Sampling of the Fish Communities in the Saugeen River Watershed, 2005-2006

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SAMPLING OF THE FISH COMMUNITIES IN THE SAUGEEN RIVER - WATERSHED, 2005-2006

by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

Marson D., N.E. Mandrak, and D.A.R. Drake. 2009. Sampling of the fish communities in the Saugeen River watershed, 2005-2006. Can. Manuscr. Rep. Fish. Aquat. Sci. 2911: vi + 19 p.

A survey of the fish assemblages in the Saugeen River watershed was conducted by Fisheries and Oceans Canada (DFO) in 2005 and 2006. A total of 25 sites were sampled using boat electrofishing, backpack electrofishing and bag seining. A total of 1344 fishes were captured, representing 45 species, including two species at risk (Black Redhorse and Pugnose Shiner). During the sampling, boat electrofishing caught the highest number of species, relative to backpack electrofishing and bag seining. Of the 45 species captured, 35 species were caught by boat electrofishing (including 16 species exclusively caught electrofishing), 24 species were caught backpack electrofishing (including nine species exclusively caught by backpack electrofishing), and 15 species were caught bag seining (including two species exclusively caught seining). Boat electrofishing caught both Black Redhorse and Pugnose Shiner, while backpack electrofishing caught Pugnose Shiner.

RÉSUMÉ

Marson D., N.E. Mandrak, and D.A.R. Drake. 2009. Sampling of the fish communities in the Saugeen River watershed, 2005-2006. Can. Manuscr.. Rep. Fish. Aquat. Sci. 2911: vi + 19 p.

Une étude des assemblages de poissons dans le bassin hydrologique de la rivière Saugeen a été effectuée par Pêches et Océans Canada (MPO) en 2005 et 2006. Un total de 25 sites ont été échantillonnés par la pêche à l'électricité dans une embarcation, un appareil portatif de pêche à l'électricité et la pêche à la senne en sac. Un total de 1 344 poissons ont été capturés, représentant 45 espèces, dont deux espèces en péril (le Chevalier Noir [*Moxostoma duquesnei*] et le Méné Camus [*Notropis anogenus*]). La pêche à l'électricité dans une embarcation a permis d'attraper le plus grand nombre d'espèces, comparé à un appareil portatif de pêche à l'électricité et la pêche à la senne en sac. Des 45 espèces capturées, 35 espèces l'ont été avec la pêche à l'électricité dans une embarcation (incluant 16 espèces exclusivement capturées par la pêche à l'électricité), 24 l'ont été à l'aide d'un appareil portatif de pêche à l'électricité (incluant neuf espèces exclusivement capturées à l'aide d'un appareil portatif de pêche à l'électricité), et 15 l'ont été par la pêche à la senne en sac (incluant deux espèces exclusivement capturées par la pêche à la senne). La pêche à l'électricité dans une embarcation a permis d'attraper le Chevalier Noir et le Méné Camus, alors qu'un appareil portatif de pêche à l'électricité a permis d'attraper le Méné Camus.

INTRODUCTION

The watershed for the Saugeen River, which flows into Lake Huron, is located in southwestern Ontario, with tributaries spread throughout much of Bruce and Grey counties (Figure 1). In 2005 and 2006, Fisheries and Oceans Canada (DFO) conducted an extensive fish survey of the Saugeen River watershed to determine the composition of the fish assemblages and the current status of fish species at risk. The fish species at risk were identified through the current listings by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessments (assessment protocols can be viewed at www.cosewic.gc.ca). Historical records of the Threatened Black Redhorse in the Ausable, Bayfield, Maitland and Sauble rivers (COSEWIC 2005), whose drainage basins abut the Saugeen River, and the Endangered Pugnose Shiner in Teeswater River (DFO unpublished data), a tributary to the Saugeen River, suggest that Black Redhorse and Pugnose Shiner may occur throughout the Saugeen River drainage basin, although before this study, the distribution of these two species was unknown.

Sampling of the Saugeen River watershed occurred in both wadeable and nonwadeable habitats. Wadeable sites are defined as sites where the water depth is less than 1.5 m, stream flow is low and substrates are sufficiently stable, for safe wading. The wadeable sites were sampled by either backpack electrofishing (12 sites), or by 8.5 m bag seine with 6.35 mm ace mesh (woven mesh with oval or hexagonal shape, two sites). Wadeable sites were selected based on accessibility and habitat suitability for targeted fishes based on the habitat preferences listed in the COSEWIC status reports. Nonwadeable sites were sampled based on accessibility by boat electrofisher (11 sites). Boat electrofishing was conducted by shocking two sites at accessible boat launches, one site adjacent to the launch, and a second located 500 m downstream of the launch. Sampling occurred on July 4 and October 26 in 2005, and July 25-27 and August 1-4 in 2006.

METHODS

ELECTROFISHING SAMPLING

Backpack electrofishing was conducted using a Smith Root LR24 backpack unit. Sampling effort ranged from 237 to 800 seconds of shocking at each site. Fishes were captured in nets as they were stunned and were placed into water-filled buckets. When electrofishing at a particular site was completed, fishes were identified, measured, and returned to the water.

Boat electrofishing was conducted using a single boom, 4.57 m jon boat equipped with a Smith Root 5.0 GPP (gas powered pulsator), and a 5.0 kW generator. Sampling effort ranged from 495 to 1678 seconds of shocking. A single netter retrieved fishes as they were stunned and transferred them into bins filled with water until sampling was complete at a site. The fishes were identified, measured, and returned to the water. Voucher specimens of each species were preserved in 10% formalin for later laboratory verification and then sent to the Royal Ontario Museum (ROM) for confirmation of identification and cataloguing, if warranted.

SEINING

Seining was performed using an 8.5 m long by 1.2 m high bag seine with 6.35 mm ace mesh. Sampling effort consisted of three hauls per site. Hauls were performed from upstream to downstream in the direction of flow. Fishes were transferred from the seine net into bins filled with water. The fishes were identified, measured, and returned to the water. Voucher specimens of each species were preserved in 10% formalin for later laboratory verification and then sent to the Royal Ontario Museum (ROM) for confirmation of identification and cataloguing, if warranted.

