Bell Creek

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

David Eilers, Thomas Van Sant | USF Water Institute | March 25, 2024

Methods

STUDY AREA ANALYISIS

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS Pro. Using this software with 2023 Hillsborough County aerial, 2020 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

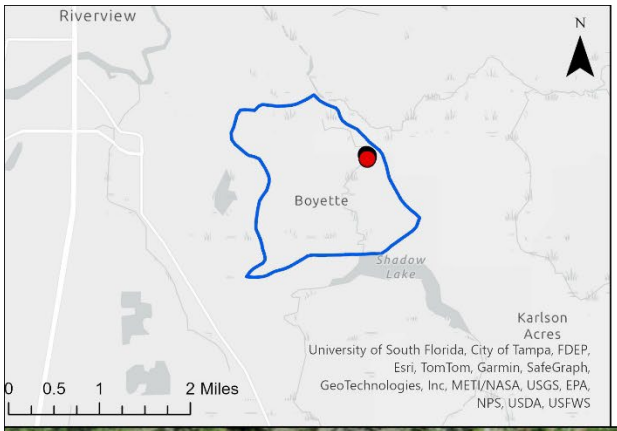
The Stream Condition Index (SCI) was sampled and calculated per DEP SOP SCI 1000. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, and identified to the lowest practical 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 south-central Hillsborough County in the Hillsborough Bay Watershed. Its headwaters are located East of Balm Boyett Rd in Hillsborough County. The outfall of Bell Creek is in the Alafia River. The assessment of Bell Creek was conducted on March 25, 2024, and at that time, the water levels were normal for the dry season. The Bell Creek WBID covers 7.85 miles and is dominated by forest/natural (73.5%) and field/pasture (9.3%) land uses. The resulting calculated landscape development intensity index score was a 2.23.



Bell Creek
WBID 1660

Mouth - Alafia River
Area - 1,586 Acres, (2.297 Sq miles)
Landscape Development
Intensity - 2.23
Stream Habitat Assessment - 103
Rapid Periphyton Survey -
% ranked 4-6 - 0%
Linear Vegetation Survey
< 2 square meters of rooted vegetation
Mean Coefficient of Conservatism - N/A
% FLEPPC - N/A
Stream Condition Index - 58

Figure 1 2024 Bell Creek Study Area Map

Figure 2 Photograph of the Bell Creek Sample Site showing the typical sandy sediment of the streambed and normal water conditions.

Habitat and Vegetation Assessment

The region of Bell Creek where the assessment was conducted was just upstream of Boyette Road. The region was heavily shaded with a mean canopy cover measurement of 81.7%. Bell Creek averaged 0.2 meters in depth and approximately 4.8 meters wide with a flow of 0.22 m/s.

The primary habitat components of the FDEP Habitat Assessment focus on in-water habitat. The primary habitat components score in the suboptimal category for Water Velocity (0.22 m/s) and Habitat Smothering (adequate number of stable pools with many productive habitats affected by sand smothering). Substrate Diversity was scored in the suboptimal category for having three major productive habitats (snag, roots, leaf packs/mats) present in the stream. Substrate Availability was scored as poor for having major productive habitats account for 4.9% of the stream. Minor habitats included sand deposits, rock or shell rubble, and mud/muck/silt. The total score for the primary habitat components was 43 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 (good sinuosity with no spoil banks or evidence of straightening) and Riparian Buffer Zone Width for the right bank (>18 meters). Bank Stability (slope is consistently too steep for both banks), Riparian Buffer Zone Width for the left bank (average of 16 meters), and Riparian Zone Vegetation Quality (visible disruption in plant community to both banks with the right being worse than the left) are scored in the suboptimal category. The secondary habitat components received a score of 60 out of 80. The resulting FDEP Habitat Assessment score was 103.

Table 1 Scoring Summary for the Stream Habitat Assessment

Metric	Score
Primary Habitat Components	
Substrate Diversity	12
Substrate Availability	5
Water Velocity	14
Habitat Smothering	12
Primary Score	**43**
Secondary Habitat Components	
Artificial Channelization	16
Bank Stability - Right Bank	8
Bank Stability - Left Bank	7
Riparian Buffer Zone Width - Right Bank	9
Riparian Buffer Zone Width - Left Bank	7
Riparian Zone Vegetation Quality - Right Bank	6
Riparian Zone Vegetation Quality - Left Bank	7
Secondary Score	**60**
Habitat Assessment Score	**103**

Periphyton was encountered during 0 of the 99 samples taken during the Rapid Periphyton Survey. The tree canopy in the assessment area averaged 81.7% reducing available light for periphyton to flourish.

