Thirteen Mile Run

STREAM HABITAT ASSESSMENT, STREAM CONDITIONS INDEX, LINEAR VEGETATION SURVEY, 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 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 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 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, E. Coli, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

Thirteen Mile Run is located in northern Hillsborough County. Its headwaters are located south of Willow Pond Dr and Debuel Road and the outfall of Thirteen Mile Run is in Cypress Creek. The assessment of Thirteen Mile Run was conducted on January 9, 2018. At the time of the assessment, the water levels were near seasonal average. The watershed surrounding Thirteen Mile Creek is dominated by residential (50.3%), natural (30.8%) and industrial (10%) land uses. The resulting Landscape Development Intensity Index calculation was a 4.79.

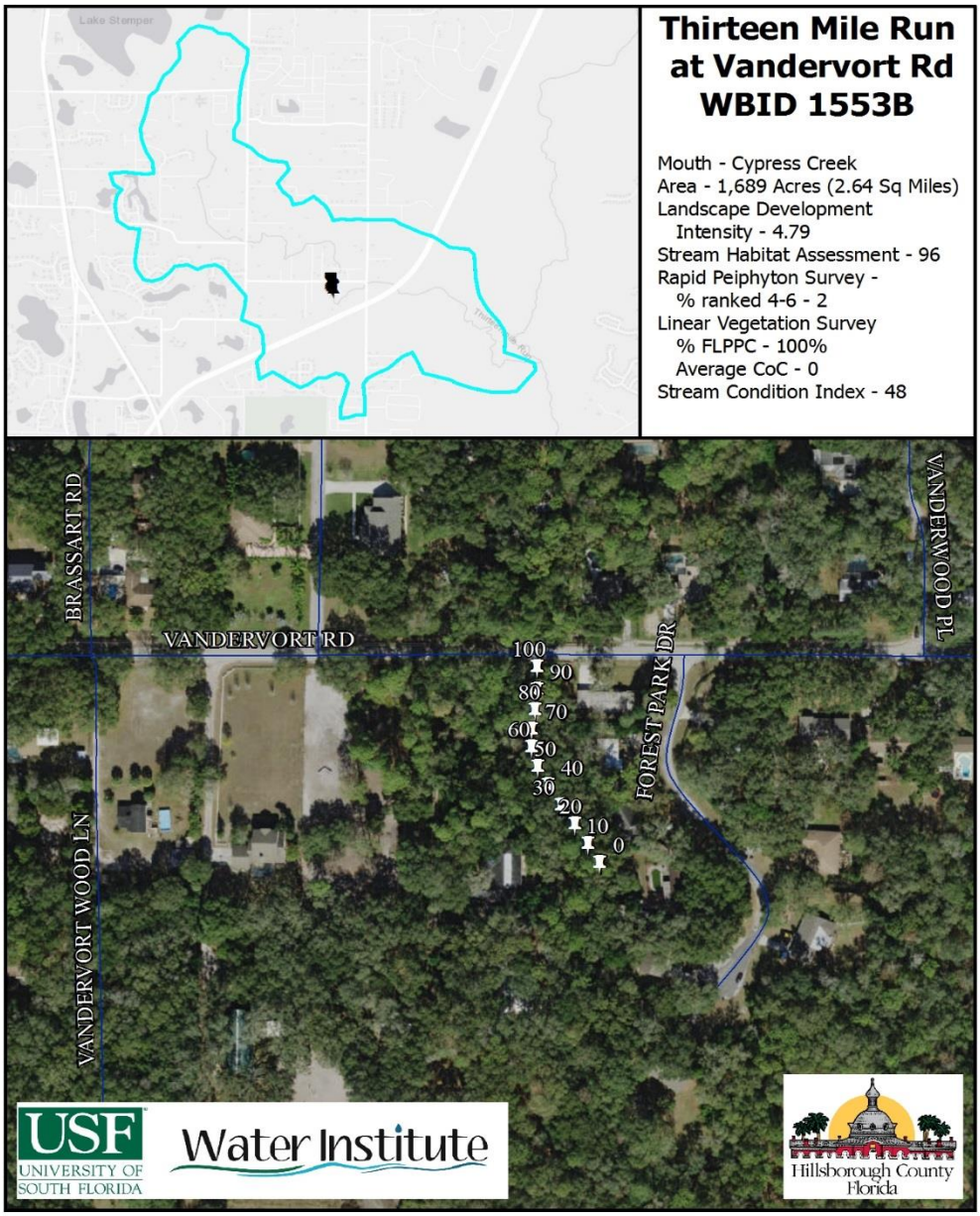

Figure 1 2018 Thirteen Mile Run Study Area Map

Habitat and Vegetation Assessment

Figure 2 Overview photograph of the Thirteen Mile Run Sample Site

The FDEP Stream Habitat Assessment is comprised of primary and secondary habitat components. The primary components focus on the in-stream habitat factors, the secondary components focus on the banks and the surrounding vegetation communities. In the region assessed, Thirteen Mile Run averaged 1.25 meters wide and 0.2 meters deep.

The primary habitat components Scored in the suboptimal range for Substrate Diversity, Substrate Availability and Water Velocity. There were three major productive habitat types in the stream Snags (14.8%), Leaf Packs (3.6%) and Roots (1.7%). The average water velocity at the time of the assessment was 0.14 m/s. Habitat Smothering received a marginal score for lacking the required stable pools and for smothering with sand and silt. The primary habitat component score was a 46 out of 80.

The secondary habitat components received suboptimal scores for Artificial Channelization having developed good sinuosity within a previously channelized streambed. Bank Stability scored in the optimal category for the left bank and the suboptimal range for the right bank due to some eroded zones on the right bank. Riparian Zone Buffer Width scored in the

