



Little Manatee River

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

David Eilers, Jordan Haselwood | USF Water Institute | March 28, 2024

Methods

STUDY AREA ANALYSIS

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

Little Manatee River is located in south-central Hillsborough County in the Middle Tampa Bay Watershed. Its headwaters are located south of Highway 674 and Earl Reynolds Road in Hillsborough County. The outfall of Little Manatee River is in Tampa Bay. The assessment of Little Manatee River was conducted on March 28th, 2024 and, at that time, the water levels were normal for the dry season. The Little Manatee River WBID covers 50.3 miles and is dominated by forest/natural (57.5%) and extractive (23%) land uses. The resulting calculated landscape development intensity index score was a 3.58.

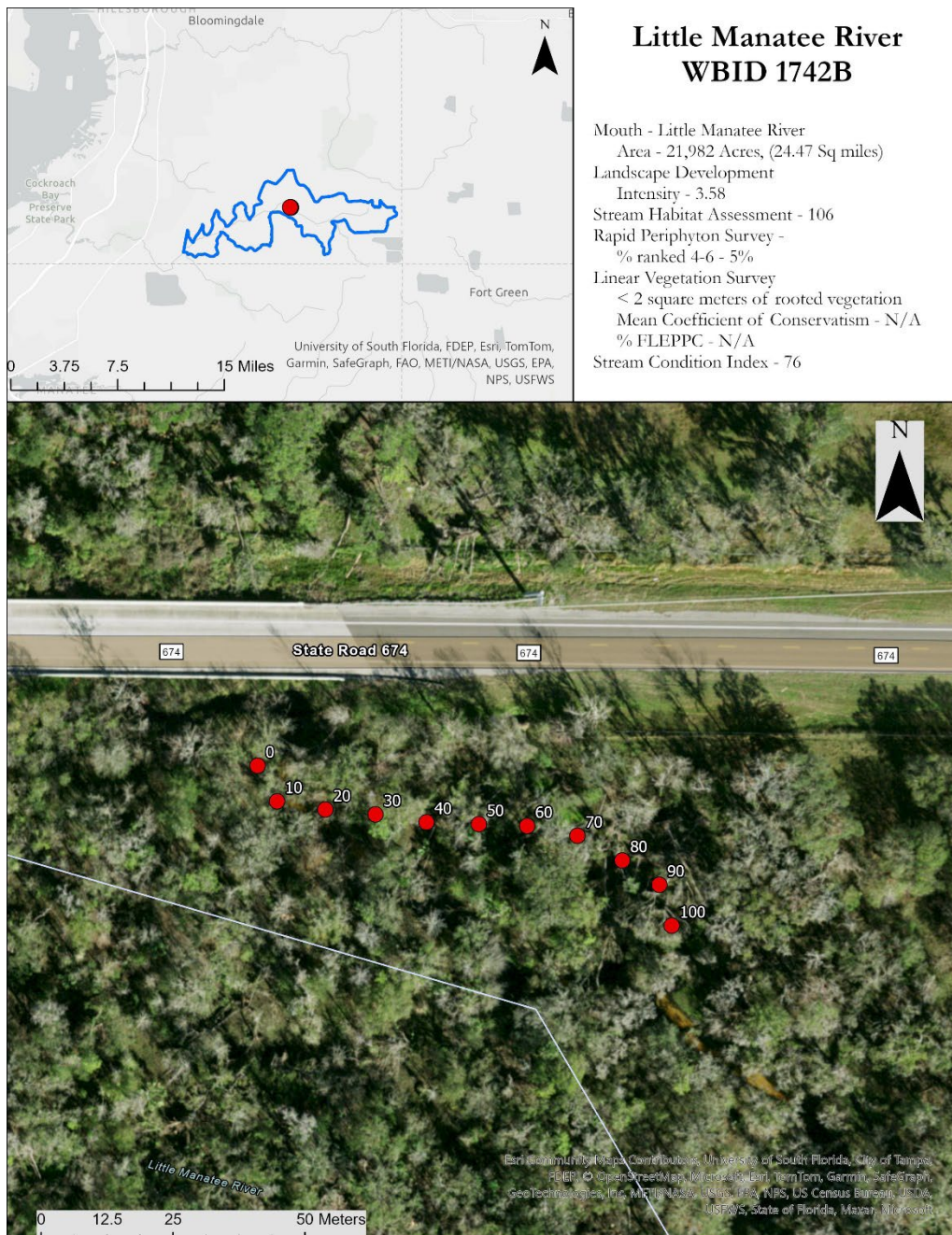




Figure 2 Photograph of the Little Manatee River Sample Site showing the typical sandy sediment of the streambed and normal water conditions.

Habitat and Vegetation Assessment

The region of Little Manatee River where the assessment was conducted is off of Highway 674. The region was moderately shaded with a mean canopy cover measurement of 62.5%. Little Manatee River averaged 0.22 meters in depth and approximately 4.8 meters wide with a flow of 0.13 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 (0.13 m/s) and Habitat Smothering (adequate number of stable pools with many productive habitats affected by sand smothering). Substrate Diversity was scored in the marginal category for having two major productive habitats (snag, roots) present in the stream. Substrate Availability was scored as poor for having major productive habitats in only 4.3% of the stream. Minor habitats included leaf packs/mats and sand deposits. The total score for the primary habitat components was a 35 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), Bank Stability for both banks, and Riparian Buffer Zone Width for both banks (>18 meters). Riparian Zone Vegetation Quality (visible disruption in plant community to both banks) is scored in the suboptimal category. The secondary habitat components received a score of 71 out of 80. The resulting FDEP Habitat Assessment score was a 106.

