

Sampling of the Fish Communities on the First Nations Lands on the Thames River, 2005

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SAMPLING OF THE FISH COMMUNITIES ON THE FIRST NATIONS LANDS ON THE
THAMES RIVER, 2005

by

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ABSTRACT

Marson, D, N.E. Mandrak and J. Barnucz. 2012. Sampling the Fish Communities on First Nations Lands on the Thames River, 2005. Can. Manuscr. Rep. Fish. Aquat. Sci. 2992: vi + 18 p.

In 2005, with permission from three First Nations, Fisheries and Oceans Canada (DFO) conducted a survey of the fish communities in the waters of the Thames River adjoining First Nations land. Sampling for fishes was conducted using an 8.5 m bag seine with 6.35 mm mesh. A total of 13 sites were sampled, resulting in the capture of 3356 fishes representing 28 species. Three sites were sampled for mussels, resulting in the collection of 626 mussels representing 18 species. Two fish species at risk, Eastern Sand Darter, Threatened, and Silver Shiner, Special Concern, were captured. A total of 94 Eastern Sand Darter were captured from nine sites. Silver Shiner was caught at a single site (Site 10), which was located in an area free of macrophyte growth. Two mussel species at risk, Round Pigtoe, Endangered, and Mapleleaf, Threatened, were collected. A total of 44 Mapleleaf Mussels were located, and specimens were found at all three sites sampled. Two Round Pigtoe shells were located at a single site, no live specimens were located. Additional sampling, incorporating sampling gears such as fyke nets, gill nets, and electrofishing is recommend in order to expand the fish community survey, locate additional species at risk, and to monitor the Eastern Sand Darter and Silver Shiner populations. Additional mussel sampling is recommended to monitor the Mapleleaf populations, and to locate additional species at risk.

RÉSUMÉ

Marson, D, N.E. Mandrak and J. Barnucz. 2012. Sampling the Fish Communities on First Nations Lands on the Thames River, 2005. Can. Manuscr. Rep. Fish. Aquat. Sci. 2992: vi + 18 p.

En 2005, avec la permission de trois Premières nations, Pêches et Océans Canada (MPO) a effectué une étude des communautés de poissons dans la rivière Thames sur le territoire des Premières nations. L'échantillonnage des poissons a été effectué à l'aide d'une senne en sac de 8,5 m munie de mailles de 6,35 mm. Un total de 13 sites ont été échantillonnés, entraînant la capture de 3 356 poissons représentant 28 espèces. Des moules ont été prélevées sur trois sites, entraînant la collecte de 626 moules représentant 18 espèces. Deux espèces de poisson en péril, le Dard De Sable (*Ammocrypta pellucida*) (désigné comme menacé par le Comité sur la situation des espèces en péril au Canada [COSEPAC]), et le Méné-Miroir (*Notropis photogenis*) (désigné comme préoccupant par le COSEPAC) ont été capturées. Un total de 94 dards de sable ont été capturés. Le Méné-Miroir a été attrapé à partir d'un seul site (site 10), qui était situé dans une zone sans macrophytes. Deux espèces de moule en péril, la Pleurobème Écarlate (*Pleurobema sintoxia*) (en voie de disparition), et la Feuille d'Érable (*Quadrula quadrula*) (menacée) ont été recueillies. Un total de 44 Feuilles d'Érable ont été trouvées à partir de trois sites échantillonnés. Deux coquilles de Pleurobème Écarlate ont été trouvées sur un seul site, mais aucun spécimen vivant n'a été trouvé. De l'échantillonnage supplémentaire, incluant du matériel d'échantillonnage comme des verveux, des filets maillants et de la pêche à l'électricité, est recommandé pour étendre l'étude de la communauté de poissons, trouver des espèces en péril supplémentaires et surveiller les populations du Dard De Sable et du Méné-Miroir. L'échantillonnage supplémentaire des moules est recommandé pour surveiller les populations de la Feuille d'Érable et trouver des espèces en péril supplémentaires.

