis*	1	1	1	0	0	0	0	0	0		0	0	0	Adult=1
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironomidae spp.	7		0	0	0	0	0	0	0		0	0	0	Pupae=6, 1 larva immature damaged
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cladotanytarsus* spp.	2	2	1	0	0	1	0	0	0		2	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* spp.	4	2	1	0	0	1	0	0	0		2	0	0	2 not sp. T
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. T	15	19	1	0	0	9.5	0	0	0		19	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum scalaenum* group	4	5	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum flavum*	16	18	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum illinoense* group	2	2	1	0	0	0	0	0	0		0	0	2	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus* spp.	9	10	1	0	0	0	10	1	0		10	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Ablabesmyia mallochi*	4	5	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Dicrotendipes* spp.	1	1	1	0	0	0.5	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Pagastiella* spp.	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Stenochironomus* spp.	3	3	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Nanocladius* spp.	1	1	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Ceratopogonidae	*Atrichopogon* spp.	1	1	1	0	0	0	0	0	0		0	0	0	Larva=1
Arthropoda	Hexapoda	Insecta	Pterygota	Lepidoptera	Crambidae	Crambidae spp.	2		0	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Pterygota	Lepidoptera	Crambidae	*Neargyractis slossonalis*	2	4	1	0	0	0	4	0	0		0	0	4	

Water Quality Assessment

Long-term water quality data is available for Bell Creek. The data that is available was collected by the Hillsborough County Environmental Protection Commission on a quarterly cycle. The available dataset at station 573 (Bell Creek at Rhodine Rd) begins in 2005 and continues through present. Only the first 2 samples of 2023 are available at the time of reporting. The 2023 USF Water Institute Assessment values fall within the range of the previous data collections. Table 6 provides a summary of the Physical/Chemical conditions recorded at the site.

Table 6 Bell Creek Physical Water Quality (Field)

WATER QUALITY	Depth (m)	Temp (°C)	pH (SU)	D.O. (MG/L)	D.O. Sat (%)	Cond. (µmhos/cm)	Salinity (PPT)	SECCHI (m)
Top:								1.4
Mid:	0.24	15.6	6.14	7.36	73.6	102.5	0.05	
Bottom:								
Meter ID:	80							

VOB

Total Depth

The chemical water quality analysis for Bell Creek is shown in Table 7 with geometric mean values for the previous 3 years for available parameters. The previous 3-year geometric mean values for Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/L with a geometric mean value of 0.174 mg/L (2020), 0.162 mg/L (2021) and 0.126 mg/L (2022). Total Phosphorous values for the available 2023 samples were 0.125 mg/L. Total Nitrogen values were below the nutrient region threshold developed by FDEP of 1.65 mg/L for the previous three year period with a mean value of 0.649 mg/L (2020), 0.520 mg/L (2021) and 0.572 mg/L (2022). The Total Nitrogen value from the available 2023 data was below the threshold with a concentration of 0.399 mg/L. Chlorophyll-a corrected values fall below the site specific evaluation range of 3.2 µg/l to 20 µg/l for the most recent 3-years of samples (1.5 µg/l in 2020, 1.95 µg/l in 2021, 2.08 µg/l in 2022). The available 2023 data has a geometric mean value of 2.68 µg/l. For sites with Chlorophyll-a values in this range, the assessment is indicating conditions reflecting a balance in flora.

An elevated biomass of the bacterial parameters was observed in the 3-year dataset with E. Coli having a geometric mean of 233.6 colonies/100 ml, 407.9/100 ml for Enterococci.

Table 7 Bell Creek Water Quality (Laboratory)

Parameter	2020	2021	2022	2023	Period of Record	Units
E. Coli	173.1	175.8	352	42.1	243.2	#/100 ml
Enterococci	267.4	305.5	650.7	175.4	876.1	#/100 ml
Chlorophyll-a	1.3	2.46	2.16	2.99	3.28	µg/L
Chlorophyll-b	0.31	0.42	0.30	0.28	1.11	µg/L
Chlorophyll-c	0.63	0.70	0.6	0.65	0.87	µg/L
Chlorophyll-t	1.61	3.04	2.54	3.10	4.58	µg/L
Chlorophyll-a Corrected	1.5	1.95	2.08	2.68	3.12	µg/L
Ammonia	0.013	0.022	0.031	0.068	0.033	mg/L
Kjeldahl Nitrogen	0.425	0.467	0.514	0.361	0.659	mg/L
Total Nitrogen	0.650	0.520	0.572	0.399	0.809	mg/L
Nitrates/Nitrites	0.102	0.050	0.053	0.072	0.105	mg/L
Total Phosphorous	0.174	0.162	0.126	0.152	0.250	mg/L

Conclusion

Bell Creek at Rhodine Road is located in a predominantly natural easement with active residential construction occurring upstream. At the time of the habitat assessment, the water levels were normal for the dry season. The 100 meter region where the assessment was conducted was characterized by a natural sinuous channel with attached forested floodplains. Snag and fine root was the most common productive habitats present. The Habit Assessment resulted in a suboptimal score of 99. Disruption to the vegetation community was not observed in the results of the Linear Vegetation Survey with the Mean CofC score and Percent FLEPPC metrics both being met. Bell Creek met the metrics for the rapid periphyton survey with 0% of samples being ranked between 4 and 6 due in part to the moderate canopy coverage in the region. The recent water quality record for Bell Creek showed concentrations of Chlorophyll-a corrected, Total Phosphorous and Total Nitrogen below the FDEP thresholds. The results of the SCI sampling indicate that the stream is "healthy" based on the macroinvertebrate community. Table 8 summarizes the results of the nutrient sampling, floristic sampling, habitat assessment and SCI.

Table 8 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Bell Creek	2020	2021	2022	Threshold
Total Phosphorous (mg/l)			0.174	0.162	0.126	< 0.49
Total Nitrogen (mg/l)			0.65	0.52	0.572	< 1.65
RPS (% Rank 4-6)		0%				< 25%
LVS	**Avg C of C**	4.25				≥ 2.5
	FLEPPC %	0.0%				< 25%
Chlorophyll-a Corrected (µg/l)			1.5	1.95	2.08	< 20 µg/l
Habitat Assessment		99				> 34
SCI		74				> 34