

Cockroach Creek

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

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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 100 meter buffer around the stream from the sampling site to 10km upstream. 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

Cockroach Creek is located in south western Hillsborough County in the Middle Tampa Bay Watershed. Its headwaters are located south of Valroy Road Hillsborough County. The outfall of Coackroach Creek is in Tampa Bay. The assessment of Cockroach Creek was conducted east of Highway 41 on March 17, 2025 at that time, the water levels were low, but normal for the dry season. The Cockroach Creek WBID covers 2.12 square miles (759 acres) and the 100-meter buffer around the stream is dominated by forest/natural (54.4%)and agricultural (20%) land uses. The resulting calculated landscape development intensity index score was a 1.9.

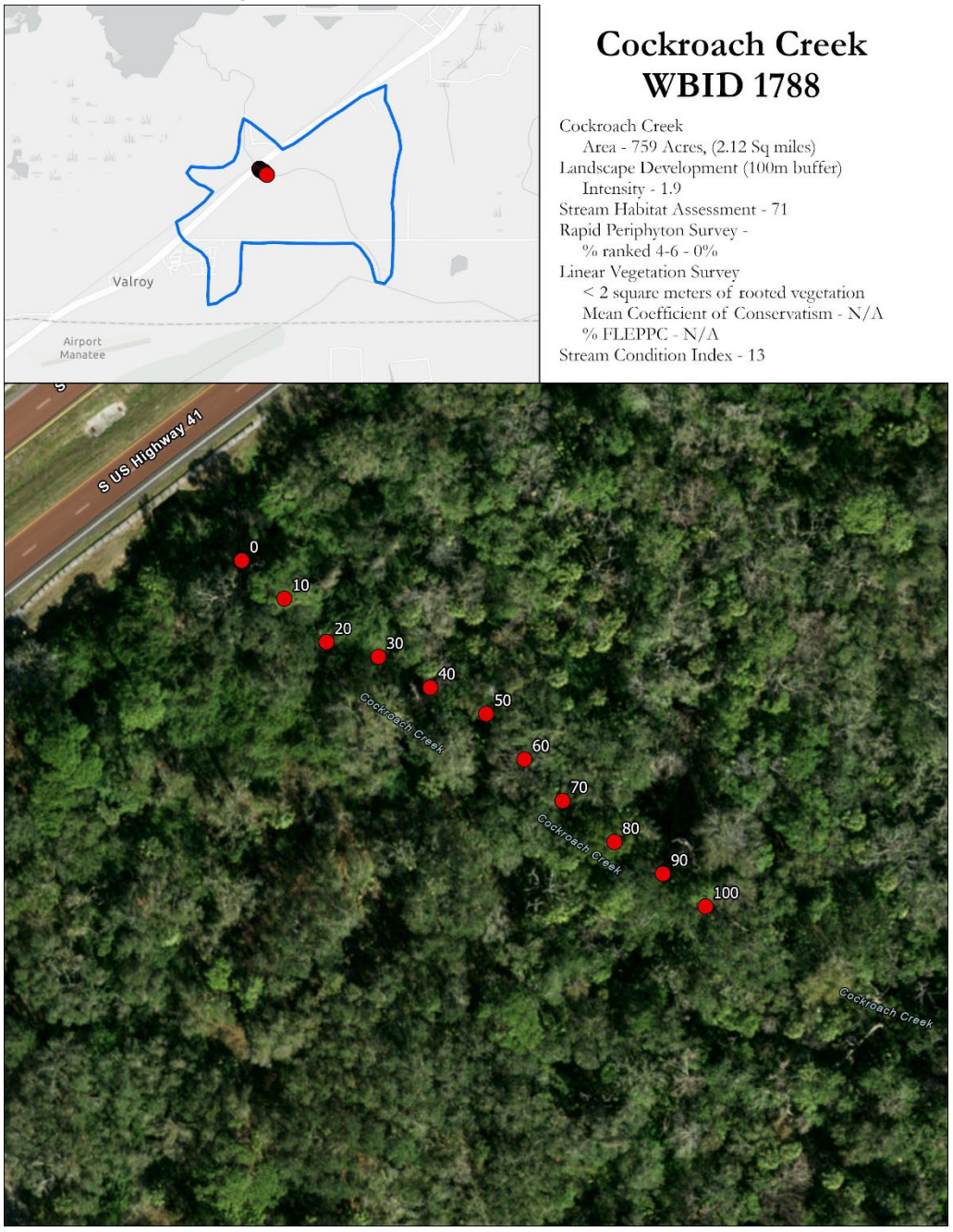

Figure 1 2025 Cockroach Creek Study Area Map



Figure 2 Photograph of the Cockroach Creek Sample Site showing the typical shoreline and normal water conditions.