Table 1 Scoring Summary for the Stream Habitat Assessment

Metric		Score
Primary Habitat Components		
	Substrate Diversity	7
	Substrate Availability	4
	Water Velocity	12
	Habitat Smothering	12
	Primary Score	35
Secondary Habitat Components		
	Artificial Channelization	18
	Bank Stability - Right Bank	9
	Bank Stability - Left Bank	9
	Riparian Buffer Zone Width - Right Bank	10
	Riparian Buffer Zone Width - Left Bank	9
	Riparian Zone Vegetation Quality - Right Bank	8
	Riparian Zone Vegetation Quality - Left Bank	8
	Secondary Score	71
Habitat Assessment Score		106

Periphyton was encountered during 14 of the 99 samples taken during the Rapid Periphyton Survey. 9 samples were ranked 3 for being between >1 mm and 6 mm in length. 3 samples were ranked 4 for being between >6 mm and 20 mm in length. 2 samples were ranked 6 for being >10 cm in length. The tree canopy in the assessment area averaged 62.5% reducing available light for periphyton to flourish.

The FDEP Linear Vegetation Survey encountered less than two square meters of rooted herbaceous vegetation in Little Manatee River 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 – Little Manatee River

[illegible]



Figure 3 A photograph of snag (major productive habitat) in Little Manatee River.



Figure 4 Roots were a major productive habitat in Little Manatee River.

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 Little Manatee River was 76 out of a possible 100 points, corresponding with a “Category 1 Exceptional” designation, with the expected community of a healthy stream. Both 2024 subsamples contained high total taxa with 41 in subsample A and 38 in subsample B. High scores (above 7.0) were achieved for the Total taxa, Total Clingers, % Dominance, % Tanytarsini in both samples. In addition, Sample A had high scores for Total Trichoptera. Low scores (less than 3.0) were achieved for the Total Sensitive taxa for Sample B. The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for Little Manatee River.

