Baseline Benthic Evaluation of Old Man Creek Downstream of the Ahmic Lake Road Bridge

For: The Magnetawan Watershed Land Trust
2018/10/16
Project: 2018-001
Fieldwebster Environmental Consulting

MAGNETAWAN WATERSHED LAND TRUST

FIELDWEBSTER ENVIRONMENTAL CONSULTING

Baseline Benthic Evaluation of Old Man Creek Downstream of Ahmic Lake Road Bridge

Project: 2018-001

Barry W. Graham, President
Magnetawan Watershed Land Trust
51 King William
Huntsville, ON
Box 30018
P1B 0B5

2018/10/16

Dear Barry W. Graham

Fieldwebster Environmental Consulting has prepared a report on the 2018 benthic evaluation of Old Man Creek downstream of the Ahmic Lake Road Bridge. The benthic evaluation was designed to provide a baseline for the evaluation of potential future impacts to the ecological health of the Old Man Creek. The sampling and analysis followed the Ontario Benthic Biomonitoring Network (OBBN) standards as regulated by the Ontario Ministry of the Environment Conservation and Parks. To account for seasonal variation samples were taken on May 20th 2018, July 29th 2018 & September 4th 2018. This baseline study included the collection and identification of 947 specimens from the Old Man Creek. The data collected indicates good ecological health in Old Man Creek. Further benthic sampling will be able to use the provided baseline to determine any potential deterioration of the site. Should you have any further questions regarding this please feel free to contact Fieldwebster Environmental Consulting.

Sincerely,

Valerie Fieldwebster B.A.H. OBBN
(705) 783-1772
340 Fish Lake Rd.
Box 92
Novar, ON.
P0A 0B5

Jesse Fieldwebster M.Eng. OBBN
(705) 956-0386
295 Fourth St.
Midland, ON.
L4R 3T9

TABLE OF CONTENTS

1.0 Introduction

The Old Man's Creek flows for approximately 1 km through the Old Man's Creek Nature Reserve (OMCR) before it empties into Ahmic Lake. The 106.2 ha (253 acres) OMCR was acquired by the Magnetawan Watershed Land Trust in 2012. The OMCR property falls within the Huntsville Ecoregion zone (538), and the Magnetawan Watershed (2EA). Historically a window and door factory was operated on the East side of the creek. The window and door factory constructed a watermill at the first waterfalls. This waterfalls has an approximate drop of 10m. The remnants of the building can still be seen in the form of a concrete wall along both sides of the creek at the waterfalls and some metal gears on the east bank. The Land Trust now maintains the OMCR as a conservation area and encourages public access only the west side of the creek. In a species at risk study in 2016, 2 bird species at risk were identified to be nesting on the east side of the creek, access to the east side of the creek is restricted. See Appendix A for further details.

2.0 OBBN Sampling

Ontario Benthic Biomonitoring Network (OBBN) sampling uses the collection of benthic macroinvertebrates to monitor the ecological condition of lakes, streams, and wetlands and other natural bodies of water. The network is led by the Ontario Ministry of the Environment Conservation and Parks who certify technicians to carry out site by site analysis. The OBBN features standard sampling protocols, training, and a database (which ensures that OBBN data is publically accessible). Benthic macroinvertebrates are animals lacking backbones which live in the water on the bottoms of creeks, streams, lakes or other water bodies. The diversity and dominance of specific populations of benthic macroinvertebrates can be used as indicators water quality and general ecosystem health. OBBN sampling sites can be viewed at the Ontario Ministry of the Environment Conservation and Parks site:

https://envconnections.maps.arcgis.com/apps/webappviewer/index.html?id=5c3a6be1b94347a6b8c8523e0c22b8fc

3.0 Sampling Sites

One site with three subsampling partial transects were investigated during the 2018 study season.

SUBSAMPLE	LOCATION
1	17T 605664 5052320
2	17T 605512 5052379
3	17T 605620 5052412

The site was accessed off of Ahmic Lake Road with trailhead parking located at 2953 Ahmic Lake Rd (UTM: 17T 605495 5052320). See Appendix B for further details.