HABITAT DATA COLLECTION

Habitat variables recorded at each site included air temperature (°C), water temperature (°C), conductivity (µS), water depth (m), sampling depth (m), Secchi depth (m), substrate components (% based on the Wentworth scale, where substrate <2 mm is sand, silt, or clay, 2-64 mm is gravel, 64-256 mm is cobble, and >256 mm is boulder), aquatic vegetation (% emergent, % submergent, % floating, based on the sampler's judgment), riparian vegetation (%), bank slope (%), channel cover (%), stream width (m), sampling distance from shore (m), habitat type (riffle, run, pool), and flow rate (none, slow, medium, fast). Habitat data were collected following sampling.

RESULTS

ELECTROFISHING SAMPLING

Backpack Electrofishing

A total of 12 sites were sampled by backpack electrofishing. Backpack electrofishing sampling was conducted on July 4, 2005 and August 1-4, 2006. The total backpack electrofishing effort was 6376 seconds, with an average of 531.33 seconds per site. A total of 387 fishes were captured, representing 24 species (Tables 1 and 2). The mean CPUE was 0.049 fishes per second. The minimum number of fishes captured at a site was 5 (Site 22) and the maximum number was 105 (Site 19). No species at risk were captured.

Boat Electrofishing

A total of 11 sites were sampled by boat electrofishing. Boat electrofishing sampling was conducted on October 26, 2005, July 25, 26 and August 2, 2006. The total boat electrofishing effort was 9072 seconds, with an average of 907.2 seconds per site (Table 1). A total of 538 fishes were captured, representing 35 species (Tables 1 and 2). The mean CPUE was 0.038 fishes per second (Table 1). The minimum number of fishes captured at a site was 14 (Site 8) and the maximum number was 195 (Site 24). Six Black Redhorse were captured from two sites, Site 2 (1 fish) and Site 3 (5 fish). A single Pugnose Shiner was captured at Site 24.

BAG SEINING

Two sites were sampled by bag seining (Sites 5 and 6). Bag seining was conducted on July 27, 2006. The total effort was 6 hauls, with an average of 3 hauls per site. A total of 419 fishes, representing 15 species were captured (Tables 1 and 2). The mean CPUE was 69.83 fishes per haul. The minimum number of fishes captured at a site was 119 (Site 5) and the maximum was 300 (Site 6). No species at risk were captured.

HABITAT DATA

Sites 1-4, 12, 14, and 18 were all 100% vegetated. The dominant vegetation type was submergent vegetation as it was the predominant vegetation at 10 of 15 sites where it was found. Emergent vegetation dominated in six sites, while four sites had no vegetation (Sites 9, 10, 19, and 23). Aquatic vegetation was not recorded for Sites 5, 24, and 25.

Substrate composition included a mix of bedrock, boulder, cobble, gravel, organic, sand, and silt. Substrate throughout the sites was generally dominated by a mix of boulder, cobble, gravel, and sand (Appendix 6).

Secchi depth was only recorded at Sites 5, 11, 13-17, and 20-23. In all cases, the water clarity led to the Secchi depth being greater than the maximum water depth (Appendices 4 and 6).

SPECIES AT RISK

Two species at risk, the Black Redhorse (Threatened) and the Pugnose Shiner (Endangered) were captured. The Black Redhorse were captured from two sites while boat electrofishing (Sites 2 and 3). Five Black Redhorse, ranging from 128 to 412 mm, were caught at Site 3, and one 177 mm individual was caught at Site 2. The sites containing Black Redhorse were both greater than 1.5 m deep with substrates of primarily cobble and boulder, along with some gravel and sand. Both sites were 100% vegetated with Site 2 composed of 100% submergent vegetation and Site 3 composed of 90% submergent and 10% emergent vegetation.

Pugnose Shiner were captured from two sites, one by backpack electrofishing (Site 22) and one by boat electrofishing (Site 24). A single Pugnose Shiner was caught at both sites. Site 22 was 80% free of vegetation with a mix of bedrock and cobble as substrate. Habitat data for Site 24 were not recorded.

DISCUSSION

Sampling of the fish communities in the Saugeen River watershed in 2005 and 2006 resulted in the capture of 1344 fishes representing 45 species including two species at risk. Boat electrofishing was successful in capturing the greatest species richness, including both of the species at risk (Black Redhorse and Pugnose Shiner). Black

Redhorse were captured at two of the 13 sites sampled in the Saugeen River watershed (Sites 2 and 3). Sites 2 and 3 had water depths of 1.8 m and 1.5 m, respectively and both sites had medium/fast flow. Substrate at the sites was primarily composed of cobble, boulder, and gravel and both sites were heavily vegetated with submergent vegetation. Black Redhorse were previously known to occur in the Ausable, Bayfield, Maitland, and Sauble rivers in the Lake Huron drainage (COSEWIC 2005). The discovery of Black Redhorse in the Saugeen River watershed increases both the number of known populations in the Lake Huron drainage and the northern limit of Canadian populations.

Pugnose Shiner were captured at two of the 13 sites sampled in the Saugeen River watershed (Sites 22 and 24). In the Lake Huron drainage, Pugnose Shiners were previously only known from the Old Ausable Channel (Holm and Mandrak 2002). Both Pugnose Shiners were caught in 2005 in the Teeswater River near the town of Cargill but none were located in any of the Saugeen River watershed sampling in 2006. Pugnose Shiners generally prefer areas that are highly vegetated, with a sandy or marl substrate and low turbidity (Holm and Mandrak, 2002). Although two Pugnose Shiners were captured in 2005, the lack of capture in 2006 highlights the need for additional sampling in areas that exhibit the particular habitat requirements of Pugnose Shiner.

