McDonald Branch

Methods

Study Area Analysis

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/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

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, Fecal Coliform, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

McDonald Branch, located in Hillsborough County, Florida was sampled on 3/20/2017 and is located approximately 500 meters west of Alderman's Ford Park off of Thompson Road in Tampa Florida at: N 27.864839, W 82.155314. McDonald Branch drains into the Alafia River and is located in FDEP WBID 1651 which contains 1,129 acres of land. The watershed surrounding McDonald Branch is dominated by Residential (31.60%), Field/Pasture (22.90%), Forest/Natural (20.30%), and Agricultural (14.90%) land use. The Landscape Development Intensity Index of the watershed is 4.18.

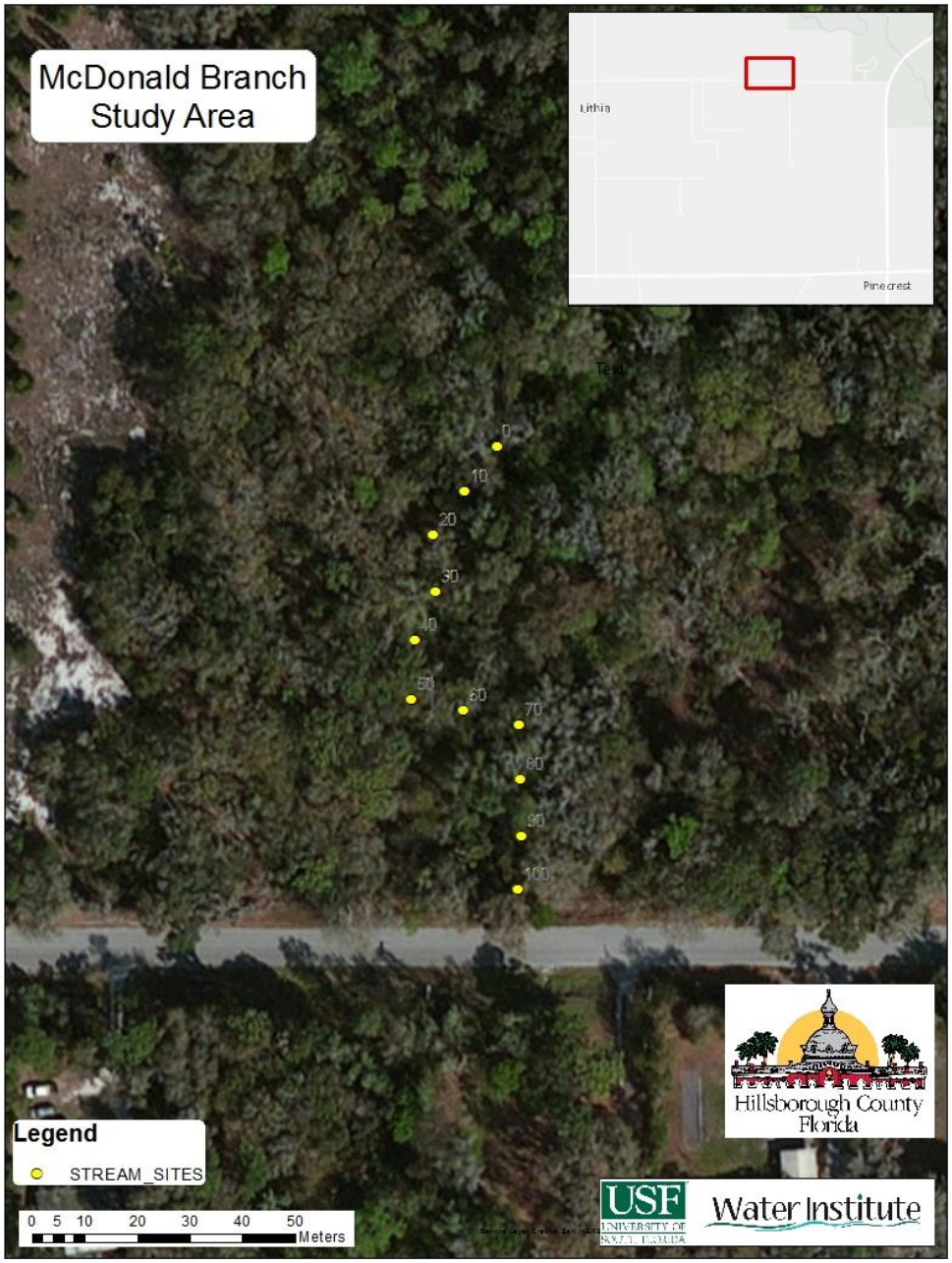

Figure 1. 2017 McDonald Branch Assessment Study Area Map

Habitat Assessment

McDonald Branch at Thompson Road

Figure 2 Overview photograph of McDonald Branch sample site

McDonald Branch received a Habitat Assessment score of 115 with no signs of artificial channelization. Primary habitat components received marginal scores for Substrate Diversity and Habitat Smothering, due to the presence of only two major productive habitats (7.3% Snags, 8.5% Roots/undercut banks) and an inadequate number of stable pools, and received suboptimal scores for Substrate Availability and Water Velocity. Secondary habitat components received optimal scores for Artificial Channelization, Bank Stability, and Riparian Buffer Zone Width. The right bank scored optimal Riparian Zone Vegetation Quality, while the left bank scored in the suboptimal range due to extensive wild hog damage along the buffer zone.

During the Rapid Periphyton Survey, periphyton was not observed in any of the 99 individual grab samples performed. The average canopy cover in the 100 meter region was 89.45%. The Secchi Disk Depth was measured as 0.40 meters visible on bottom at the 50 meter mark. The average water depth at the time of the assessment was 0.3 meters.

The Linear Vegetation Survey identified 12 species rooted in the water at the time of the assessment. Four of these species are non-native, invasive species shown in bold in Table 1. The remaining 8 species are native to this region. *Saururus cernuus* was the dominant species in Region 70-80 of the Linear Vegetation Survey. The vegetation community along this sample location showed evidence of infrequent disturbance. There were a total of 38 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 4.08 and the %