4.0 Methodology

The sampling and analysis followed the OBBN standards as regulated by the Ontario Ministry of the Environment Conservation and Parks. To account for seasonal variation samples were taken in Spring 23/05/2018, Summer 29/07/2018, Autumn 04/09/2016. During each sampling date three subsamples were taken. Each subsample was comprised of a minimum of 100 organisms.[1] Over the course of the investigation 947 benthic macroinvertebrates were caught, identified, and included in the analysis.

Subsampling sites were reached by foot. Samples were collected using the kick and sweep technique with a 500 micron dip net. Sampling transects started at the river's edge and proceeded inwards until reaching ~1m in depth. Net contents were deposited into holding bucket. Live identification technique was done in field using a Marchant Box. Identification took roughly one hour per subsample with two OBBN staff. Student volunteers from Canadore College and Nippising University assisted during the spring and summer sampling events under the supervision of OBBN qualified staff.

Water samples were taken from subsample site 1. Water samples were stored at 4-6 ^{o}C and analysed within 24hrs. Analysis was done using a DR890 Hach Colorimeter with Hach reagents. QA/QC included one duplicate per sampling session, field blanks and comparisons to known standards. See Appendix B for further details.

5.0 Resulting Study

This study is designed to provide an initial baseline; it is not designed to reach conclusions with regards to any current impacts to the Old Man Creek site. This baseline and can be used as a comparison point for future studies. The three biotic metrics valuable for comparison are biodiversity, percentage dominant and percentage EPT. Basic water chemistry was also analysed.

5.1 Biodiversity

An aquatic ecosystem that is dominated by a small number of species is typically viewed as unhealthy. A drop in biodiversity over time can be an indicator of an ecosystem facing some form of stressor. Ecosystem richness is determined by counting how many of the 27 family groups included in the OBBN system are present in a studied water body. This study found a mean of 12.3 family groups per site of the possible 27.

[1] The benthic invertebrate population density in Site 1 during the fall sampling season was too low to allow for the collection of a 100 organism sample size during a reasonable sampling period. This is discussed further in Appendix D.

While no suitable reference site was found for this study a recent work in Ontario found the mean number of family groups per site to be 12.1 in 50 sites across rural southern Ontario.[2]

5.2 Percentage Dominant

Related to biodiversity is the percentage dominant indicator. OBBN collections having more than 45% of their catch from one dominant species are considered extreme and can indicate poor ecosystem health. There were no instances of the dominant species comprising more that 45% of the catch in any one of the subsamples.

5.3 Percentage EPT

Species that are sensitive to changes in their environment are labeled indicator species. OBBN protocol lists three important indicator species that can be used as a combined indicator of ecosystem health: Mayflies (*Ephemeroptera*), Stoneflies (*Plecotera*) & Caddisflies (*Trichoptera*). Together these make up percentage EPT. This study has a mean percentage EPT of 47.04%. While no suitable reference site was found for this study recent work in Ontario found a mean percentage EPT of 25.3% in 50 sites across rural southern Ontario.[3]

5.4 Water Chemistry

Nitrate, Phosphorous (as Orthophosphate) & pH were analysed. Water chemistry appears good with ranges falling within the Canadian Water Quality Guidelines for the Protection of Aquatic Life.[4] See Appendix C for further details.

5.5 Limitations

During the fall sampling period a population crash in subsampling site 1 prevented adequate sample collection during a reasonable period of time. Please see Appendix E for further details.

5.6 Further Study

The data collected as part of this baseline study will be added to the OBBN data base assist with province wide analysis of ecological trends. It will provide a baseline to assess any future impacts to the site. See Appendix D for raw benthic populations data.