To capture the greatest diversity of fishes possible, a wide variety of habitats were targeted and several gear types used during the sampling of the fish communities of the Saugeen River watershed. Boat electrofishing, backpack electrofishing, and bag seining were employed to sample the various habitats. The three sampling methods resulted in the capture of 45 species, of which 25 species were exclusively caught with a single gear type. Of those 25, 16 species were unique to boat electrofishing and nine were unique to backpack electrofishing. Backpack electrofishing and seining were limited to areas with depths of less than 1.5 m, with stable substrates and low flow. This means that shallow riffles, smaller tributaries, and unnavigable stretches of river could be sampled by either backpack electrofisher or seine, where boat electrofishing could not be used. However, boat electrofishing was not limited by depth, substrate or flow and, as a result, fishes preferring deeper and faster water would have only been accessible to boat electrofishing sampling. This observation is noteworthy when considering future targeted sampling for Redhorse, since the number of Redhorse captured during non-wadeable boat electrofishing was much higher relative to either bag seining or backpack electrofishing. The Redhorse species captured in this study are generally associated with medium to large streams where they prefer deeper pool areas (Scott and Crossman 1998, COSEWIC 2005).

The 2005-2006 sampling of the fish communities of the Saugeen River watershed was successful in capturing 45 species of fishes from diverse habitats. Despite the capture of a diversity of fishes, including two fish species at risk, additional species, including additional species at risk, may be caught with further sampling. In a comparison of fishes caught during sampling from 1956 to 1985 in the Teeswater River, a tributary of the Saugeen River, to those captured in the 2005/2006 Saugeen River watershed, five species including Channel Catfish (*Ictalurus punctatus*), Iowa Darter (*Etheostoma exile*),

Northern Redbelly Dace (*Phoxinus eos*), Redfin Shiner (*Lythrurus umbratilis)*, and Tadpole Madtom (*Noturus gyrinus)* were not collected in the 2005/2006 study. Further sampling of additional areas within the Saugeen River is recommended in an effort to locate these and additional species, with an emphasis on sampling habitats preferred by the fish species at risk known, and suspected, to be in the watershed.

ACKNOWLEDGEMENTS

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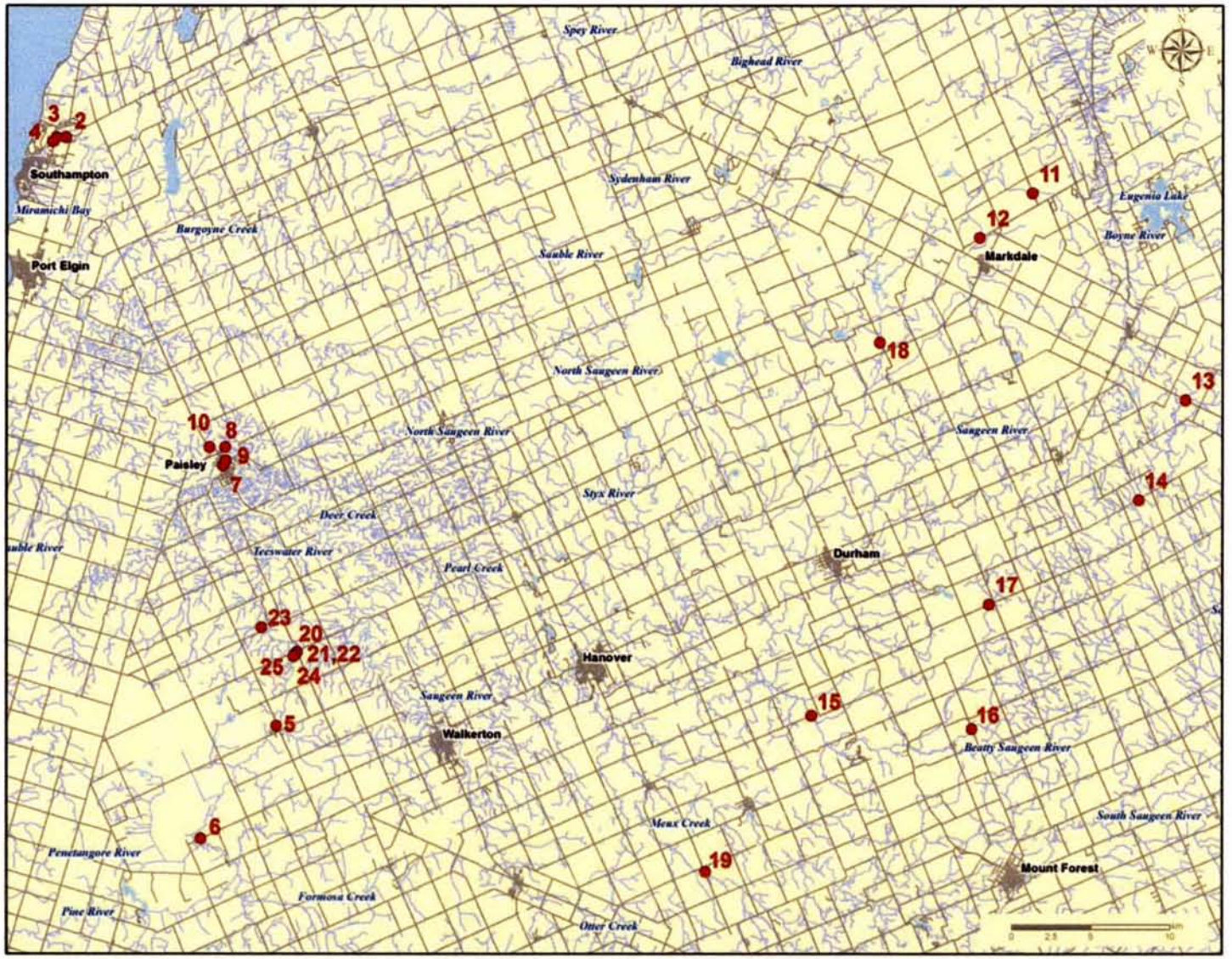

Figure 1. Sites sampled in the Saugeen River watershed in 2005/2006. See Appendix 1 for detailed site descriptions.

Table 1. Summary of sampling effort during 2005/2006 Saugeen River watershed sampling.