FLEPPC metric for the study area was 26%. The FDEP thresholds are > 2.5 for Mean CoC and < 25% for % FLEPPC.

Table 1 Linear Vegetation Survey Results – McDonald Branch

Plant Species	C of C Score	Sample Site										
		0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Observations / Species
Ardisia escallonioides	4.17							1				1
Boehmeria cylindrica	5				1							1
Cicuta maculata	4.54			1				1		1		3
Colocasia esculenta	0			1	1	1	1	1		1		6
Commelina diffusa	2.02				1		1				1	3
Crinum americanum	9			1								1
Hydrocotyle umbellata	1.92	1	1	1			1					4
Ipomoea carnea	0							1		1	1	3
Itea virginica	7.09	1	1	1	1	1	1	1			1	8
Orontium aquaticum	8.39	1	1						1		1	4
Saururus cernuus	6.5	1	1						D			3
Sphagneticola trilobata	0										1	1
Total Observations/ Station		4	4	5	4	2	4	5	2	3	5	38
Total Observations	38											
Mean CoC	4.08											
% FLEPPC	26%											

Figure 3. *Saururus cernuus* was the dominant species in Region 70-80 of the Linear Vegetation Survey of McDonald Branch.

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 McDonald Branch Creek was 70 out of a possible 100 points, corresponding with an "Exceptional" designation, with disruption to the expected community of a healthy stream.

The summary of the metric scores for aliquot A (top) and aliquot B (bottom) are shown in Table 2. Both samples were dominated by *Gammarus tigrinus.* Sample A contained 31 total taxa, including 4 sensitive taxa and 6.21% very tolerant individuals. Sample B contained 32 total taxa, including 5 sensitive taxa and 4.64% very tolerant individuals. Both samples contained a long-lived taxa *Palaemonetes spp.* and Sample A also contained the long-lived species *Corbicula spp.*

Table 2 SCI metric summaries for McDonald Branch Creek

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	31.00	6.67	6.67
Total Ephemeroptera	2.00	4.00	4.00
Total Trichoptera	4.00	5.71	5.71
% Filter Feeders	16.90	3.77	3.77
Total Clingers	7.00	10.00	10.00
Total Long-lived Taxa	2.00	6.67	6.67
% Dominance	22.07	8.39	8.39
% Tanytarsini	2.76	3.89	3.89
Total Sensitive Taxa	4.00	5.71	5.71
% Very Tolerant Individuals	6.21	6.81	6.81

SCI Sum	61.62
Final SCI score	68.47

	Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa	32.00	7.08	7.08
Total Ephemeroptera	3.00	6.00	6.00
Total Trichoptera	4.00	5.71	5.71
% Filter Feeders	20.53	4.61	4.61
Total Clingers	7.00	10.00	10.00
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	24.50	7.90	7.90
% Tanytarsini	6.62	5.97	5.97
Total Sensitive Taxa	5.00	7.14	7.14
% Very Tolerant Individuals	4.64	7.43	7.43

SCI Sum	65.19
Final SCI score	72.43

The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for McDonald Branch Creek.