[2] -Ed Gazendam , Bahram Gharabaghi , F. Chris Jones & Hugh Whiteley (2011) Evaluation of the Qualitative Habitat Evaluation Index as a Planning and Design Tool for Restoration of Rural Ontario Waterways , Canadian Water Resources Journal, 36:2, 149-158.

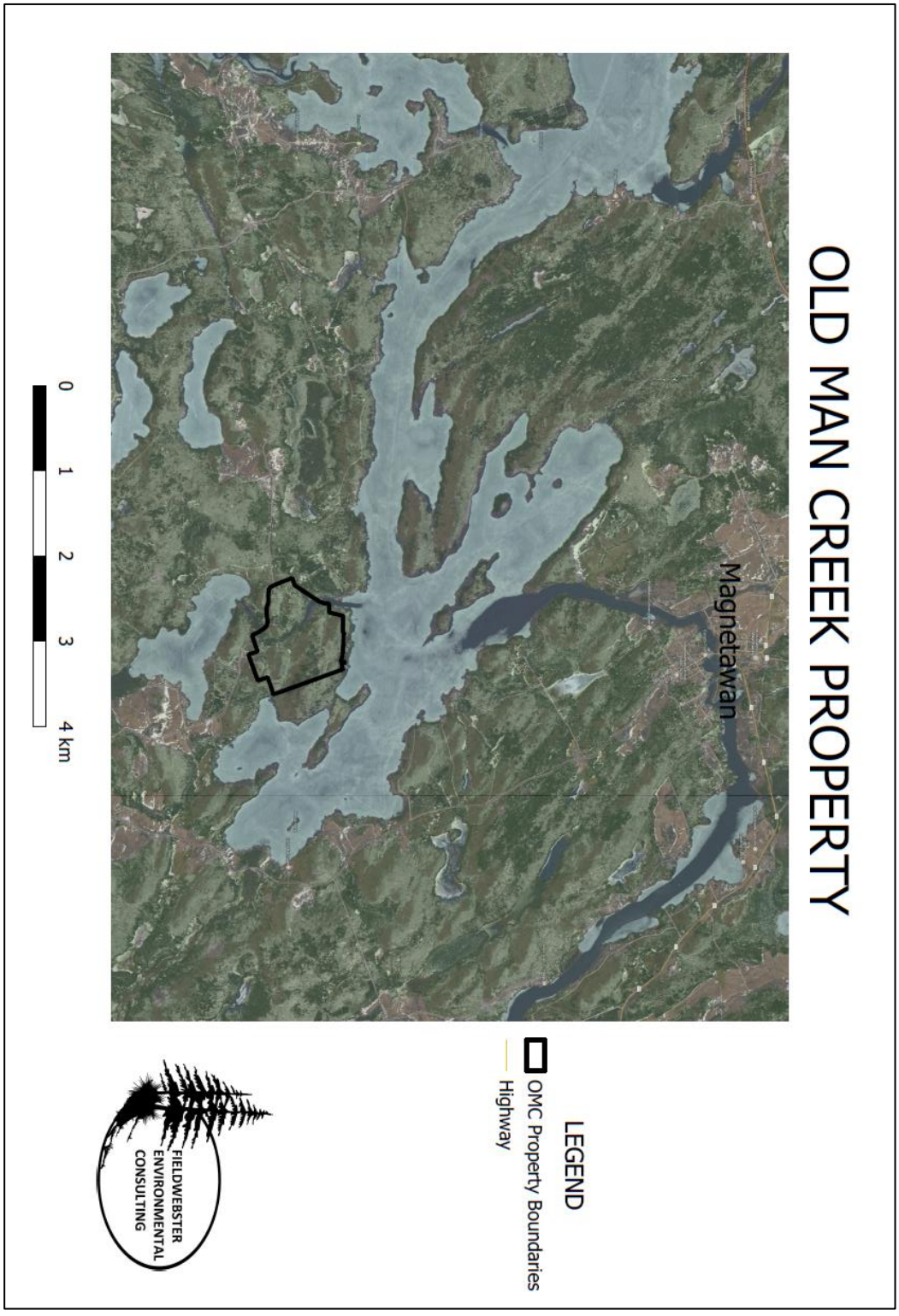
[3] -Ed Gazendam , Bahram Gharabaghi , F. Chris Jones & Hugh Whiteley (2011) Evaluation of the Qualitative Habitat Evaluation Index as a Planning and Design Tool for Restoration of Rural Ontario Waterways , Canadian Water Resources Journal, 36:2, 149-158.