The FDEP Linear Vegetation Survey encountered less than two square meters of rooted herbaceous vegetation in Bell Creek at the time of the assessment. As a result, neither metric for mean coefficient of conservatism or Percent FLEPPC were calculated.

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	
Less than two square meters of vegetation												

Figure 3 A photograph of snag (major productive habitat) in Bell Creek.

Figure 4 Roots were a major productive habitat 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 aliquot separately. The final SCI score is an average of the two scores. The SCI score for Bell Creek was 58 out of a possible 100 points, corresponding with a "Category 2 Healthy" designation, with noticeable loss of taxonomic diversity from the expected community of a healthy stream. Both 2024 subsamples contained a single sensitive taxa and Sample A contained no Ephemeroptera taxa. High scores (above 7.0) were achieved for the Total Clingers, % dominance and % Very Tolerant Individuals in both samples. 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	28.00	5.42	5.42
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	4.00	5.71	5.71
% Filter Feeders	13.67	3.02	3.02
Total Clingers	5.00	7.14	7.14
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	26.67	7.47	7.47
% Tanytarsini	6.67	5.99	5.99
Total Sensitive Taxa	1.00	1.43	1.43
% Very Tolerant Individuals	4.00	7.73	7.73

SCI Sum	47.24
Final SCI score	52.48

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	30.00	6.25	6.25
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	3.00	4.29	4.29
% Filter Feeders	21.05	4.73	4.73
Total Clingers	5.00	7.14	7.14
Total Long-lived Taxa	2.00	6.67	6.67
% Dominance	25.00	7.80	7.80
% Tanytarsini	8.55	6.64	6.64
Total Sensitive Taxa	1.00	1.43	1.43
% Very Tolerant Individuals	3.95	7.75	7.75

SCI Sum	56.70
Final SCI score	63.00

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
Platyhelminthes						Platyhelminthes spp.	1	1	1	0	0	0	0	0	0		0	0	0
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Physidae	*Physa acuta*	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	*Laevapex fuscus*	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	*Ferrissia fragilis*	3	3	1	0	0	0	0	0	0		0	0	0
Mollusca		Bivalvia	Autobranchia	Venerida	Cyrenidae	*Corbicula* spp.	2	2	1	0	0	0	2	0	1		0	0	0
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Hyalellidae	*Hyalella* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	*Enallagma cardenium*	1	1	1	0	0	0	0	0	0		0	0	1
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	*Oecetis persimilis*	2	2	1	0	1	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	*Nectopsyche candida/exquisita*	4	4	1	0	1	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	Hydropsychidae spp.	2		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	9	11	1	0	1	0	11	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Neotrichia* spp.	1	1	1	0	1	0	0	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Dubiraphia* spp.	10	10	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Stenelmis* spp.	12	12	1	0	0	0	0	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Microcylloepus* spp.	40	40	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironomidae spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Ablabesmyia mallochi*	6	6	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Pentaneura inconspicua*	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Labrundinia* spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Labrundinia pilosella*	1	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cladotanytarsus* cf. *davesi*	1	1	1	0	0	0.5	0	0	0		1	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* spp.	2		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus buckleyi*	2	3	1	0	0	1.5	0	0	0		3	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. alpha	2	3	1	0	0	1.5	0	0	0		3	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum scalaenum* group	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum flavum*	26	27	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum illinoense* group	3	3	1	0	0	0	0	0	0		0	0	3
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus* spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	2	3	1	0	0	0	3	1	0		3	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Stenochironomus* spp.	6	6	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Corynoneura* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Nanocladius crassicornus/rectinervis*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Simuliidae	*Simulium* spp.	1	1	1	0	0	0	1	1	0		0	1	0