suboptimal range for the left bank (13 meters), but in the marginal range for the right bank (6 meters). Riparian Zone Vegetation Quality scored in the marginal category for both banks due to the prevalence of non-native species and areas of removed vegetation where disruption to the plant community was obvious. The secondary habitat component score was a 50 of a possible 80. The total Habitat Assessment score for Thirteen Mile Run was a 96 out of 160.

Periphyton was found during the FDEP Rapid Periphyton Survey in 5 of the 99 samples. 2 of these samples were ranked 4-6 (corresponding to 6mm to >10 cm). The average tree canopy coverage in the assessment region was 82% corresponding to a heavily shaded system. The most prevalent periphyton location of the study area was closest to the bridge at Vandervort Rd.

Three species of aquatic vegetation were observed during the FDEP Linear Vegetation Survey. All three species are non-native, invasive species. The results of the Linear Vegetation Survey are shown in Table 1 indicating Thirteen Mile Run not meeting the metrics for Mean Coefficient of Conservatism (0) or the % FLEPPC (100%).

Table 1 Linear Vegetation Survey Results – Thirteen Mile Run

Plant Species	Sample Site										Obsevations/ Species	CoC
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
Sphagneticola trilobata		1	1	1	1	1	1	1	1	1	9	7.09
Colocasia esculenta		1			1	1	1	1	1	1	7	2.02
Alternanthera philoxeroides										1	1	4.54
Observations/station	0	2	1	1	2	2	2	2	2	3	17	
Total Observations	17											
Mean CoC	0											
% FLEPPC	100%											

Figure 3 Thirteen Mile Run assessment site

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 Thirteen Mile Run was 48 out of a possible 100 points, corresponding with a "Healthy" designation, with the expected community of a healthy stream.

Neither subsample contained Long-Lived Taxa or Sensitive Taxa potentially indicating a disruption to the hydroperiod or a pollutant. High scores were achieved for the % Filter Feeders, % Dominance, % Tanytarsini and % Very Tolerant Individuals metrics.