McDonald Branch SCIA
Stream Condition Index (SCI)
Samples Collected 03/20/2017
Project #: 6063170278

Stream Condition Index Results for McDonald Branch 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
Annelida	Clitellata	Tubificida	Naididae	*Nais pardalis*	3	3	1										3
Annelida	Clitellata	Tubificida	Naididae	*Dero trifida*	1	1	1										1
Mollusca	Gastropoda	Hygrophila	Ancylidae	Ancylidae spp.	3	3	1										
Mollusca	Gastropoda	Hygrophila	Planorbidae	Planorbidae spp.	1	1	1										1
Mollusca	Bivalvia	Veneroida	Corbiculidae	*Corbicula* spp.	1	1	1				1		1				
Arthropoda	Malacostraca	Isopoda	Asellidae	*Caecidotea* spp.	7	7	1									1	
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus* spp.	11												
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus tigrinus*	21	32	1							32			
Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemonetes* spp.	1	1	1						1				
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Pseudocloeon ephippiatum*	5	5	1	1									
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Heptageniidae spp.	1	1	1	1				1				1	
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia sedula*	1	1	1										1
Arthropoda	Insecta	Odonata	Coenagrionidae	*Enallagma coecum*	3	3	1										3
Arthropoda	Insecta	Odonata	Aeshnidae	Aeshnidae spp.	1	1	1										
Arthropoda	Insecta	Trichoptera	Polycentropodidae	*Cernotina* spp.	3	3	1		1			1					
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis avara*	4	4	1		1								
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	2	2	1		1		2	1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Neotrichia* spp.	6	6	1		1			1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Dubiraphia* spp.	2	2	1										
Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis* spp.	1	1	1					1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	18	18	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Cladotanytarsus* spp.	1	1	1			0.5					1		
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* spp.	1												
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus buckleyi*	1	2	1			1					2		
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	8	8	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	1	1	1				1	1			1		
Arthropoda	Insecta	Diptera	Chironomidae	*Stenochironomus* spp.	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Apedilum* spp.	9	9	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Parametriocnemus* spp.	4	4	1									1	
Arthropoda	Insecta	Diptera	Chironomidae	*Cricotopus* or *Orthocladius*	1	1	1										
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Atrichopogon* spp.	2	2	1										
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium* spp.	19	19	1				19	1				1	
Arthropoda	Insecta	Heteroptera	Veliidae	*Rhagovelia* spp.	1	1	1										

Table 3 SCI full results for Sample A

McDonald Branch SCIB
Stream Condition Index (SCI)
Samples Collected 03/20/2017
Project #: 6063170278