INTRODUCTION

Upon receiving permission from the Chippewa of the Thames, Oneida, Nation of the Thames and Munsee Delaware Nation, First Nations, sampling of the fish communities in the Thames River waters adjoining the three First Nations lands was conducted on August 23 and 24, 2005. Fisheries and Oceans Canada (DFO) sampled the Thames River approximately 30 kilometers southwest of London, Ontario, adjacent to the town of Muncey (Figure 1, Appendix 1). A total of 13 sites, in 3 sampling areas, were sampled using an 8.5 m bag seine with 6.35 mm mesh. An emphasis was placed on the discovery of fish species at risk while sampling, including the Eastern Sand Darter, Gravel Chub, and Silver Shiner. Of specific interest was the search for the Gravel Chub, a species which was last documented within the Thames River on First Nations land in 1958 (COSEWIC 2000, Mandrak and Crossman 1992). An additional 3 sites were sampled for mussels on August 23 and 24, 2005. Nine mussel species at risk are historically known from the Thames River, and efforts were focused on locating these species within the Thames River on First Nations lands.

METHODS

SITE SELECTION

The site selection was limited to areas where water depth and conditions were conducive to wading and sampling with a seine net. Sites were characterized by having a water depth of less than 1.5 m, low stream flow and stable substrates (Appendix 2). Attempts were made to target various habitats to capture the greatest diversity of fishes in order to accurately represent the fish community, as well as to target habitat associated with fish species at risk.

SEINE NET SAMPLING

Seining was performed using an 8.5 m bag seine with 6.35 mm square mesh. The number of hauls per area varied from three to five. This variation in haul numbers was due to the sampling protocol, which outlines the need for at least three seine hauls per site with an additional haul following the discovery a new species. As a result of this protocol, areas 1 and 2, sampled on August 23, required five hauls each, while area 3, sampled on August 24, required only three hauls. Captured fishes were placed in large water-filled bins until the completion of the seining. Upon completion, the fishes were identified, counted, measured and released. Discrete individual length and weight measurements were taken of all species at risk caught during sampling. Voucher specimens of each species were preserved in 10% formalin for later laboratory verification of the species' identity (Portt et al. 2008). Fish species of interest (i.e. species at risk) were sent to the Royal Ontario Museum for further review and verification.

MUSSEL SAMPLING

Mussel sampling was conducted using a technique described in detail by Metcalfe-Smith et al. (2000) as an intensive time search method of detecting rare mussel species in rivers. The riverbed was manually searched by a 4 person team wearing waders, polarized glasses, and using underwater viewers for a total of 4.5 person hours of sampling effort per site. Specimens were collected and held until the end of the sampling period, when they were identified to species, sexed (if possible), the shell length was measured (to nearest mm), the total number of individuals of each species were counted and they were returned to the riverbed.

HABITAT DATA COLLECTION

Habitat measurements at each site included: air temperature (°C), water temperature (°C), conductivity (µS), water depth (m), substrate components (%), aquatic vegetation (% emergent, % submergent, % floating), riparian vegetation (%), sampling distance from shore (m), bank slope (%), channel cover (%), floodplain use and weather conditions. Habitat data were collected prior to seining. All substrate samples were classified according to the Wentworth Scale (Wentworth 1922).

RESULTS

BAG SEINING

All of the 13 sites were sampled using an 8.5 m bag seine. A total of 3346 fishes representing 28 species were captured (Table 1). The total sampling effort was 13 hauls, with areas 1 and 2 (sites 1 through 10) consisting of five seine hauls each, and area 3 (sites 11 through 13) consisting of three hauls. The maximum number of fishes caught in a site was 948 (Site 9), the lowest was 10 fishes at Site 8 (Table 2). The mean catch per haul was 257.39 fishes (Table 3).

MUSSEL SAMPLING

A total of 626 live mussels were found, representing 16 species. An additional two species were identified from shell remains (Table 4). The maximum number of mussels collected at a site was 290 (Site TM05-03), and the minimum number collected was 164 (TM05-04, Appendix 5). The most abundant species was the Mucket ($n = 399$) at all three sites, followed by the Pimpleback, Mapleleaf, and Plain Pocketbook (Table 4, Appendix 5).