	BEF	BPEF	Seine	Combined Gears
Total Fish Captured	538	387	419	1344
Species Richness	35	24	15	45
Unique species	16	9	0	25
Fish SAR detected	2	1	0	2
Total Effort (seconds, hauls)	9072s*	6376s	6 hauls	
Mean Effort (seconds, hauls)	907.2s*	531.33s	3 hauls	
Mean CPUE (fish/sec, fish/haul)	0.038*	0.049	69.83	

*excludes Site 24 data due to lack of sampling effort data
BEF – Boat electrofishing; BPEF – Backpack electrofishing

Table 2. Summary of species captured during the 2005/2006 Saugeen River watershed sampling by boat electrofishing (BEF), backpack electrofishing (BPEF), and bag seining.

Common Name	Scientific Name	BEF	BPEF	Seine	Total
Black Bullhead	*Ameiurus melas*	1			**1**
Black Redhorse	*Moxostoma duquesnei* **(TH)**	6			**6**
Blackchin Shiner	*Notropis heterodon*	165			**165**
Blacknose Dace	*Rhinichthys atratulus*		44		**44**
Blacknose Shiner	*Notropis heterolepis*	2			**2**
Blackside Darter	*Percina maculata*	2	1	9	**12**
Bluntnose Minnow	*Pimephales notatus*	12	15	4	**31**
Brook Stickleback	*Culaea inconstans*		3		**3**
Brook Trout	*Salvelinus fontinalis*		28		**28**
Brown Bullhead	*Ameiurus nebulosus*	9		1	**10**
Central Mudminnow	*Umbra limi*	5	9		**14**
Common Carp	*Cyprinus carpio*	1			**1**
Common Shiner	*Luxilus cornutus*	90	38	356	**484**
Creek Chub	*Semotilus atromaculatus*	1	89	4	**94**
Emerald Shiner	*Notropis atherinoides*	1			**1**
Fantail Darter	*Etheostoma flabellare*		2		**2**
Finescale Dace	*Phoxinus neogaeus*		2		**2**
Freshwater Drum	*Aplodinotus grunniens*	2			**2**
Golden Redhorse	*Moxostoma erythrurum*	16			**16**
Greater Redhorse	*Moxostoma valenciennesi*	13		1	**14**
Hornyhead Chub	*Nocomis biguttatus*	23	4		**27**
Johnny Darter	*Etheostoma nigrum*		1	4	**5**
Largemouth Bass	*Micropterus salmoides*	12			**12**
Least Darter	*Etheostoma microperca*	1			**1**
Longear Sunfish	*Lepomis megalotis*	2	3		**5**
Longnose Dace	*Rhinichthys cataractae*		14		**14**
Longnose Sucker	*Catostomus catostomus*	1			**1**
Mimic Shiner	*Notropis volucellus*	32			**32**
Mottled Sculpin	*Cottus bairdii*		11		**11**
Muskellunge	*Esox masquinongy*	1			**1**
Northern Pike	*Esox lucius*	2		2	**4**
Pugnose Shiner	*Notropis anogenus* **(EN)**	1	1		**2**
Pumpkinseed	*Lepomis gibbosus*	10	1	1	**12**
Rainbow Darter	*Etheostoma caeruleum*		59		**59**
River Chub	*Nocomis micropogon*	9	10		**19**
Rock Bass	*Ambloplites rupestris*	7	15	1	**23**
Rosyface Shiner	*Notropis rubellus*	33		24	**57**
Shorthead	*Moxostoma macrolepidotum*	8			**8**
Silver Redhorse	*Moxostoma anisurum*	4		1	**5**
Smallmouth Bass	*Micropterus dolomieu*	23	5	2	**30**
Spotfin Shiner	*Cyprinella spiloptera*	6			**6**
Stonecat	*Noturus flavus*		1		**1**
Sunfish	*Lepomis* sp.	2			**2**
White Sucker	*Catostomus commersonii*	24	26	4	**54**
Yellow Perch	*Perca flavescens*	11	5	5	**21**
Total		**538**	**387**	**419**	**1344**

COSEWIC status EN – Endangered; TH – Threatened

Appendix 1. Site location data for 2005/2006 Saugeen River watershed sampling. Map # (1-25) corresponds to number on Figure 1.

Map#	Date	Waterbody Name	Narrative Locality Description	Start Latitude	Start Longitude
1	25/07/2006	Saugeen River	At Denny's dam - just downstream	44.50490	-81.33018
2	25/07/2006	Saugeen River	~1 km downstream of dam, adjacent to trailer park	44.50655	-81.33815
3	25/07/2006	Saugeen River	~1 km upstream of public boat launch, just upstream of the 1st	44.50760	-81.34578
4	25/07/2006	Saugeen River	At first island upstream of launch, right channel	44.50596	-81.34920
5	27/07/2006	Saugeen River	At the sideroad 5 bridge, town of Chepstow, Ont., Teeswater River	44.15751	-81.27651
6	27/07/2006	Saugeen River	At concession 2, iron bridge crossing, Teeswater River, (outskirts of Greenock Swamp)	44.10537	-81.35440
7	26/07/2006	Saugeen River	At confluence of Teeswater River and Saugeen River (Paisley, Ont.)	44.30656	-81.27259
8	26/07/2006	Saugeen River		44.31647	-81.26771
9	26/07/2006	Saugeen River	250 m downstream of Teeswater confluence	44.30899	-81.26962
10	26/07/2006	Saugeen River	At Hwy. 3 bridge, just west of Paisley, Ont.	44.31836	-81.28000
11	01/08/2006	Rocky Saugeen River	By house # 135078, directly to the E of the 9th line road, NE of Markdale - between Hwy 30 and sideroad 4A	44.35109	-80.59784
12	01/08/2006	Saugeen River		44.33353	-80.64694
13	02/08/2006	Saugeen River	Directly west of bridge on West Bank Line, between road 170 and	44.21758	-80.51743
14	02/08/2006	Saugeen River	At Road #26, between Grey Road #14 and sideroad #7, on south	44.16936	-80.57198
15	02/08/2006	Saugeen River	Southgate Concession 14, between Baseline and sideroad 25	44.09445	-80.86257
16	03/08/2006	Saugeen River	Bridge over creek on Southgate Sideroad 41 between Southgate Rd 14 and Rd 12	44.06626	-80.74115
17	03/08/2006	Saugeen River		44.13203	-80.70551
18	03/08/2006	Black's Creek	Traverston Rd, between Grey Rd. 12 and concession 12	44.15751	-81.27651
19	04/08/2006	Meux Creek	Grey sideroad 5, between concessions 8 and 6	44.10537	-81.35440
20	04/07/2005	Teeswater River	Between 0 and 200 m downstream from the Cargill dam tail race (S side of dam)	44.19508	-81.24814
21	04/07/2005	Teeswater River	Between 0 and 100 m downstream of main dam outflow, North side of Channel, Cargill dam	44.19440	-81.24968
22	04/07/2005	Teeswater River	Same as Site 21	44.19440	-81.24968
23	04/07/2005	Teeswater River	Bridge crossing directly downstream of the town of Cargill, shocked between 0 and 75 m upstream of the bridge;	44.21321	-81.27111
24	26/10/2005	Teeswater River	Pond above Cargill Dam	44.19352	-81.25078
25	26/10/2005	Teeswater River	Pond above Cargill Dam	44.19321	-81.25173