[4] -Canadian Council of Ministers of the Environment. 2010. Canadian water quality guidelines for the protection of aquatic life: Ammonia. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

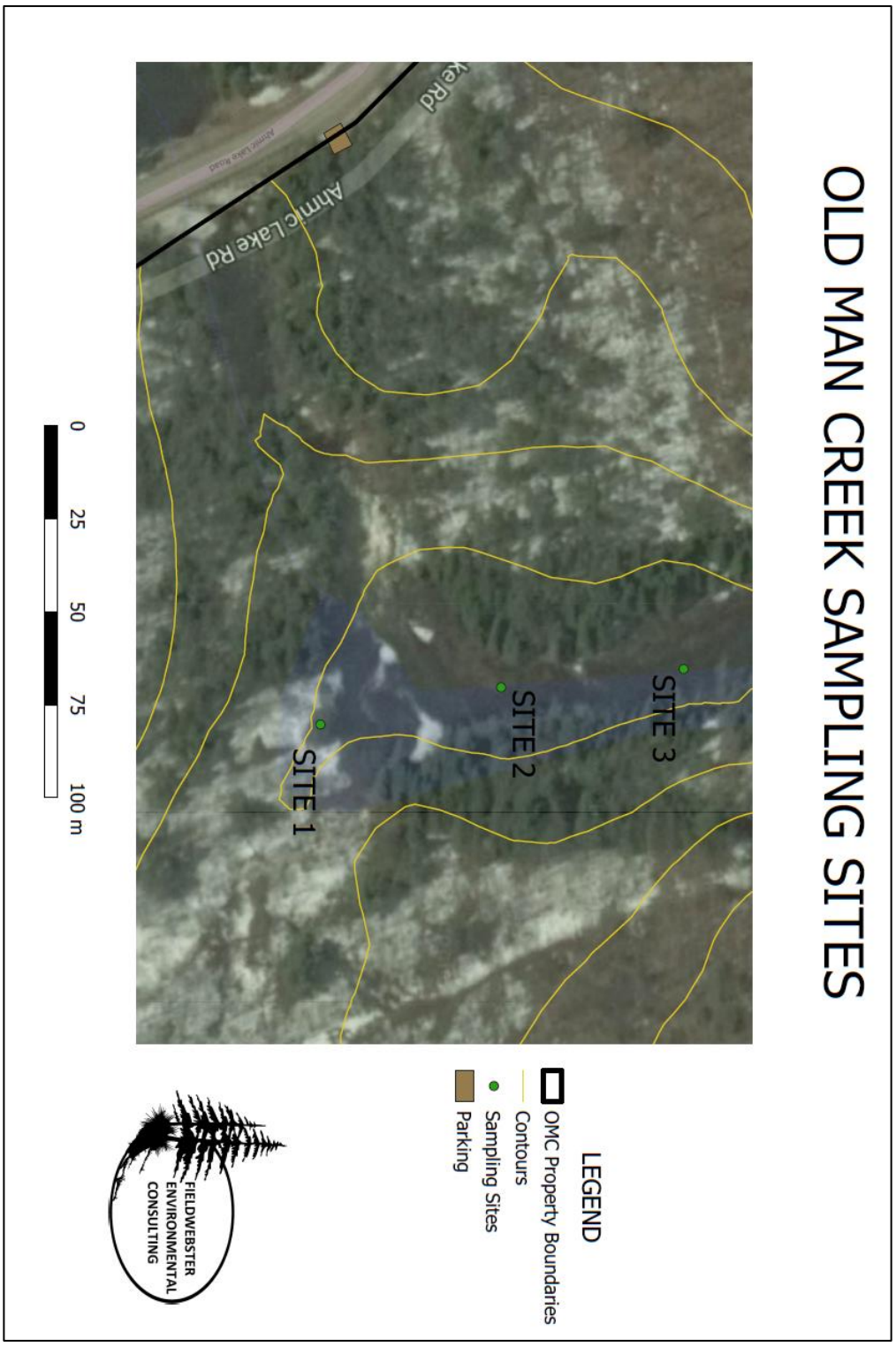
-Canadian Council of Ministers of the Environment. 2010. Canadian water quality guidelines for the protection of aquatic life: Nitrate. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