SPECIES AT RISK

Two fish species at risk were captured during the 2005 sampling. The Eastern Sand Darter, Threatened, was detected at nine sites, with a total of 94 individuals captured (Table 1). Sites where Eastern Sand Darter were captured were characterized by a high percentage of sandy substrate, little aquatic vegetation and water depth less than a meter (Appendix 2a-2b). Eastern Sand Darter were captured at Sites 1-5, where substrate was composed of 70 % sand, and at Sites 12 and 13, which had 40 % sand composition. Substrate data are not available for sites 9 and 10. Sites 1-5 were 60 % non-vegetated, sites 9 and 10 were completely free of vegetation and Sites 12 and 13 were 90 % free of aquatic vegetation. Sampling depth ranged from 0.50 m to 0.72 m.

Silver Shiner, Special Concern, was collected from a single site (Site 5), where two individuals were captured (Table 1). Site 5 was primarily free of aquatic vegetation, Secchi depth was 0.262 m and sampling depth was 0.72 m. Substrate was composed of 70% sand, 20% gravel and 10% pebble.

The Round Pigtoe, Endangered, was not found alive, but two weathered shells were located at site TM05-04. Indications from previous studies suggest that only remnants of a dying population remain in the Thames River (Morris and Edwards, 2007).

A total of 44 Mapleleaf specimens, Threatened, were located during the 2005 sampling. They were located at each of the three sites sampled. Substrate composition at the sites was composed of a mix of sand (70%), gravel (20%), and pebble (10%) at sites 1-5 (where site TM05-03 was sampled, Appendix 2c, 4). Substrate composition at sites 11-13 was gravel (50%), sand (40%), and silt (10%) (where site TM05-05 was sampled, Appendix 2c, 4). Substrate data was not recorded for sites 6 to 10. Size distributions of the Mapleleaf Mussels captured in the lower Thames River in 2004-2005 show a normal distribution of sizes, indicating a successfully reproducing population (Morris and Edwards, 2007).

HABITAT DATA

Turbidity varied slightly within the sites, with secchi depth readings ranging from 0.25 m to 0.38 m (Appendix 2a). Sampling depth did not exceed 0.72 m. Riparian vegetation was composed primarily of grasses and herbaceous material in sites 1 to 10 (Appendix 2b). All of the sites sampled were primarily free of aquatic vegetation (Appendix 2c). Sites 1-5 had the heaviest macrophyte growth, with 40% of the site containing vegetation (in each case, the vegetation was comprised of equal parts submergent and emergent vegetation). Substrate in sites 1-5 and 11-13 was composed primarily of sand and gravel, with small amounts of pebble and silt in some sites (Appendix 2c).

DISCUSSION

The 2005 sampling of the Thames River adjoining First Nations lands resulted in the capture of 3356 fishes representing 28 species, including two fish species at risk. Eastern Sand Darter was distributed throughout the areas of suitable habitat, as indicated by their presence in nine of the 13 sites sampled. Of the 94 Eastern Sand Darter captured, 42 were caught in Sites 1-5, where the proportion of sandy substrate was highest. Substrate composition of the sites where Eastern Sand Darter were found were composed of 70 % sand at Sites 1-5, and 40 % sand at Sites 12 and 13. Unfortunately, substrate composition was not available for three of the sites where Eastern Sand Darter were not found (Sites 6, 7, 8), and it is not possible to rule out whether the substrate composition may have been a factor in their absence.

The two Silver Shiner specimens were captured at Site 5. The site was primarily free of macrophytes, indicating that Silver Shiner may prefer open water. However, having only captured Silver Shiner in a single site, habitat preferences are difficult to assess. Two mussel species at risk were identified during the 2005 sampling. The Round Pigtoe, represented by 2 shell remains, and the Mapleleaf, of which 44 specimens were captured, were the only mussel species at risk located in the Thames River on First Nations lands. Additional sampling is recommended in an effort to locate additional mussel species at risk historically found in the Thames River, and to monitor the threatened Mapleleaf mussels located in the three sites sampled.

With the collection of two fish species at risk and two mussel species at risk in the 2005 sampling of the Thames River on the First Nations land, it is recommended that additional sampling occur to establish whether other species at risk exist within the area of the river sampled, and to monitor the presence of Eastern Sand Darter, Silver Shiner, Mapleleaf Mussel, and Round Pigtoe.

Some sites were not sampled for substrate due to depth and/or velocity. Attempts were made to maintain consistency in sampling procedures but it was not always possible to acquire a complete data set due to river conditions.