Habitat and Vegetation Assessment

The region of Cockroach Creek where the assessment was conducted is east of Highway 41. The region was moderately shaded with a mean canopy cover measurement of 47.2%. Cockroach Creek averaged 0.2 meters in depth and approximately 1.3 meters wide with a flow of 0.12 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 (0.12 m/s). Substrate Diversity (two major productive habitats (fine roots, snags) scored in the marginal category. Habitat Smothering (inadequate number of stable pools and > 25% of habitats affected by sand/silt/algae) and Substrate Availability was scored as poor for having major productive habitats in only 3.5% of the stream. Minor habitats included leaf and sand deposits. The total score for the primary habitat components was 26 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 suboptimal category for Artificial Channelization for having moderate sinuosity with spoil banks or evidence of straightening. Bank stability for the right bank passed 2 of three measures of bank stability and was scored in the suboptimal range while the left bank met 1 of the 3 measures of bank stability and was scored as marginal. Riparian zone vegetation for the right bank scored in the suboptimal while the left bank scored in the marginal category both due to varying levels of non-native species. Riparian buffer zone width scored in the optimal category with > 18 meters of buffer on the right bank while the left bank scored in the marginal category. The secondary components received a score of 45 out of 80. The resulting FDEP Habitat Assessment score was 71.

Table 1 Scoring Summary for the Stream Habitat Assessment

Metric	Score
Primary Habitat Components	
Substrate Diversity	6
Substrate Availability	4
Water Velocity	11
Habitat Smothering	5
Primary Score	**26**
Secondary Habitat Components	
Artificial Channelization	11
Bank Stability - Right Bank	6
Bank Stability - Left Bank	5
Riparian Buffer Zone Width - Right Bank	9
Riparian Buffer Zone Width - Left Bank	3
Riparian Zone Vegetation Quality - Right Bank	7
Riparian Zone Vegetation Quality - Left Bank	4
Secondary Score	**45**
Habitat Assessment Score	**71**

Periphyton was encountered during 2 of the 99 samples taken during the Rapid Periphyton Survey. Both samples were ranked 3 for being between >1 mm and 6 mm in length. The tree canopy in the assessment area averaged 47.2%. These results do not indicate an excess of periphyton present in the stream as a result of an imbalance of nutrients.

The FDEP Linear Vegetation Survey encountered less than two square meters of rooted herbaceous vegetation in Cockroach Creek at the time of the assessment.

Table 2 Linear Vegetation Survey Results – Cockroach 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 2 square meters of vegetation.												



Figure 3 A photograph displaying the fine root and snag habitats in Cockroach Creek



Figure 4 Snag habitat in a shallow section of Cockroach 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 Cockroach Creek was 13 out of a possible 100 points, corresponding with a "Category 3 - Impaired" designation, with the streams macroinvertebrate community showing signs of impairment from human disturbance. Both of the 2025 sub samples featured extremely low taxa diversity showing dominance by amphipods, chironomids and snails. The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for Cockroach Creek.