Stream Condition Index Results for McDonald Branch 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
Annelida	Clitellata	Tubificida	Naididae	Tubificinae spp.	1	1	1										
Annelida	Clitellata	Tubificida	Naididae	*Aulodrilus pigueti*	1	1	1										
Annelida	Clitellata	Tubificida	Naididae	Naidinae spp.	3	3	1										
Annelida	Clitellata	Tubificida	Naididae	*Nais communis*	1	1	1										1
Annelida	Clitellata	Tubificida	Naididae	*Nais pardalis*	3	3	1										3
Mollusca	Gastropoda	Hygrophila	Ancylidae	Ancylidae spp.	12	12	1										
Mollusca	Gastropoda	Hygrophila	Planorbidae	Planorbidae spp.	1	1	1										1
Arthropoda	Malacostraca	Isopoda	Asellidae	*Caecidotea* spp.	6	6	1									1	
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus* spp.	13												
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus tigrinus*	24	37	1							37			
Arthropoda	Malacostraca	Decapoda	Palaemonidae	*Palaemonetes* spp.	1	1	1						1				
Arthropoda	Insecta	Ephemeroptera	Caenidae	*Caenis* spp.	1	1	1	1									
Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetidae spp.	1												
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Pseudocloeon ephippiatum*	3	4	1	1									
Arthropoda	Insecta	Ephemeroptera	Heptageniidae	*Stenacron interpunctatum*	1	1	1	1				1				1	
Arthropoda	Insecta	Odonata	Coenagrionidae	Coenagrionidae spp.	1												
Arthropoda	Insecta	Odonata	Coenagrionidae	*Enallagma* spp.	1	1	1										
Arthropoda	Insecta	Odonata	Coenagrionidae	*Enallagma coecum*	1	2	1										2
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis* spp.	1												
Arthropoda	Insecta	Trichoptera	Leptoceridae	*Oecetis avara*	3	4	1		1								
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche* spp.	6	6	1		1		6	1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Hydroptila* spp.	1	1	1		1			1					
Arthropoda	Insecta	Trichoptera	Hydroptilidae	*Neotrichia* spp.	2	2	1		1			1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Stenelmis* spp.	3	3	1					1					
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus* spp.	19	19	1										
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae spp.	1												
Arthropoda	Insecta	Diptera	Chironomidae	*Cladotanytarsus* spp.	2	2	1			2					2		
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus* spp.	4												
Arthropoda	Insecta	Diptera	Chironomidae	*Tanytarsus buckleyi*	2	7	1			7					7		
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum scalaenum* group	1	1	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum flavum*	2	2	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Rheotanytarsus exiguus* group	1	1	1				1	1			1		
Arthropoda	Insecta	Diptera	Chironomidae	*Stenochironomus* spp.	2	2	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Apedilum* spp.	4	4	1										
Arthropoda	Insecta	Diptera	Chironomidae	*Parametriocnemus* spp.	3	3	1									1	
Arthropoda	Insecta	Diptera	Ceratopogonidae	*Atrichopogon* spp.	3	3	1										
Arthropoda	Insecta	Diptera	Simuliidae	*Simulium* spp.	15	15	1				15	1				1	
Arthropoda	Insecta	Diptera	Empididae	*Hemerodromia* spp.	1	1	1									1	

Table 4 SCI full results for Sample B

Water Quality Assessment

Limited long-term water quality data is not available for McDonald Branch. The data that is available was collected by the USF Water Institute. Table 3 provides a summary of the Physical/Chemical conditions recorded.

Table 5 McDonald Branch Physical Water Quality (Field)

Depth (m)	Temp (c)	pH	DO (mg/L)	DO (% Sat)	Cond (umho/cm)	Salinity (ppt)	TDS (mg/L)	Sample Site
0.19	19.74	8.875	6.535	70.8	209.65	0.1	113.9	Thompson Rd.

The chemical water quality analysis McDonald Branch is shown in Table 4. Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/l. Total Nitrogen values were also below the nutrient region threshold developed by FDEP of 1.65 mg/l. Chlorophyll-a values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l.

Table 6 McDonald Branch Water Quality (Laboratory)

Parameter	Thompson Rd.	Units
Alkalinity	84.0	mg/LCaCO3
Nitrates/Nitrites	0.505	mg/L
Fecal Coliform	20	#/100 ml
Enterococci	440	#/100 ml
Chlorophyll a	1.2	ug/L
Chlorophyll b	2.6	ug/L
Chlorophyll c	0.5	ug/L
Chlorophyll t	1.7	ug/L
Chlorophylla Corr	3.4	ug/L
Chlorophyll-pheo	6.6	ug/L
Ammonia	0.010	mg/L
Kjeldahl Nitrogen	0.422	mg/L
Total Nitrogen	0.927	mg/L
Total Phosphorus	0.198	mg/L
Color(345)F.45	13.1	Pt/Co

Conclusion

The McDonald Branch region that was assessed during this study does not show impairment based on water quality from this single sample. More samples throughout the year in varying water levels and flows would be required to conduct any trend analysis on the water quality. The system does show impairment in the vegetation communities through the linear vegetation survey results with a high percentage of non-native invasive species. The habitat assessment performed on the sample site shows habitat is sufficient for biotic use with an optimal score of 115. The results of the SCI sampling classify McDonald Branch Creek as Exceptional based on the macroinvertebrate community.

Table 7 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Thompson Rd	Threshold
Total Phosphorous (mg/l)		0.198	< 0.49
Total Nitrogen (mg/l)		0.927	< 1.65
RPS (% Rank 4-6)		0	< 25%
LVS	Avg C of C	4.08	≥ 2.5
	FLEPPC %	26.00%	< 25%
Chlorophyll (µg/l)		3.4	< 20 µg/l
Habitat Assessment		115	> 34
SCI		70	> 34