In the case of fish species at risk, it would be valuable to incorporate other sampling methods, such as fyke netting, gill netting, boat electrofishing and trawling, in order to sample areas not accessible by wading, and to target species more susceptible to electrofishing than seining. Additional sampling should also record habitat characteristics in order to aid in the targeted sampling of species at risk, based on their historical presence, and habitat preferences.

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The methods used in this study were reviewed and approved by the Joint GLLFAS NWRI Animal Care Committee for compliance with the guidelines recommended by the Canada Council on Animal Care.

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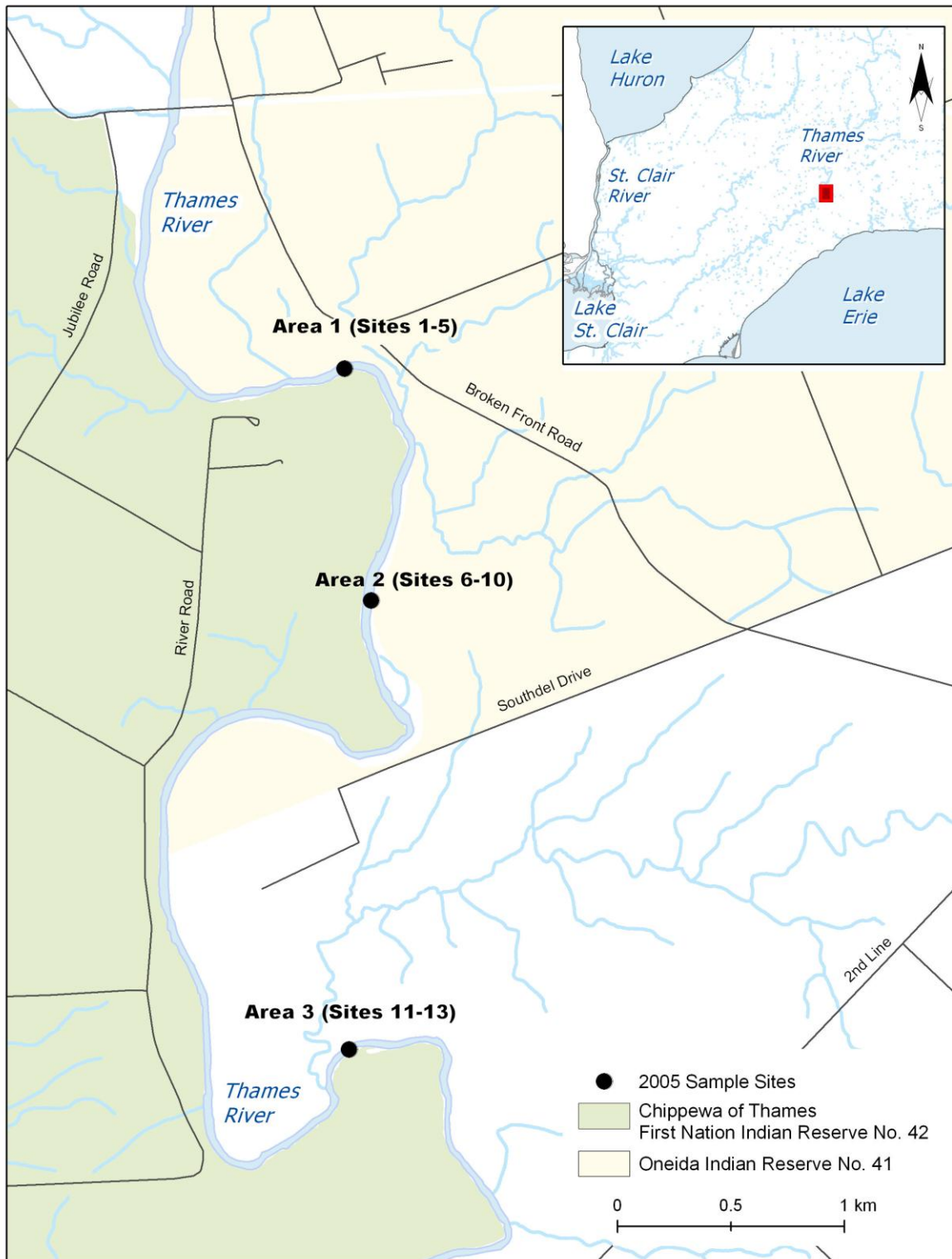


Figure 1. Sites sampled in the Thames River in 2005. Numbers on map correspond to field numbers in Appendix 1.