Table 2 SCI metric summaries for Thirteen Mile Run subsample A (top) and subsample B (bottom)

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	18.00	1.25	1.25
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	1.00	1.43	1.43
% Filter Feeders	51.38	11.79	10.00
Total Clingers	2.00	2.86	2.86
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	22.07	8.39	8.39
% Tanytarsini	44.83	11.25	10.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	5.52	7.06	7.06
SCI Sum	44.99		
Final SCI score	49.98		

SCI Metric	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	19.00	1.67	1.67
Total Ephemeroptera	1.00	2.00	2.00
Total Trichoptera	1.00	1.43	1.43
% Filter Feeders	42.91	9.82	9.82
Total Clingers	2.00	2.86	2.86
Total Long-lived Taxa	0.00	0.00	0.00
% Dominance	28.37	7.13	7.13
% Tanytarsini	41.84	11.05	10.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	4.96	7.29	7.29
SCI Sum	42.18		
Final SCI score	46.87		

The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for Thirteen Mile Run.

Thirteen Mile Creek SCIA
Stream Condition Index (SCI)
Samples Collected 01/09/2018
Project #: 6063170278

Stream Condition Index Results for Thirteen Mile Creek SCIA

Phylum	Class	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	Hygrophila	Ancylidae	*Hebetancylus excentricus*	3	3	1	0	0	0	0	0	0		0	0	3
Mollusca	Bivalvia	Veneroida	Sphaeriidae	*Sphaeriidae spp.*	4	4	1	0	0	0	4	0	0		0	0	0
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	*Hyalella azteca sp. complex*	15	15	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis diminuta*	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis amica*	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Hydropsychidae spp.*	2		0	0		0	0		0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche spp.*	22	24	1	0	1	0	24	1	0		0	0	0
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Neoporus spp.*	5	5	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera		*Diptera spp.*	1		0	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomidae spp.*	2		0	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomus spp.*	1	1	1	0	0	0	0	0	0		0	0	1
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus spp.*	5	5	1	0	0	2.5	0	0	0		5	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum scalaenum group*	4	4	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	14	14	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum illinoense group*	1	1	1	0	0	0	0	0	0		0	0	1
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus group*	27	28	1	0	0	0	28	1	0		28	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Pentaneura inconspicua*	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Stenochironomus spp.*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Corynoneura spp.*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum beckae*	3	3	1	0	0	0	0	0	0		0	0	3
Arthropoda	Insecta	Diptera	Chironomidae	*Paratanytarsus spp.*	30	32	1	0	0	16	0	0	0	32	32	0	0

Table 3 SCI full results for Sample A

Table 4 SCI full results for Sample B

Thirteen Mile Creek SCIB

Stream Condition Index (SCI)

Samples Collected 01/09/2018

Project #: 60631702278

Stream Condition Index Results for Thirteen Mile Creek SCIB

Phylum	Class	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			Planariidae	Platyhelminthes spp.	1	1	1	0	0	0	0	0	0		0	0	0
Mollusca	Bivalvia	Veneroida	Sphaeriidae	Sphaeriidae spp.	2	2	1	0	0	0	2	0	0		0	0	0
Arthropoda	Malacostraca	Amphipoda	Dogielinotidae	*Hyalella azteca* sp. complex	11	11	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis* spp.	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Odonata	Gomphidae	*Dromogomphus spinosus*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Odonata	Coenagrionidae	Coenagrionidae spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsychidae spp.	2		0	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	20	22	1	0	1	0	22	1	0		0	0	0
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* spp.	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Neoporus* spp.	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus buckleyi*	5	5	1	0	0	2.5	0	0	0		5	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum scalaenum* group	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	22	22	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum illinoense* group	5	5	1	0	0	0	0	0	0		0	0	5
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	14	14	1	0	0	0	14	1	0		14	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Pentaneura inconspicua*	7	7	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Stenochironomus* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Corynoneura* spp.	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum beckae*	2	2	1	0	0	0	0	0	0		0	0	2
Arthropoda	Insecta	Diptera	Chironomidae	*Paratanytarsus* spp.	40	40	1	0	0	20	0	0	0	40	40	0	0