Appendix 2. Description of sampling methods for 2005/2006 Saugeen River watershed sampling sites. na – not available

Map #	Field Number	Date	Capture Method	Effort	Units	Description of Method
1	SR06-072506-001	25/07/2006	BEF	504	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
2	SR06-072506-002	25/07/2006	BEF	631	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
3	SR06-072506-003	25/07/2006	BEF	645	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
4	SR06-072506-004	25/07/2006	BEF	589	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
5	SR06-270706-005	27/07/2006	Seine	3	Haul	Bag Seine, 6.35 mm mesh, Length - 8.5 m
6	SR06-270706-006	27/07/2006	Seine	3	Haul	Bag Seine, 6.35 mm mesh, Length - 8.5 m
7	SR06-260706-007	26/07/2006	BEF	857	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
8	SR06-260706-008	26/07/2006	BEF	853	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
9	SR06-260706-009	26/07/2006	BEF	1522	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
10	SR06-260706-010	26/07/2006	BEF	1678	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
11	SR06-080106-011	01/08/2006	BPEF	627	Seconds	Backpack Electrofishing Unit
12	SR06-010806-012	01/08/2006	BPEF	670	Seconds	Backpack Electrofishing Unit
13	SR06-080206-013	02/08/2006	BEF	495	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
14	SR06-080206-014	02/08/2006	BPEF	489	Seconds	Backpack Electrofishing Unit
15	SR06-080206-015	02/08/2006	BPEF	800	Seconds	Backpack Electrofishing Unit
16	SR06-080306-016	03/08/2006	BPEF	513	Seconds	Backpack Electrofishing Unit
17	SR06-080306-017	03/08/2006	BPEF	550	Seconds	Backpack Electrofishing Unit
18	SR06-080306-018	03/08/2006	BPEF	730	Seconds	Backpack Electrofishing Unit
19	SR06-080406-019	04/08/2006	BPEF	726	Seconds	Backpack Electrofishing Unit
20	TWR05070405001	04/07/2005	BPEF	237	Seconds	Backpack Electrofishing Unit
21	TWR05070405002	04/07/2005	BPEF	346	Seconds	Backpack Electrofishing Unit
22	TWR05070405002 silvia	04/07/2005	BPEF	346	Seconds	Backpack Electrofishing Unit
23	TWR05070405003	04/07/2005	BPEF	342	Seconds	Backpack Electrofishing Unit
24	TWR05102605	26/10/2005	BEF	na	na	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom
25	TWR05102605002	26/10/2005	BEF	1298	Seconds	Efishing Boat, Small – 4.57 m, 5.0 GPP, single boom

Appendix 3a. Summary of species collected by site in the 2006 Saugeen River watershed fish community sampling at Sites 1-19. Scientific and common names according to Nelson et al. (2004). Sites 1-25 correspond to numbers in Figure 1 and Appendices.

Common Name	Scientific Name	Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Black Bullhead	*Ameiurus melas*	**1**							1												
Black Redhorse	*Moxostoma duquesnei* **(TH)**	**6**		1	5																
Blacknose Dace	*Rhinichthys atratulus*	**44**											3	3		1		9	21		7
Blackside Darter	*Percina maculata*	**11**		1			1	8	1												
Bluntnose Minnow	*Pimephales notatus*	**28**		4			3	1	3				1		2	2	10			2	
Brook Stickleback	*Culaea inconstans*	**1**											1								
Brook Trout	*Salvelinus fontinalis*	**28**											8	10			10				
Brown Bullhead	*Ameiurus nebulosus*	**3**						1	2												
Central Mudminnow	*Umbra limi*	**5**													1	4					
Common Carp	*Cyprinus carpio*	**1**			1																
Common Shiner	*Luxilus cornutus*	**460**	1	2		6	98	258	44	3	29				2	3	1			4	9
Creek Chub	*Semotilus atromaculatus*	**82**					4						15		1		8	13	11	9	21
Emerald Shiner	*Notropis atherinoides*	**1**		1																	
Freshwater Drum	*Aplodinotus grunniens*	**2**			1	1															
Golden Redhorse	*Moxostoma erythrurum*	**16**	2	1	2	3			1	1	5	1									
Greater Redhorse	*Moxostoma valenciennesi*	**9**		1				1		1	4	2									
Hornyhead Chub	*Nocomis biguttatus*	**25**	1			1			8			3			11					1	
Johnny Darter	*Etheostoma nigrum*	**5**						4										1			
Longnose Dace	*Rhinichthys cataractae*	**14**												14							
Longnose Sucker	*Catostomus catostomus*	**1**			1																
Mimic Shiner	*Notropis volucellus*	**36**		24		6			2	4											
Mottled Sculpin	*Cottus bairdii*	**11**											2	8					1		
Muskellunge	*Esox masquinongy*	**1**								1											
Northern Pike	*Esox lucius*	**3**					1	1		1											
Pumpkinseed	*Lepomis gibbosus*	**1**						1													