Table 1. Summary of species captured during Thames River First Nations sampling in 2005. Common and scientific names according to Nelson et al. (2004).

Common Name	Scientific Name	Total Captured
Blackside Darter	<i>Percina maculata</i>	7
Bluntnose Minnow	<i>Pimephales notatus</i>	601
Central Stoneroller	<i>Campostoma anomalum</i>	9
Channel Catfish	<i>Ictalurus punctatus</i>	982
Common Shiner	<i>Luxilus cornutus</i>	49
Creek Chub	<i>Semotilus atromaculatus</i>	1
Eastern Sand Darter	<i>Ammocrypta pellucida (TH)</i>	94
Emerald Shiner	<i>Notropis atherinoides</i>	45
Ghost Shiner	<i>Notropis buechanani</i>	380
Gizzard Shad	<i>Dorosoma cepedianum</i>	80
Golden Redhorse	<i>Moxostoma erythrurum</i>	3
Greenside Darter	<i>Etheostoma blennioides</i>	17
Johnny Darter	<i>Etheostoma nigrum</i>	18
Logperch	<i>Percina caprodes</i>	7
Longnose Dace	<i>Rhinichthys cataractae</i>	2
Mimic Shiner	<i>Notropis volucellus</i>	43
Minnow Species	<i>Cyprinidae</i>	6
Northern Hog Sucker	<i>Hypentelium nigricans</i>	66
Quillback	<i>Carpionodes cyprinus</i>	16
Redhorse Species	<i>Moxostoma sp.</i>	122
Rock Bass	<i>Ambloplites rupestris</i>	2
Rosyface Shiner	<i>Notropis rubellus</i>	11
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	3
Silver Redhorse	<i>Moxostoma anisurum</i>	2
Silver Shiner	<i>Notropis photogenis (SC)</i>	2
Smallmouth Bass	<i>Micropterus dolomieu</i>	3
Spotfin Shiner	<i>Cyprinella spiloptera</i>	774
Striped Shiner	<i>Luxilus chrysocephalus</i>	1
Total		3346

COSEWIC status assessment: SC – special concern; TH – threatened

Table 2. Summary of catch data for Thames River sampling sites in 2005.

Catch Data	Bag Seine
Total Fishes Caught (13 sites)	3346
Mean Fishes Caught/Site	257.39
Min. No. Fishes Caught	10
Max. No. Fishes Caught	948

Table 3. Summary of sampling effort for Thames River sampling sites in 2005.

Sampling Effort	Bag Seine
Mean CPUE (fish/haul)	257.39
Mean Effort/Area (hauls)	4.34
Total Sampling Effort (hauls)	13

Table 4. Summary of mussel species captured during Thames River First Nations sampling in 2005.

Common Name	Species	Total
Black Sandshell	<i>Ligumia recta</i>	6
Creek Heelsplitter	<i>Lasmigona compressa</i>	1
Deertoe	<i>Truncilla truncata</i>	9
Elktoe	<i>Alasmidonta marginata</i>	4
Fawnsfoot	<i>Truncilla donaciformis</i>	3
Flutedshell	<i>Lasmigona costata</i>	20
Fragile Papershell	<i>Leptodea fragilis</i>	9
Mapleleaf	<i>Quadrula quadrula</i> (TH)	44
Mucket	<i>Actinonaias ligamentina</i>	399
Pimpleback	<i>Quadrula pustulosa pustulosa</i>	79
Pink Heelsplitter	<i>Potamilus alatus</i>	3
Plain Pocketbook	<i>Lampsilis cardium</i>	26
Purple Wartyback	<i>Cyclonaias tuberculata</i>	7
Round Hickorynut	<i>Obovaria subrotunda</i>	1 shell
Round Pigtoe	<i>Pleurobema sintoxia</i> (EN)	2 shells
Threehorn wartyback	<i>Obliquaria reflexa</i>	1
Threeridge	<i>Amblema plicata plicata</i>	4
White Heelsplitter	<i>Lasmigona complanata complanata</i>	11
Total		626
Diversity (live)		16
Diversity (live and dead)		18

COSEWIC status assessment: EN – endangered; TH – threatened

Appendix 1. Sites sampled for fishes in the Thames River, 2005. Map # corresponds to number in Figure 1 and in appendices.