--Canadian Council of Ministers of the Environment. 2010. Canadian water quality guidelines for the protection of aquatic life: Phosphorous. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

APPENDIX A: OLD MAN CREEK PROPERTY



APPENDIX B: SUBSAMPLING SITES



SUBSAMPLING SITES

	**SITE:** 1 **COORDINATES:** 17T Easting 605643 Northing 5052319 +- 5m **NOTES:** site affected by waterfall directly upstream
	**SITE:** 2 **COORDINATES:** 17T Easting 605642 Northing 5052350 +- 5m **NOTES:**
	**SITE:** 3 **COORDINATES:** 17T Easting 605620 Northing 5052412 +-5m **NOTES:**

APPENDIX C: WATER CHEMISTRY

SAMPLING SITE

Date	pH	NO3 (mg/L)	PO3 (mg/L)
20/05/2018	6.8	0.2	0.03
04/09/2018	6.9	0.1	0.04

STANDARDS AND BLANKS

NITRATE

Cadmium Reduction Method, Hach Program 8171

Trip Blanks: *20/05/2018- 0.1 mg/L, 04/09/2018- 0.2mg/L*

Standards (2mg/L): *23/05/2016- 2.2mg/L, 17/06/2016- 2.0mg/L, 04/10/2016- 2.1mg/L*

The method precision listed is 0.2mg/l.

PHOSPHOROUS, REACTIVE (ORTHOPHOSPHATE)

Ascorbic Acid Method, Hach Program 8048

Trip Blanks: *20/05/2016- 0.02mg/L, 04/09/2016- 0.01mg/L**

Standards (2mg/L): *20/05/2016- 1.98mg/L, 04/09/2016- 2.00mg/L*

The method precision listed is 0.03mg/l.