Table 2 SCI metric summaries for Cockroach Creek Sample A (top) and Sample B (bottom)

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	16.00	0.42	0.42
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	1.00	1.43	1.43
% Filter Feeders	3.87	0.74	0.74
Total Clingers	1.00	1.43	1.43
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	61.29	0.54	0.54
% Tanytarsini	1.29	2.44	2.44
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	22.58	3.85	3.85

SCI Sum	14.17
Final SCI score	15.75

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	10.00	-2.08	0.00
Total Ephemeroptera	0.00	0.00	0.00
Total Trichoptera	1.00	1.43	1.43
% Filter Feeders	4.38	0.85	0.85
Total Clingers	1.00	1.43	1.43
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	63.13	0.17	0.17
% Tanytarsini	1.25	2.39	2.39
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	27.50	3.38	3.38

SCI Sum	9.65
Final SCI score	10.72

Table 3 SCI full results for Sample A

Stream Condition Index Results for Cockroach 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
Mollusca		Gastropoda	Caenogastropoda	Littorinimorpha	Hydrobiidae	*Pyrgophorus platyrachis*	10	10	1	0	0	0	0	0	0		0	0	10
Mollusca		Gastropoda	Caenogastropoda		Thiaridae	*Melanoides tuberculata*	9	9	1	0	0	0	0	0	0		0	0	9
Mollusca		Bivalvia	Autobranchia	Sphaeriida	Sphaeriidae	Sphaeriidae spp.	2	2	1	0	0	0	2	0	0		0	0	0
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda		Senticaudata spp.	31		0	0	0	0	0	0	0		0	0	0
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Hyalellidae	*Hyalella* spp.	64	95	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Corduliidae	*Epitheca* spp.	1	1	1	0	0	0	0	0	1		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	3	3	1	0	1	0	3	1	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	*Microcylloepus* spp.	1	1	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	*Pentaneura inconspicua*	4	4	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironomini spp.	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. T	2	2	1	0	0	1	0	0	0		2	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cryptochironomus* spp.	1	1	1	0	0	0	0	0	0		0	0	1
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum scalaenum* group	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Polypedilum illinoense* group	13	15	1	0	0	0	0	0	0		0	0	15
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Paracladopelma* spp.	4	4	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Thienemanniella* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cricotopus* or *Orthocladius*	3	3	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Ceratopogonidae	Ceratopogoninae spp.	2	2	1	0	0	0	0	0	0		0	0	0

Table 4 SCI full results for Sample B

Stream Condition Index Results for Cockroach 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*	21	21	1	0	0	0	0	0	0		0	0	21
Mollusca		Gastropoda	Caenogastropoda		Thiaridae	*Melanoides tuberculata*	9	9	1	0	0	0	0	0	0		0	0	9
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda		Senticaudata spp.	38		0	0	0	0	0	0	0		0	0	0
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Hyalellidae	*Hyalella* spp.	64	101	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	6	6	1	0	1	0	6	1	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	*Pentaneura inconspicua*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Tanytarsus* sp. T	2	2	1	0	0	1	0	0	0		2	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 illinoense* group	12	14	1	0	0	0	0	0	0		0	0	14
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Paracladopelma* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	*Cricotopus* or *Orthocladius*	3	4	1	0	0	0	0	0	0		0	0	0

Water Quality Assessment

Recent and long-term water quality data is available for Cockroach Creek. The majority of data that is available was collected by the Hillsborough County Environmental Protection Commission at sites 584 and 633 between 7/13/2005 and 9/28/2025. Additional data near the sample site was collected by the Florida Department of Environmental Protection. The 2025 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 Cockroach Creek Physical Water Quality (Field) from 4/3/2025

WATER QUALITY	Depth (m)	Temp (°C)	pH (SU)	D.O. (MG/L)	D.O. Sat (%)	Cond. (µmhos/cm)	Salinity (PPT)	SECCHI (m)
Top:	0.2	18.7	7.12	1.36	14.7	3119	1.65	0.25
Mid:								
Bottom:								

x VOB

Total Depth: 0.25

The chemical water quality analysis for Cockroach Creek is shown in Table 7 with geometric mean values for the previous 3 years for available parameters. To calculate numeric nutrient criteria values there must be at least 4 samples during each year for the past three years. The data for Cockroach Creek is sufficient in 2022, but insufficient in 2023 and 2024 (3 samples in each).