Map #	Field Number	Latitude	Longitude	Narrative Locality Description
1	TR05082305001	42.80924	-81.42532	Upstream of Jubilee Creek; east bank
2	TR05082305001b	42.80924	-81.42532	Upstream of Jubilee Creek; east bank
3	TR05082305001c	42.80924	-81.42532	Upstream of Jubilee Creek; east bank
4	TR05082305001d	42.80924	-81.42532	Upstream of Jubilee Creek; east bank
5	TR05082305001e	42.80924	-81.42532	Upstream of Jubilee Creek; east bank
6	TR05082305002	42.80001	-81.42448	Downstream of Muncey Bridge; approximately 3.35 km
7	TR05082305002b	42.80001	-81.42448	Downstream of Muncey Bridge; approximately 3.35 km
8	TR05082305002c	42.80001	-81.42448	Downstream of Muncey Bridge; approximately 3.35 km
9	TR05082305002d	42.80001	-81.42448	Downstream of Muncey Bridge; approximately 3.35 km
10	TR05082305001e	42.80001	-81.42448	Downstream of Muncey Bridge; approximately 3.35 km
11	TR05082405001	42.78228	-81.42682	Downstream of cemetery; 800m downstream at the high bank with point bar.
12	TR05082405001b	42.78228	-81.42682	Downstream of cemetery; 800m downstream at the high bank with point bar.
13	TR05082405001c	42.78228	-81.42682	Downstream of cemetery; 800m downstream at the high bank with point bar.

Appendix 2a. Habitat data for Thames River sites, 2005. Map number corresponds to numbers in Figure 1.

Map #	Air Temp (°C)	Water Temp (°C)	Conductivity (µS)	Secchi Depth (m)	Floodplain Use	Bank Slope (%)	Weather Conditions
1	22.4	22.6	541	0.26	agriculture	20	Mixed sun and cloud
2	22.4	22.6	541	0.26	agriculture	20	Mixed sun and cloud
3	22.4	22.6	541	0.26	agriculture	20	Mixed sun and cloud
4	22.4	22.6	541	0.26	agriculture	20	Mixed sun and cloud
5	22.4	22.6	541	0.26	agriculture	20	Mixed sun and cloud
6	27.3	23.6	537	0.25	agriculture	30	Mixed sun and cloud
7	27.3	23.6	537	0.25	agriculture	30	Mixed sun and cloud
8	27.3	23.6	537	0.25	agriculture	30	Mixed sun and cloud
9	27.3	23.6	537	0.25	agriculture	30	Mixed sun and cloud
10	27.3	23.6	537	0.25	agriculture	30	Mixed sun and cloud
11	20.4	21	585	0.38	agriculture	90	Sunny
12	20.4	21	585	0.38	agriculture	90	Sunny
13	20.4	21	585	0.38	agriculture	90	Sunny

Appendix 2b. Habitat data for Thames River sites, 2005. Map # corresponds to numbers in Figure 1.

Map #	Stream Width (m)	Sampling Depth (m)	Riparian Veg Type1	Riparian Veg 1 (%)	Riparian Veg Type2	Riparian Veg 2 (%)	Riparian Veg Type3	Riparian Veg 3 (%)
1	44	0.72	Grasses	40	Herbaceous	40	Deciduous	20
2	44	0.72	Grasses	40	Herbaceous	40	Deciduous	20
3	44	0.72	Grasses	40	Herbaceous	40	Deciduous	20
4	44	0.72	Grasses	40	Herbaceous	40	Deciduous	20
5	44	0.72	Grasses	40	Herbaceous	40	Deciduous	20
6	44	0.56	Herbaceous	40	Grasses	40	Deciduous	20
7	43	0.56	Herbaceous	40	Grasses	40	Deciduous	20
8	43	0.56	Herbaceous	40	Grasses	40	Deciduous	20
9	43	0.56	Herbaceous	40	Grasses	40	Deciduous	20
10	43	0.56	Herbaceous	40	Grasses	40	Deciduous	20
11	28	0.50						
12	28	0.50						
13	28	0.50						

Appendix 2c. Habitat data for Thames River sites, 2005. Map # corresponds to numbers in Figure 1.