APPENDIX D: BENTHIC POPULATIONS DATA

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*1*	*20/05/2018*	*9:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	4	2.86	1		
Decapoda	Crayfish	6	4.29	1		
Trombidiformes	Mites	1	0.71	1		
Ephemeroptra	Mayflies	39	27.86	1	27.86	27.86
Anisopetera	Dragonflies	6	4.29	1		
Zygoptera	Damselflies		0			
Plecoptera	Stoneflies	20	14.29	1	14.29	
Hemiptra	True Bugs		0	1		
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	26	18.57		18.57	
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	1	0.71	1		
Gastropoda	Snails and Limpets		0			
Chironomidae	Midges	13	9.29	1		
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos	6	4.29	1		
Ceratopogonidae	No-see-ums	6	4.29	1		
Tipulidae	Crane Flies		0			
Simuliidae	Black Flies	12	8.57	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**140**	**100**	**12**	**60.71**	**27.86**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*2*	*20/05/2018*	*10:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	7	6.31	1		
Decapoda	Crayfish	1	0.90	1		
Trombidiformes	Mites	1	0.90	1		
Ephemeroptra	Mayflies	47	42.34	1	42.34	42.34
Anisopetera	Dragonflies	5	4.50	1		
Zygoptera	Damselflies		0			
Plecoptera	Stoneflies	7	0		6.31	
Hemiptra	True Bugs	1	0.90	1		
Megaloptera	Fishflies & Alderflies	1	0.90	1		
Trichoptera	Caddisflies	17	15.32	1	15.32	
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	2	1.80	1		
Gastropoda	Snails and Limpets	2	1.80	1		
Chironomidae	Midges	3	2.70	1		
Tabanidae	Horse & Deer Flies	1	0.90	1		
Culicidae	Mosquitos	10	9.01	1		
Ceratopogonidae	No-see-ums	4	3.60	1		
Tipulidae	Crane Flies	1	0.90	1		
Simuliidae	Black Flies	1	0.90	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**111**	**100**	**16**	**63.96**	**42.34**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*3*	*20/05/2018*	*11:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms	2	2			
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	23	18.25	1		
Decapoda	Crayfish		0			
Trombidiformes	Mites	5	3.97	1		
Ephemeroptra	Mayflies	52	41.27	1	41.27	41.27
Anisopetera	Dragonflies	1	0.79	1		
Zygoptera	Damselflies		0			
Plecoptera	Stoneflies		0		0.00	
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	3	2.38	1	2.38	
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles		0			
Gastropoda	Snails and Limpets	1	0.79	1		
Chironomidae	Midges	8	6.35	1		
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos	12	9.52	1		
Ceratopogonidae	No-see-ums	15	11.90	1		
Tipulidae	Crane Flies	1	0.79	1		
Simuliidae	Black Flies	3	2.38	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**126**	**100**	**11**	**43.65**	**41.27**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*1*	*29/07/2018*	*9:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras	1	0.95	1		
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms	10	9.52	1		
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	27	25.71	1		
Decapoda	Crayfish	4	3.81	1		
Trombidiformes	Mites		0			
Ephemeroptra	Mayflies	22	20.95	1		
Anisopetera	Dragonflies	12	11.43	1		
Zygoptera	Damselflies	1	0.95	1		
Plecoptera	Stoneflies		0			
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies		0			
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	3	2.86	1		
Gastropoda	Snails and Limpets		0			
Chironomidae	Midges	19	18.10	1		
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos		0			
Ceratopogonidae	No-see-ums	3	2.86	1		
Tipulidae	Crane Flies	2	1.90	1		
Simuliidae	Black Flies	1	0.95	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**105**	**100**	**12**	**20.95**	**25.71**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*2*	*29/07/2018*	*11:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	7	6.03	1		
Decapoda	Crayfish	1	0.86	1		
Trombidiformes	Mites	1	0.86	1		
Ephemeroptra	Mayflies	47	40.52	1		
Anisopetera	Dragonflies	5	4.31	1		
Zygoptera	Damselflies		0			
Plecoptera	Stoneflies	12	10.34	1		
Hemiptra	True Bugs	1	0.86	1		
Megaloptera	Fishflies & Alderflies	1	0.86	1		
Trichoptera	Caddisflies	17	14.66	1		
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	2	1.72	1		
Gastropoda	Snails and Limpets	2	1.72	1		
Chironomidae	Midges	3	2.59	1		
Tabanidae	Horse & Deer Flies	1	0.86	1		
Culicidae	Mosquitos	10	8.62	1		
Ceratopogonidae	No-see-ums	4	3.45	1		
Tipulidae	Crane Flies	1	0.86	1		
Simuliidae	Black Flies	1	0.86	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**116**	**100**	**17**	**65.52**	**40.52**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*3*	*29/07/2018*	*13:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms	2	1.55	1		
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams	1	0.78	1		
Amphipoda	Scuds	23	17.83	1		
Decapoda	Crayfish		0			
Trombidiformes	Mites	5	3.88	1		
Ephemeroptra	Mayflies	52	40.31	1		
Anisopetera	Dragonflies	1	0.78	1		
Zygoptera	Damselflies		0			
Plecoptera	Stoneflies		0			
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	3	2.33	1		
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles		0			
Gastropoda	Snails and Limpets	1	0.78	1		
Chironomidae	Midges	8	6.20	1		
Tabanidae	Horse & Deer Flies	2	1.55	1		
Culicidae	Mosquitos	12	9.30	1		
Ceratopogonidae	No-see-ums	15	11.63	1		
Tipulidae	Crane Flies	1	0.78	1		
Simuliidae	Black Flies	3	2.33	1		
Misc. Diptera	Misc. True Flies		0			
Totals:		**129**	**100**	**14**	**42.64**	**40.31**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*1*	*04/09/2018*	*9:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms		0			
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds		0			
Decapoda	Crayfish	1	7.69	1		
Trombidiformes	Mites		0			
Ephemeroptra	Mayflies	2	15.38	1		
Anisopetera	Dragonflies	1	7.69	1		
Zygoptera	Damselflies	1	7.69	1		
Plecoptera	Stoneflies	5	38.46	1		
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	2	2.00	1		
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	1	7.69	1		
Gastropoda	Snails and Limpets		0			
Chironomidae	Midges		0			
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos		0			
Ceratopogonidae	No-see-ums		0			
Tipulidae	Crane Flies		0			
Simuliidae	Black Flies		0			
Misc. Diptera	Misc. True Flies		0			
Totals:		**13**[5]	**100**	**7**	**55.85**	**38.46**