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
Mollusca		Gastropoda	Caenogastropoda	Littorinimorpha	Hydrobiidae	*Pyrgophorus platyrachis*	2	2	1	0	0	0	0	0	0		0	0	2
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Physidae	*Physa acuta*	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	*Ferrissia fragilis*	4	4	1	0	0	0	0	0	0		0	0	0
Mollusca		Gastropoda	Caenogastropoda		Thiaridae	*Melanoides tuberculata*	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca		Bivalvia	Autobranchia	Venerida	Cyrenidae	*Corbicula* spp.	4	4	1	0	0	0	4	0	1		0	0	0
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Hyalellidae	*Hyalella* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Caenidae	*Caenis hilaris*	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Baetidae	*Labiobaetis propinquus*	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	*Argia sedula*	2	2	1	0	0	0	0	0	0		0	0	2
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Aeshnidae	*Boyeria vinosa*	1	1	1	0	0	0	0	0	1		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	Leptoceridae spp.	2	2	1	0	1	0	0	0	0		0	0	0
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		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydroptilidae	*Neotrichia* spp.	2	3	1	0	1	0	0	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	Elmidae spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Dubiraphia* spp.	11	12	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Stenelmis* spp.	9	9	1	0	0	0	0	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Microcylloepus* spp.	38	38	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironomidae spp.	3		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Procladius* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Ablabesmyia mallochi*	6	7	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironominae spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus buckleyi*	2	3	1	0	0	1.5	0	0	0		3	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. alpha	1	1	1	0	0	0.5	0	0	0		1	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum scalaenum* group	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum flavum*	20	21	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus* spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	7	9	1	0	0	0	9	1	0		9	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	*Kribiodorum perpulchrum*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Nanocladius crassicornus/rectinervis*	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Simuliidae	*Simulium* spp.	6	6	1	0	0	0	6	1	0		0	1	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Ceratopogonidae	Ceratopogoninae spp.	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Limoniidae	Eriopterini spp.	1	1	1	0	0	0	0	0	0		0	0	0

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 574 (Bell Creek at Boyette Rd) begins in 2005 and continues through present. Only the first sample of 2024 is available at the time of reporting. The 2024 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:								1.3
Mid:	0.16	20.12	7.08	9.67	100.6	608	0.3	
Bottom:								
Meter ID:								

VOB

Total Depth

0.3

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 0.187 mg/L (2021), 0.120 mg/L (2022) and 0.139 mg/L (2023). Total Phosphorous values for the available 2024 samples were 0.141 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 0.804 mg/L (2021), 0.721 mg/L (2022) and 0.850 mg/L (2023). The Total Nitrogen value from the available 2024 data was below the threshold with a concentration of 0.763 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 (5.16 µg/l in 2021, 3.82 µg/l in 2022, 2.54 µg/l in 2023). The available 2024 data has a geometric mean value of 7.4 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 219.01 colonies/100 ml, 505.4/100 ml for Enterococci.

Table 7 Bell Creek Water Quality (Laboratory)

Parameter	2021	2022	2023	2024	Period of Record	Units
E. Coli	266.88	173.66	289.83	60	219.01	#/100 ml
Enterococci	364.64	164.64	268.33	67	506.95	#/100 ml
Chlorophyll-a	5.16	3.82	2.54	7.4	5.48	µg/L
Chlorophyll-b	0.67	0.39	0.32	0.7	0.99	µg/L
Chlorophyll-c	1.03	0.6	0.6	0.9	0.98	µg/L
Chlorophyll-a Corrected	3.01	2.82	2.09	4	2.95	µg/L
Ammonia	0.06	0.03	0.08	0.06	0.04	mg/L
Kjeldahl Nitrogen	0.70	0.64	0.72	0.71	0.70	mg/L
Total Nitrogen	0.80	0.72	0.85	0.81	0.76	mg/L
Nitrates/Nitrites	0.09	0.06	0.11	0.1	0.08	mg/L
Total Phosphorous	0.19	0.12	0.14	0.14	.20	mg/L

Conclusion

Bell Creek at Boyett Road is located in a protected natural buffer in an active residential area. 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, fine root, and leaf packs/mats were the most common productive habitats present. The Habit Assessment resulted in a suboptimal score of 103. Disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with the Mean CofC score and Percent FLEPPC being zero as there was less than 2 meters of rooted herbaceous vegetation along the creek. 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	2022	2023	2024	Threshold
Total Phosphorous (mg/l)			0.120	0.139	0.141	< 0.49
Total Nitrogen (mg/l)			0.721	0.850	0.813	< 1.65
RPS (% Rank 4-6)		0%				< 25%
LVS	**Avg C of C**	0				≥ 2.5
	FLEPPC %	0.0%				< 25%
Chlorophyll-a Corrected (µg/l)			1.5	1.95	2.08	< 20 µg/l
Habitat Assessment		103				> 34
SCI		58				> 34