Map #	Substrate 1	Substrate 1 (%)	Substrate 2	Substrate 2 (%)	Substrate 3	Substrate 3 (%)	Aquatic Veg Type1	Aquatic Veg 1 (%)	Aquatic Veg Type2	Aquatic Veg 2 (%)	Aquatic Veg Type3	Aquatic Veg 3 (%)
1	Sand	70	Gravel	20	pebble	10	None	60	Submergent	20	Emergent	20
2	Sand	70	Gravel	20	pebble	10	None	60	Submergent	20	Emergent	20
3	Sand	70	Gravel	20	pebble	10	None	60	Submergent	20	Emergent	20
4	Sand	70	Gravel	20	pebble	10	None	60	Submergent	20	Emergent	20
5	Sand	70	Gravel	20	pebble	10	None	60	Submergent	20	Emergent	20
6	na		na		na		None	100				
7	na		na		na		None	100				
8	na		na		na		None	100				
9	na		na		na		None	100				
10	na		na		na		None	100				
11	Gravel	50	Sand	40	Silt	10	None	90	Emergent	5	Submergent	5
12	Gravel	50	Sand	40	Silt	10	None	90	Emergent	5	Submergent	5
13	Gravel	50	Sand	40	Silt	10	None	90	Emergent	5	Submergent	5

Appendix 3: Total number of each fish species captured per site, with total number of specimens captured in cell. Map # corresponds to numbers in Figure 1.

Common Name	Scientific Name	Total	1	2	3	4	5	6	7	8	9	10	11	12	13
Blackside Darter	<i>Percina maculata</i>	7		3	1	1					1				1
Bluntnose Minnow	<i>Pimephales notatus</i>	601	71	54	161	63	25	16	3		51	19		10	128
Central Stoneroller	<i>Campostoma anomalum</i>	9	1			1					2			5	
Channel Catfish	<i>Ictalurus punctatus</i>	982	38	57	118	48	16				656	25	1	1	22
Common Shiner	<i>Luxilus cornutus</i>	49	18								26	3		1	1
Creek Chub	<i>Semotilus atromaculatus</i>	1												1	
Eastern Sand Darter	<i>Ammocrypta pellucida</i> (TH)	94	7	5	2	19	9				31	12		3	6
Emerald Shiner	<i>Notropis atherinoides</i>	45	1								4	1		19	20
Ghost Shiner	<i>Notropis buchanani</i>	380		1	12	96	160	1			2	18		46	44
Gizzard Shad	<i>Dorosoma cepedianum</i>	80	1	1	36		1				6			34	1
Golden Redhorse	<i>Moxostoma erythrurum</i>	3			1	2									
Greenside Darter	<i>Etheostoma blennioides</i>	17				2			2	3	3	1	2	1	3
Johnny Darter	<i>Etheostoma nigrum</i>	18	2	4	1	1								3	7
Log Perch	<i>Percina caprodes</i>	7				1	1		1	1	1	2			
Longnose Dace	<i>Rhinichthys cataractae</i>	2								1			1		
Mimic Shiner	<i>Notropis volucellus</i>	43		7		1	9	1		1	17	7			
Minnow species	<i>Cyprinidae</i>	6												2	4
Northern Hogsucker	<i>Hypentelium nigricans</i>	76		2	1	6	4		1		20	18	2	7	5
Quillback Sucker	<i>Carpionodes cyprinus</i>	16			4	1					10				1