[5] See Appendix E for clarification.

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*2*	*04/09/2018*	*11:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms	5	4.72	1		
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	31	29.25	1		
Decapoda	Crayfish		0			
Trombidiformes	Mites		0			
Ephemeroptra	Mayflies	21	19.81	1		
Anisopetera	Dragonflies	5	4.72	1		
Zygoptera	Damselflies	2	1.89	1		
Plecoptera	Stoneflies	1	0.94	1		
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	4	3.77	1		
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	2	1.89	1		
Gastropoda	Snails and Limpets		0			
Chironomidae	Midges	28	26.42	1		
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos	2	1.89	1		
Ceratopogonidae	No-see-ums	5	4.72	1		
Tipulidae	Crane Flies		0			
Simuliidae	Black Flies		0			
Misc. Diptera	Misc. True Flies		0			
Totals:		**106**	**100**	**11**	**24.53**	**29.25**

WaterBody	Site	Subsample	Date	Time	Organisation	Contact
Old Man Creek	*Below Ahmic Lake Rd. Dam*	*3*	*04/09/2018*	*13:00*	*Fieldwebster Environmental Consulting*	*Jesse Fieldwebster*
Scientific Name	**Common Name**	**Count**	**Correction**	**Richness**	**% EPT**	**% Dominant**
Coelenterata	Hydras		0			
Turbellaria	Flatworms		0			
Nematoda	Roundworms		0			
Oligochaeta	Aquatic Eathworms	1	0.99	1		
Hirudinea	Leeches		0			
Isopoda	Sow Bugs		0			
Bivalvia	Clams		0			
Amphipoda	Scuds	22	21.78	1		
Decapoda	Crayfish		0			
Trombidiformes	Mites	2	1.98	1		
Ephemeroptra	Mayflies	40	39.60	1		
Anisopetera	Dragonflies	1	0.99	1		
Zygoptera	Damselflies	22	21.78	1		
Plecoptera	Stoneflies	1	0.99	1		
Hemiptra	True Bugs		0			
Megaloptera	Fishflies & Alderflies		0			
Trichoptera	Caddisflies	4	3.96	1		
Lepidoptera	Aquatic Moths		0			
Coleoptera	Bettles	5	4.95	1		
Gastropoda	Snails and Limpets		0			
Chironomidae	Midges	1	0.99	1		
Tabanidae	Horse & Deer Flies		0			
Culicidae	Mosquitos		0			
Ceratopogonidae	No-see-ums	2	1.98	1		
Tipulidae	Crane Flies		0			
Simuliidae	Black Flies		0			
Misc. Diptera	Misc. True Flies		0			
Totals:		**101**	**100**	**11**	**44.55**	**39.60**

APPENDIX E: SUBSAMPLING SITE 1 POPULATION CRASH

The benthic macroinvertebrate collection at subsampling site 1 during autumn found that there was insufficient population density to collect as 100 unit sample within a reasonable amount of time.