COSEWIC: TH – Threatened, EN – Endangered

Appendix 3a. Continued

Common	Scientific Name	Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Rainbow Darter	*Etheostoma caeruleum*	**55**																			55
River Chub	*Nocomis micropogon*	**18**		2							7					9					
Rock Bass	*Ambloplites rupestris*	**20**						1	2						5	2				8	2
Rosyface Shiner	*Notropis rubellus*	**53**	2				8	16	3		15	9									
Shorthead Redhorse	*Moxostoma macrolepidotum*	**8**	1	3	1	2					1										
Silver Redhorse	*Moxostoma anisurum*	**5**	1	1			1				1	1									
Smallmouth Bass	*Micropterus dolomieu*	**24**	2	2	6	2	1	1	2	2	3	3									
Spotfin Shiner	*Cyprinella spiloptera*	**6**	5	1																	
White Sucker	*Catostomus commersonii*	**29**		1		5	2	2	1	1			3				1	1	1		11
Yellow Perch	*Perca flavescens*	**5**						5													
Total		**1018**	**15**	**45**	**17**	**26**	**119**	**300**	**70**	**14**	**65**	**19**	**33**	**35**	**22**	**21**	**30**	**24**	**34**	**24**	**105**

Appendix 3b. Summary of species collected by site in the 2006 Saugeen River watershed fish community sampling at Sites 20-25. Scientific and common names according to Nelson et al. (2004). Sites 1-25 correspond to numbers in Figure 1 and Appendices.

Common Name	Scientific Name	Total	20	21	22	23	24	25
Blackchin Shiner	*Notropis heterodon*	**165**					159	6
Blacknose Shiner	*Notropis heterolepis*	**2**					2	
Blackside Darter	*Percina maculata*	**1**			1			
Bluntnose Minnow	*Pimephales notatus*	**2**					2	
Brook Stickleback	*Culaea inconstans*	**2**	2					
Brown Bullhead	*Ameiurus nebulosus*	**7**					3	4
Central Mudminnow	*Umbra limi*	**9**	4	1			3	1
Common Shiner	*Luxilus cornutus*	**24**	21				2	1
Creek Chub	*Semotilus atromaculatus*	**12**	2	10				
Fantail Darter	*Etheostoma flabellare*	**2**		1	1			
Finescale Dace	*Phoxinus neogaeus*	**2**	2					
Greater Redhorse	*Moxostoma valenciennesi*	**5**					3	2
Hornyhead Chub	*Nocomis biguttatus*	**3**		2		1		
Largemouth Bass	*Micropterus salmoides*	**12**					2	10
Least Darter	*Etheostoma microperca*	**1**					1	
Longear Sunfish	*Lepomis megalotis*	**5**		1	2		2	
Northern Pike	*Esox lucius*	**1**						1
Pugnose Shiner	*Notropis anogenus* **(EN)**	**2**			1		1	
Pumpkinseed	*Lepomis gibbosus*	**11**	1				6	4
Rainbow Darter	*Etheostoma caeruleum*	**4**		3		1		
River Chub	*Nocomis micropogon*	**1**		1				
Rock Bass	*Ambloplites rupestris*	**3**				3		
Smallmouth Bass	*Micropterus dolomieu*	**6**		5				1
Stonecat	*Noturus flavus*	**1**				1		
Sunfish	*Lepomis* sp.	**2**					2	
White Sucker	*Catostomus commersonii*	**25**	9				4	12
Yellow Perch	*Perca flavescens*	**16**	5				3	8
Total		**326**	46	24	5	6	195	50

Appendix 4. Summary of aquatic vegetation data for 2005/2006 Saugeen River watershed sampling. Map # corresponds to numbers in Figure 1 and Appendices. na – not available

Map#	Stream Width (m)	Max Stream Depth (m)	Distance From Shore (m)	Aquatic Veg Type1	Aquatic Veg 1 (%)	Aquatic Veg Type2	Aquatic Veg 2 (%)	Aquatic Veg Type3	Aquatic Veg 3 (%)	Aquatic Veg Type4	Aquatic Veg 4 (%)
1	60	2	2	Submergent	100						
2	50	1.8	0	Submergent	100						
3	30	1.5	5	Submergent	90	Emergent	10				
4	30	1.5	0	Submergent	100						
5	15	0.75	5	no data collected							
6	12	2	0-10	None	80	Submergent	15	Emergent	5		
7	45	2	0.45	None	90	Submergent	10				
8	40	2	10	None	80	Submergent	20				
9	30	2	na	None	100						
10	30	2	0-50	None	100						
11	10	0.5	0	None	45	Emergent	30	Submergent	25		
12	20	0.4	0	Submergent	90	Emergent	10				
13	20	0.75	0	Emergent	50	Submergent	20	Floating	15	None	15
14	15	1	0	Emergent	40	Floating	30	Submergent	30		
15	15	0.75	0	None	90	Submergent	10				
16	18	0.6	0	Emergent	50	None	25	Submergent	20	Floating	5
17	8	0.4	0	None	75	Emergent	20	Submergent	5		
18	na	na	na	Submergent	60	Emergent	40				
19	3	1.5	0	None	100						
20	6	0.9	6	Floating	75	Submergent	20	None	5		
21	54	1.75	6	None	80	Emergent	20				
22	54	1.75	6	None	80	Emergent	20				
23	24	1.1	4	None	100						
24	no data collected										
25	no data collected										

Appendix 5. Summary of riparian vegetation data for 2005/2006 Saugeen River watershed sampling. Map # corresponds to numbers in Figure 1 and Appendices. na – not available