Table 2 SCI metric summaries for Little Manatee River Sample A (top) and Sample B (bottom)

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	41.00	10.83	10.00
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	6.00	8.57	8.57
% Filter Feeders	20.65	4.64	4.64
Total Clingers	6.00	8.57	8.57
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	16.13	9.57	9.57
% Tanytarsini	14.84	8.12	8.12
Total Sensitive Taxa	3.00	4.29	4.29
% Very Tolerant Individuals	13.55	5.06	5.06
		SCI Sum	68.16
		Final SCI score	75.73
SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	38.00	9.58	9.58
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	4.00	5.71	5.71
% Filter Feeders	25.00	5.65	5.65
Total Clingers	5.00	7.14	7.14
Total Long-lived Taxa	2.00	6.67	6.67
% Dominance	11.69	10.46	10.00
% Tanytarsini	18.83	8.79	8.79
Total Sensitive Taxa	2.00	2.86	2.86
% Very Tolerant Individuals	7.79	6.32	6.32
		SCI Sum	68.72
		Final SCI score	76.35

Table 3 SCI full results for Sample A

Stream Condition Index Results for Little Manatee River 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
Annelida		Citellata	Oligochaeta	Tubificidae	Naididae	Tubificinae spp.	3	3	1	0	0	0	0	0	0	0	0	0	0
Annelida		Citellata	Oligochaeta	Tubificidae	Naididae	Dero nivea	1	1	1	0	0	0	0	0	0	0	0	0	1
Annelida		Citellata	Oligochaeta	Tubificidae	Naididae	Slavina appendiculata	1	1	1	0	0	0	0	0	0	0	0	0	0
Mollusca		Gastropoda	Caenogastropoda	Littorinimorpha	Hydrobiidae	Pyrgophorus platyrachis	9	9	1	0	0	0	0	0	0	0	0	0	9
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Physidae	Physa acuta	1	1	1	0	0	0	0	0	0	0	0	0	1
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	Menetus dilatatus	2	2	1	0	0	0	0	0	0	0	0	0	0
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Planorbidae	Ferrisia fragilis	2	2	1	0	0	0	0	0	0	0	0	0	0
Mollusca		Gastropoda	Heterobranchia	Hygrophila	Lymnaeidae	Lymnaea columella	1	1	1	0	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Autobranchia	Venerida	Cyrenidae	Cyrenidae	Corbicula spp.	8	8	1	0	0	8	0	0	1	0	0	0	0
Mollusca	Bivalvia	Autobranchia	Sphaeriidae	Sphaeriidae	Sphaeriidae spp.	Sphaeria spp.	3	3	1	0	0	3	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Baetidae	Labiobaetis propinquus	3	3	1	1	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Baetidae	Acerpenna pygmaea	6	6	1	0	0	0	0	0	0	0	0	1	0
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Heptageniidae	Stenacron interpunctatum	1	1	1	1	0	0	0	1	0	0	0	1	0
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	Argio sedula	2	2	1	0	0	0	0	0	0	0	0	0	2
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Coenagrionidae	Enallagma cardenium	2	2	1	0	0	0	0	0	0	0	0	0	2
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	Oecetes spp.	1		0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	Oecetes persimilis	1	2	1	0	1	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Leptoceridae	Trianaodes spp.	1	1	1	0	0	0	0	0	0	0	0	1	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	Hydropsychidae spp.	2		0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydropsychidae	Cheumatopsyche spp.	7	9	1	0	1	0	9	1	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydrotillidae	Hydrotillidae spp.	2		0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydrotillidae	Oxyethira spp.	3	4	1	0	1	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydrotillidae	Hydrotila spp.	2	3	1	0	1	0	0	0	1	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	Hydrotillidae	Neotrichia spp.	3	3	1	0	1	0	0	0	1	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	Dubirapha spp.	5	5	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	Stenelmis spp.	5	5	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Elmidae	Microcyllopus spp.	12	12	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Scirtidae	Scirtes spp.	1	1	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera		Diptera spp.	1		0	0	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	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Pentaneura inconspicua	1	1	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Chironominae spp.	4	1	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Cladotanytarsus spp.	2		0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Cladotanytarsus cf. davesi	6	9	1	0	0	4.5	0	0	0	0	9	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Tanytarsus spp.	2		0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Tanytarsus sepp	1	2	1	0	0	1	0	0	0	0	2	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Tanytarsus buckleyi	2	2	1	0	0	1	0	0	0	0	2	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Tanytarsus sp. alpha	5	7	1	0	0	3.5	0	0	0	0	7	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Polypedium scalenum group	3	3	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Polypedium flavum	22	25	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Polypedium minus group	1	1	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Rheotanytarsus exiguus group	2	2	1	0	0	0	0	0	0	0	2	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Stempellina sp. A	1	1	1	0	0	0	0	0	0	0	1	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Stenochironomus spp.	2	2	1	0	0	0	0	0	0	0	0	0	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Polypedium beckae	3	3	1	0	0	0	0	0	0	0	0	0	3
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Chironomidae	Corynoneura spp.	1	1	1	0	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	0
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Ceratopogonidae	Ceratopogoninae spp.	4	4	1	0	0	0	0	0	0	0	0	0	0