During the summer of 2018 the Canadian Drought Monitor classified the August weather as Abnormally Dry.[6] This resulted in low water levels through Old Man's Creek. The reduced water levels likely resulted in decreased benthic macroinvertebrate populations.[7] The reduction in water levels had a greater effect on subsampling site 1 as compared to subsampling sites 2 & 3 as it had lower water levels under mean water flows.

Over the three days prior to the Autumn sampling date the site received 15mm of rain, over 350% the mean precipitation for the September in that region.[8] This resulted in a greatly increased flow rate in Old Man's Creek. The subsequent rainfall would then have a dilution and flushing effect on the remaining benthic macroinvertebrates, reducing the benthic macroinvertebrate population concentration at subsampling site 1. This increased flow had a greater impact on subsampling site 1 as opposed to 2 & 3 as subsampling site 1 has the lowest mean water depth and thus would experience the greatest increase in water velocity from any increase flow. Subsampling site 1 is also closes to the Old Man's Creek waterfall making it more susceptible to increased water turbulence from the waterfall.

The information contained in this report make Fieldwebster Environmental Consulting reasonably confident that the reduced population concentration of benthic macroinvertebrates at subsampling site 1 during the Autumn sampling period was not reflective of an ongoing impact to Old Man's Creek and that the reduced population concentration should not be considered a normal feature of the baseline assessment of Old Man's Creek. A resampling of this site will take place in September 2019 and that data will be submitted to the Ministry of the Environment Conservation and Parks.

---

[6] Agriculture and Agri-Food Canada. (2018). Canadian Drought Monitor. http://www.agr.gc.ca/eng/programs-and-services/drought-watch/canadian-drought-monitor/?id=1463575104513.

[7] Dewson, Z.S., James, A.B.W., Death, R.G., 2017. A review of the consequences of decreased flow for instream habitat and macroinvertebrates. Journal of North American Benthological Society. 26, 401-415.

[8] Environment and Natural Resources Canada. (2018). Sprucedale Daily Data Report for September 2018. http://climate.weather.gc.ca/climate_data/daily_data_e.html?hlyRange=%7C&dlyRange=2003-08-01%7C2018-09-19&mlyRange=2003-08-01%7C2006-12-01&StationID=44303&Prov=ON&urlExtension=_e.html&searchType=stnProx&optLimit=yearRange&Month=9&Day=23&StartYear=1840&EndYear=2018&Year=2018&selRowPerPage=25&Line=7&txtRadius=25&optProxType=custom&selCity=&selPark=&txtCentralLatDeg=45&txtCentralLatMin=36&txtCentralLatSec=59&txtCentralLongDeg=79&txtCentralLongMin=38&txtCentralLongSec=41&timeframe=2

APPENDIX F: STAFF QUALIFICATIONS

Valerie Fieldwebster is the Coordinator for the Magnetawan Watershed Land Trust (MWLT). She has more than 30 years of experience of working with Environmental Conservation Organizations. She was the recipient of the Ontario Land Trust Alliance 2016 Community Outreach Award and was a guest speaker at the 2016 International Land Conservation Conference in Minneapolis. She obtained her Ontario Biomonitoring Benthic Network Certificate in 2014 and holds an honours Degree in Geography.

Jesse Fieldwebster works in the Lands and Resources Department of the Métis Nation of Ontario reviewing developments that have a potential to affect the Métis way of life as well as working as an independent environmental consultant. He has worked in the environmental field for over 10 years including working for a variety of institutions. He holds a Master's Degree in Environmental Engineering, Ontario Biomonitoring Benthic Network Certification (MOECP), Ontario Wetland Evaluation System Certification (MNRF), and Ontario Stream Assessment Fish ID Certification (MNRF).