The previous 3-year geometric mean values for Total Phosphorus values were mixed compared to the nutrient region threshold developed by FDEP of 0.49 mg/L with a geometric mean value of 0.425 mg/L (2022), 0.597 mg/L (2023) and 0.322 mg/L (2024). The incomplete 2025 data have a geometric mean value of 0.590 mg/L. The period of record geometric mean value for total phosphorus was 0.601 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 1.147 mg/L (2022), 1.044 mg/L (2023) and 0.983 mg/L (2024). The incomplete 2025 data have a geometric mean value of 1.781 mg/L, exceeding the numeric nutrient criteria value. The Total Nitrogen value from the period of record data was below the threshold with a concentration of 1.485 mg/L.

Chlorophyll-a corrected values vary when compared to the site specific evaluation range of 3.2 µg/L to 20 µg/l for two of the most recent 3-years of samples (9.66 µg/L in 2022, 45.52 µg/L in 2023, 6.38 µg/L in 2024). The incomplete 2025 data have a geometric mean value of 2.53 µg/L. For sites with Chlorophyll-a values in this range, the assessment is indeterminate of impairment. The 2023 data exceeds the thresholds and is indicating an imbalance of flora. The period of record geometric mean value for Chlorophyll-a corrected is 2.95 µg/L.

A moderate biomass of the bacterial parameters was observed in the 2022-2025 dataset with Escherichia Coli having a geometric mean 413 colonies/100 ml (6/21/2023 with a value of 3,875 colonies/100ml), 519 colonies/100 ml for Enterococci (6/21/2023 with a value of 4000 colonies/100 ml).

Table 7 Cockroach Creek Water Quality (Laboratory)

Parameter	2022	2023	2024	2025	Period of Record	Units
E. Coli	54.5	1,352	57.7	350.4	421	#/100 ml
Enterococci	275.3	1,470	420	150	3,130	#/100 ml
Chlorophyll-a	41.6	58.3	8.9	4.0	10.3	µg/L
Chlorophyll-b	13.5	11.3	1.4	0.8	2.8	µg/L
Chlorophyll-c	0.9	2.7	0.6	0.7	0.7	µg/L
Chlorophyll-a Corrected	9.7	46.5	6.4	2.5	3.5	µg/L
Ammonia	0.343	0.082	0.158	0.098	0.114	mg/L
Kjeldahl Nitrogen	1.105	0.916	0.988	1.076	1.071	mg/L
Total Nitrogen	1.147	1.044	0.983	1.781	1.485	mg/L
Nitrates/Nitrites	0.057	0.132	0.055	0.760	0.587	mg/L
Total Phosphorus	0.415	0.597	0.322	0.590	0.601	mg/L

Conclusion

Cockroach Creek at Highway 41 is located in a mixture of natural and agricultural land uses. 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 an partially straightened channel with unstable banks and some alterations to the vegetation community. Snag and fine roots were the most common productive habitat present. The Habit Assessment resulted in a marginal score of 71. Disruption to the vegetation community was not assessed in the results of the Linear Vegetation Survey due to less than two square meters of rooted vegetation present in the currently wet portion of the stream. Cockroach Creek did meet the metrics for the rapid periphyton survey with 1% of samples being ranked between 4 and 6. The recent water quality record for Cockroach Creek showed concentrations of Chlorophyll-a corrected, Total Phosphorous and Total Nitrogen above the FDEP thresholds periodically. The water quality record was insufficient to accurately compare to the numeric nutrient criteria. The results of the SCI sampling indicate that the stream is "impaired" based on the macroinvertebrate community. Cockroach Creek would require increased monitoring to ensure 4 samples per year for water quality parameters for a minimum of 3 years to determine accurate numeric nutrient criteria values. Additional monitoring of salinity variations would also assist in determining the suitability of the stream conditions index at this site. Table 8 summarizes the results of nutrient sampling, floristic sampling, habitat assessment and SCI.

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

Measure		Cockroach Creek	2022	2023	2024	Threshold
Total Phosphorous (mg/l)			0.425	0.597	0.322	< 0.49
Total Nitrogen (mg/l)			1.147	1.044	0.983	< 1.65
RPS (% Rank 4-6)		1%				< 25%
LVS	**Avg C of C**	<2 meters				≥ 2.5
	FLEPPC %	<2 meters				< 25%
Chlorophyll-a Corrected (µg/l)			9.66	46.52	6.38	< 20 µg/l
Habitat Assessment		71				> 34
SCI		13				> 34