Map#	Riparian Veg Type1	Riparian Veg 1 (%)	Riparian Veg Type2	Riparian Veg 2 (%)	Riparian Veg Type3	Riparian Veg 3 (%)	Riparian Veg Type4	Riparian Veg 4 (%)	Bank Slope (%)	Channel Cover (%)	Flow Rate
1	Grasses	100							30	0	fast
2	Deciduous	50	Grasses	30	Coniferous	20			60	0	medium/fast
3	Grasses	70	Deciduous	20	Coniferous	10			60	0	medium/fast
4	Grasses	70	Deciduous	20	Coniferous	10			70	0	medium/fast
5	no data collected										slow/medium/fast
6	Grasses	60	Deciduous	30	None	10			25		none/slow
7	Deciduous	70	none	30					35	5	slow/medium/fast
8	Deciduous	60	Grasses	30	Coniferous	10			30	5	none/slow/medium
9	Deciduous	85	none	15					35	na	na
10	Deciduous	60	Grasses	30	Coniferous	10			30	10	slow/medium/fast
11	Coniferous	75	Deciduous	15	Shrubs	5	Grasses	5	45	25	medium
12	Coniferous	70	Grasses	20	Deciduous	10			5	5	medium/fast
13	Grasses	80	Shrubs	20					15	10	slow
14	no data collected								30	0	slow/medium/none
15	Grasses	70	Shrubs	15	Deciduous	15			25	10	medium
16	Grasses	65	Shrubs	15	Coniferous	15	Deciduous	5	40	5	slow
17	Coniferous	40	Grasses	30	Shrubs	20	Deciduous	10	60	30	medium
18	Coniferous	60	Grasses	40					20	20	na
19	Grasses	90	Deciduous	10					50	30	slow/medium/none
20	Deciduous	50	Grasses	50					20	20	none
21	Grasses	40	Deciduous	30	None	30			10	5	none/slow/medium
22	Grasses	40	Deciduous	30	None	30			10	5	none/slow/medium
23	Grasses	90	none	10					25	0	slow/medium
24	no data collected										
25	no data collected										

Appendix 6. Summary of substrate data for 2005/2006 Saugeen River watershed sampling. Map # corresponds to numbers in Figure 1 and appendices. na – not available

Map#	Air Temp (°C)	Water Temp (°C)	Cond. (µS)	Secchi Depth (m)	Substrate 1	Substrate 1 (%)	Substrate 2	Substrate 2 (%)	Substrate 3	Substrate 3 (%)	Substrate 4	Substrate 4 (%)
1	25.6	25.1	540	na	Cobble	60	Boulder	30	Gravel	10		
2	28.4	26.9	533	na	Cobble	50	Gravel	20	Boulder	20	Sand	10
3	28.4	27	538	na	Cobble	40	Boulder	40	Sand	20		
4	25.1	27.4	531	na	Cobble	60	Boulder	20	Gravel	10	Sand	10
5	22.8	22.1	576	max	Cobble	50	Gravel	45	Boulder	5		
6	na	23.2	576	na	Silt	65	Sand	20	Gravel	10	Cobble	5
7	27	25.2	595	na	Sand	60	Cobble	40				
8	26.3	26.2	536	na	Sand	70	Cobble	20	Clay	10		
9	28	26.7	557	na	Cobble	50	Sand	40	Boulder	10		
10	28.7	25.1	550	na	Cobble	70	Boulder	10	Clay	10	Gravel	10
11	31.3	26.9	468	1.2+	Cobble	40	Gravel	40	Boulder	10	Silt	10
12	31.5	25.4	456	Na	Cobble	40	Gravel	40	Boulder	10	Silt	10
13	24	25.4	427	1.2+	Gravel	50	Boulder	25	Cobble	15	Silt	10
14	28.5	29.8	388	1.2+	Cobble	50	Gravel	30	Boulder	10	Sand	10
15	29.3	27.1	457	1.2+	Gravel	50	Silt	30	Boulder	20		
16	22.6	24.3	418	1.2+	Gravel	70	Cobble	15	Sand	10	Silt	5
17	na	24.5	380	1.2+	Boulder	40	Gravel	40	Cobble	15	Sand	5
18	23.7	24.2	409	na	Gravel	50	Sand	20	Organic	20	Cobble	10
19	25.5	22.4	543	na	Cobble	40	Gravel	40	Sand	20		
20	27.8	20.1	247	0.93	Organic	80	Silt	20				
21	28.1	24.5	261	1.2+	Cobble	50	Bedrock	45	Organic	5		
22	28.1	24.5	261	1.2+	Cobble	50	Bedrock	45	Organic	5		
23	31.5	25.5	249	1.2+	Cobble	80	Boulder	20				
24	4.6	7.9	640	na	no data collected							
25	no data collected											

Appendix 7. Fishes captured in the Teeswater River during sampling from 1956-1985 by site. See Appendix 8 for location description. Column numbers correspond to location numbers in Appendix 8. Bolded fishes were not collected in 2005/2006.

Common Name	Scientific Name	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Blacknose Dace	*Rhinichthys atratulus*									*			
Blacknose Shiner	*Notropis heterolepis*												
Blackside Darter	*Percina maculata*	*	*							*			*
Bluntnose Minnow	*Pimephales notatus*	*	*						*				
Brook Stickleback	*Culaea inconstans*												
Brook Trout	*Salvelinus fontinalis*						*				*		
Brown Bullhead	*Ameiurus nebulosus*												
Central Mudminnow	*Umbra limi*								*				
Channel Catfish	***Ictalurus punctatus***							*					
Chub	*Nocomis* sp.			*									
Common Shiner	*Luxilus cornutus*	*	*			*		*	*	*		*	*
Creek Chub	*Semotilus atromaculatus*	*	*			*		*	*	*		*	*
Fantail Darter	*Etheostoma flabellare*												
Hornyhead Chub	*Nocomis biguttatus*									*		*	
Iowa Darter	***Etheostoma exile***				*	*		*				*	
Johnny Darter	*Etheostoma nigrum*	*	*						*	*		*	
Largemouth Bass	*Micropterus salmoides*					*							
Least Darter	*Etheostoma microperca*	*	*										
Longnose Dace	*Rhinichthys cataractae*					*		*		*			
Mottled Sculpin	*Cottus bairdii*												
Northern Redbelly Dace	***Phoxinus eos***												
Pumpkinseed	*Lepomis gibbosus*												
Rainbow Darter	*Etheostoma caeruleum*	*	*			*		*		*		*	*
Redfin Shiner	***Lythrurus umbratilis***					*							
River Chub	*Nocomis micropogon*					*		*					*
Rock Bass	*Ambloplites rupestris*	*	*		*	*		*	*	*		*	
Rosyface Shiner	*Notropis rubellus*	*	*					*				*	
Smallmouth Bass	*Micropterus dolomieu*									*			
Stonecat	*Noturus flavus*							*					
Tadpole Madtom	***Noturus gyrinus***												
White Sucker	*Catostomus commersonii*	*	*		*				*	*		*	*