Water Quality Assessment

Limited long-term water quality data is available for Thirteen Mile Run. The data that is available was collected by the Hillsborough County Environmental Protection Commission and Florida LAKEWATCH. Values for the physical water parameters begin in 2005 and continue through present. Values for the laboratory water parameters also begin in 2005 and continue to present, 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 Thirteen Mile Run Physical Water Quality (Field)

Thirteen Mile Run								
Date	**Depth (m)**	**Temp (°C)**	**pH**	**DO (mg/L)**	**DO (% Sat)**	**Cond (UMHO/cm**	**Salinity (PPT)**	**Secchi Depth (m)**
1/31/18	0.29	12.8	6.77	6.82	63.4	165	0.07	1.2
Mean POR		22.2	7.08	3.58	41.12	N/A	0.14	0.27

The chemical water quality analysis for Thirteen Mile Run is shown in Table 6 along with mean values for the period of record for available parameters. Period of record mean and the sample for this assessment for Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/L with a mean value of 0.078mg/L (2005-2017). Total Phosphorous values for the sample from this assessment were 0.065 mg/L. Total Nitrogen values were below the nutrient region threshold developed by FDEP of 1.65 mg/L with a mean value of 1.117 mg/L (2005-2017). The Total Nitrogen value from the assessment was also below the threshold with a concentration of 1.023 mg/L. Chlorophyll-a corrected values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l for the period of record (3.79 µg/l (2005-2017)) and the most recent sample (5.6 µg/l). For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora. Elevated biomass of the bacterial parameters was observed in both the sample for this assessment and the long term dataset.

In the framework of the FDEP Numeric Nutrient Criteria, Total Nitrogen concentrations remained below the 1.65mg/L target for the past 3 years with a geometric mean concentration of 0.703 mg/L. Total Phosphorous concentrations also remained below the 0.49 mg/L target with a three year geometric mean concentration of 0.056 mg/L. Neither parameter exceeded the target in any sample.

Table 6 Thirteen Mile Run Water Quality (Laboratory)

Parameter	Thirteen Mile Run	POR Mean	Units
Alkalinity	38.0	N/A	mg/LCaCO3
Nitrates/Nitrites	0.036	0.056	mg/L
E. Coli	860	200	#/100 ml
Enterococci	2100	1899	#/100 ml
Chlorophyll a	6.4	4.03	ug/L
Chlorophyll b	5.1	N/A	ug/L
Chlorophyll c	0.7	N/A	ug/L
Chlorophyll t	7.8	N/A	ug/L
Chlorophylla Corr	5.6	3.79	ug/L
Chlorophyll-pheo	3.2	N/A	ug/L
Ammonia	0.029	0.051	mg/L
Kjeldahl Nitrogen	0.987	0.691	mg/L
Total Nitrogen	1.023	1.117	mg/L
Total Phosphorus	0.065	0.078	mg/L
Color(345)F.45	19.2	32.24	Pt/Co

Conclusion

Thirteen Mile Run at Vandervort Rd is located with some buffer of natural, undeveloped land surrounding it in a residential landscape. The stream itself showed moderate 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 a Suboptimal score of 96. Disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with Thirteen Mile Run not meeting either metric for Average Coefficient of Conservatism or the Percent FLEPPC. Thirteen Mile Run met standards for the rapid periphyton survey with 2% of samples being ranked between 4 and 6. The historical water quality record for Thirteen Mile Run showed acceptable concentrations of Total Phosphorous and Total Nitrogen but showed elevated biomass for Bacteria. The results of the SCI sampling indicate that the stream is not impaired based on the macroinvertebrate community with a score of 48, in the "Healthy" category. 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		Thirteen Mile Run	Mean POR	Threshold
Total Phosphorous (mg/l)		0.065	0.078	< 0.49
Total Nitrogen (mg/l)		1.023	1.117	< 1.65
RPS (% Rank 4-6)		2%		< 25%
LVS	**Avg C of C**	0		≥ 2.5
	FLEPPC %	100.00%		< 25%
Chlorophyll (µg/l)		5.6	3.79	< 20 µg/l
Habitat Assessment		96		> 34
SCI		48		> 34