COSEWIC status assessment: SC – special concern; TH - threatened

Appendix 3: Continued

	Scientific Name	Total	1	2	3	4	5	6	7	8	9	10	11	12	13
Redhorse species	<i>Moxostoma</i> sp.	122	1	3	40	27	20				18	1			12
Rock Bass	<i>Ambloplites rupestris</i>	2				1	1								
Rosyface Shiner	<i>Notropis rubellus</i>	11	2								1			8	
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	3		1	1	1									
Silver Redhorse	<i>Moxostoma anisurum</i>	2			1		1								
Silver Shiner	<i>Notropis photogenis</i> (SC)	2					2								
Smallmouth Bass	<i>Micropterus dolomieu</i>	3											1	1	1
Spotfin Shiner	<i>Cyprinella spiloptera</i>	774	63	3	11	31	63	17	5	4	99	32	5	340	101
Striped Shiner	<i>Luxilus chrysocephalus</i>	1	1												
Total		3356	206	141	390	302	312	35	12	10	948	149	12	482	357

COSEWIC status assessment: SC – special concern; TH - threatened

Appendix 4. Sites sampled for mussels in the Thames River, 2005. Map # corresponds to numbers in Figure 1.

Map #	Latitude	Longitude	Date	Description	Effort	Collectors
1 to 6	42.80924	-81.42523	23/08/05	Upstream of Jubilee Creek, boat access (TM05-03)	4.5 p-h	Morris, Barnucz, Stackhouse, Martens, Maness
7 to 10	42.8001	-81.42448	23/08/05	3.35km downstream of Muncey Bridge, boat access (TM05-04)	4.5 p-h	Morris, Barnucz, Stackhouse, Martens, Maness
11 to 13	42.78228	-81.42682	24/08/05	800m downstream of cemetery access point, boat access (TM05-05)	4.5 p-h	Morris, Barnucz, Stackhouse, Martens, Maness

p-h – person-hours; TM – Thames River mussel sampling site number code.

Appendix 5. Total number of each mussel species captured per site, with total number of specimens captured in cell.

Common Name	Species	Total	TM05-03	TM05-04	TM05-05
Mucket	<i>Actinonaias ligamentina</i>	399	187	84	128
Elktoe	<i>Alasmodonta marginata</i>	4	1	3	
Threeridge	<i>Amblema plicata plicata</i>	4	2	1	1
Purple Wartyback	<i>Cyclonaias tuberculata</i>	7	3	4	
Plain Pocketbook	<i>Lampsilis cardium</i>	26	12	3	11
White Heelsplitter	<i>Lasmigona complanata complanata</i>	11	6	3	2
Creek Heelsplitter	<i>Lasmigona compressa</i>	1		1	
Flutedshell	<i>Lasmigona costata</i>	20	9	7	4
Fragile Papershell	<i>Leptodea fragilis</i>	9	4	2	3
Black Sandshell	<i>Ligumia recta</i>	6	4		2
Threehorn Wartyback	<i>Obliquaria reflexa</i>	1			1
Round Hickorynut	<i>Obovaria subrotunda</i>	0		1 fresh	
Round Pigtoe	<i>Pleurobema sintoxia (EN)</i>	0		2 weathered	
Pink Heelsplitter	<i>Potamilus alatus</i>	3	3		
Pimpleback	<i>Quadrula pustulosa pustulosa</i>	79	36	28	15
Mapleleaf	<i>Quadrula quadrula (TH)</i>	44	19	22	3
Fawnsfoot	<i>Truncilla donaciformis *</i>	3	1 fresh	3	
Deertoe	<i>Truncilla truncata</i>	9	4	3	2
Total		626	290	164	172
Diversity (live)		16	13	13	11
Diversity (live and dead)		18	14	15	11

COSEWIC status assessment: EN – endangered; TH – threatened; * candidate species

Appendix 6: Description of sampling effort. Map # corresponds to number in Figure 1.

Map #	Field Number	Date	Capture Method	Effort	Effort Units	Description of Method
1	TR05082305001	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
2	TR05082305001b	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
3	TR05082305001c	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
4	TR05082305001d	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
5	TR05082305001e	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
6	TR05082305002	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
7	TR05082305002b	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
8	TR05082305002c	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
9	TR05082305002d	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
10	TR05082305001e	23/08/2005	Seine Net	5	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
11	TR05082405001	24/08/2005	Seine Net	3	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
12	TR05082405001b	24/08/2005	Seine Net	3	Haul	Bag Seine, 6.35mm mesh, length - 8.5m
13	TR05082405001c	24/08/2005	Seine Net	3	Haul	Bag Seine, 6.35mm mesh, length - 8.5m