Appendix 7. Continued

Common Name	Scientific Name	H13	H14	H15	H16	H17	H18	H19	H20	H21
Blacknose Dace	*Rhinichthys atratulus*				*					
Blacknose Shiner	*Notropis heterolepis*								*	
Blackside Darter	*Percina maculata*	*	*	*	*		*			
Bluntnose Minnow	*Pimephales notatus*							*	*	
Brook Stickleback	*Culaea inconstans*				*					
Brook Trout	*Salvelinus fontinalis*									
Brown Bullhead	*Ameiurus nebulosus*		*			*				
Central Mudminnow	*Umbra limi*	*		*	*					
Channel Catfish	***Ictalurus punctatus***									
Chub	*Nocomis* sp.									
Common Shiner	*Luxilus cornutus*	*	*				*	*	*	*
Creek Chub	*Semotilus atromaculatus*	*			*		*	*	*	*
Fantail Darter	*Etheostoma flabellare*	*			*					
Hornyhead Chub	*Nocomis biguttatus*	*	*					*	*	*
Iowa Darter	***Etheostoma exile***	*	*				*			
Johnny Darter	*Etheostoma nigrum*		*	*	*					*
Largemouth Bass	*Micropterus salmoides*									
Least Darter	*Etheostoma microperca*							*		*
Longnose Dace	*Rhinichthys cataractae*					*	*			
Mottled Sculpin	*Cottus bairdii*	*		*			*			
Northern Redbelly Dace	***Phoxinus eos***								*	*
Pumpkinseed	*Lepomis gibbosus*						*			
Rainbow Darter	*Etheostoma caeruleum*	*			*		*			*
Redfin Shiner	***Lythrurus umbratilis***									
River Chub	*Nocomis micropogon*					*	*			*
Rock Bass	*Ambloplites rupestris*	*					*	*		*
Rosyface Shiner	*Notropis rubellus*							*	*	
Smallmouth Bass	*Micropterus dolomieu*						*			
Stonecat	***Noturus flavus***	*	*				*			*
Tadpole Madtom	*Noturus gyrinus*		*			*				
White Sucker	*Catostomus commersonii*	*		*	*		*	*		*

Appendix 8. Location description of sites sampled in the Teeswater River from 1956 to 1985.

Location #	Waterbody	Location Description	Source	Date	Latitude	Longitude
H1	Teeswater River	Teeswater River	ROM	16-Jul-56	44.1496301	-81.2844901
H2	Teeswater River	Teeswater River	ROM	16-Jul-56	44.1496301	-81.2844901
H3	Teeswater River	Teeswater River	ROM	16-Jul-56	44.1500001	-81.2833301
H4	Teeswater River	Teeswater River Stn 03 (OMNR)	OMNR	10-Aug-71	44.1750099	-81.2630401
H5	Teeswater River	Teeswater River Stn 02 (OMNR)	OMNR	10-Aug-71	44.2281	-81.27157
H6	Teeswater River	Teeswater River Stn 07 (OMNR)	OMNR	11-Aug-71	43.9747701	-81.1116901
H7	Teeswater River	Teeswater River Stn 08 (OMNR)	OMNR	11-Aug-71	44.19828	-81.24681
H8	Teeswater River	Teeswater River Stn G1 (OMNR)	OMNR	17-Aug-72	44.2214999	-81.3267701
H9	Teeswater River	Teeswater River Stn G2 (OMNR)	OMNR	17-Aug-72	44.2469699	-81.2750299
H10	Teeswater River	Teeswater River Stn 01 (OMNR)	OMNR	18-Aug-72	43.98518	-81.13267
H11	Teeswater River	Teeswater River Stn 02 (OMNR)	OMNR	18-Aug-72	44.00506	-81.2532801
H12	Teeswater River	Teeswater River Stn 03 (OMNR)	OMNR	25-Sep-72	43.99539	-81.31483
H13	Teeswater River	Teeswater River Stn B (OMNR)	OMNR	25-Sep-72	44.05834	-81.30162
H14	Teeswater River	Teeswater River Stn 04 (OMNR)	OMNR	26-Sep-72	44.09	-81.33642
H15	Teeswater River	Teeswater River Stn D (OMNR)	OMNR	26-Sep-72	44.10406	-81.3132401
H16	Teeswater River	Teeswater River Stn F (OMNR)	OMNR	26-Sep-72	44.20836	-81.2867401
H17	Teeswater River	Teeswater River (OMNR)	OMNR	26-Sep-72	44.2989599	-81.2668901
H18	Teeswater River	Teeswater River Stn 06 (OMNR)	OMNR	26-Sep-72	44.30333	-81.2757999
H19	Teeswater River	Teeswater River, 4.5 km Se Of Teeswater	ROM	09-Aug-85	43.9897301	-81.23632
H20	Teeswater River	Teeswater River, 2 km E Of Teeswater	ROM	09-Aug-85	44.00389	-81.26423
H21	Teeswater River	Teeswater River, 3 km E Of Teeswater	ROM	09-Aug-85	44.0054901	-81.2536901

Source: OMNR – Ontario Ministry of Natural Resources; ROM – Royal Ontario Museum