Table 4 SCI full results for Sample B

[illegible]

Water Quality Assessment

Long-term water quality data is available for Little Manatee River Creek. The data that is available was collected by the Hillsborough County Environmental Protection Commission, USGS and FDEP. The available dataset begins in 1968 and continues through present. 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 Little Manatee River 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
Mid:	0.15	21.2	7.34	6.76	91.4	466	0.21	VOB
Bottom:								Total Depth 0.25
Meter ID:	30							

The chemical water quality analysis for Little Manatee River 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 0.427 mg/L (2022), 0.441 mg/L (2024) but exceeded the threshold for 2023 with a concentration of 0.492 mg/L. Total Phosphorous values for the period of record was 0.505 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 0.912 mg/L (2022), 1.141 mg/L (2023) and 1.086 mg/L (2024). The Total Nitrogen value for the period of record had a concentration of 0.952 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 (1.52 µg/l in 2022, 1.64 µg/l in 2023, 1.5 µg/l in 2024). The available period of record had a mean value of 1.90 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 111.5 colonies/100 ml, 387.9 colonies/100 ml for Enterococci.

Table 7 Little Manatee River Water Quality (Laboratory)

Parameter	2022	2023	2024	Period of Record	Units
E. Coli	129.8	116.9	87.8	103.4	#/100 ml
Enterococci	313.6	445.4	404.8	565.3	#/100 ml
Chlorophyll-a	1.47	1.59	1.35	1.77	µg/L
Chlorophyll-b	0.24	0.22	0.22	1.12	µg/L
Chlorophyll-c	0.6	0.6	0.6	1.76	µg/L
Chlorophyll-a Corrected	1.52	1.64	1.5	1.90	µg/L
Ammonia	0.048	0.064	0.062	0.026	mg/L
Kjeldahl Nitrogen	0.768	0.933	0.985	0.733	mg/L
Total Nitrogen	0.912	1.141	1.086	0.952	mg/L
Nitrates/Nitrites	0.115	0.177	0.076	0.113	mg/L
Total Phosphorous	0.427	0.492	0.441	0.505	mg/L

Conclusion

Little Manatee River at Highway 674 is located in a predominantly natural easement with agriculture and mining activities nearby. 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 106. Disruption to the vegetation community was not observed in the results of the Linear Vegetation Survey with less than 2 square meters of rooted herbaceous vegetation present. Little Manatee River met the metrics for the rapid periphyton survey with 5% 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 Little Manatee River 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 “exceptional” 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		Little Mantee River	2022	2023	2024	Threshold
Total Phosphorous (mg/l)		5%	0.427	0.492	0.441	< 0.49
Total Nitrogen (mg/l)			0.912	1.141	1.086	< 1.65
RPS (% Rank 4-6)						< 25%
LVS	Avg C of C	NA				≥ 2.5
	FLEPPC %	NA				< 25%
Chlorophyll-a Corrected (µg/l)			1.52	1.64	1.5	< 20 µg/l
Habitat Assessment		106				> 34
SCI		76				> 34