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Adephagous water beetles of Ontario and western Quebec, Canada
(Coleoptera: Dytiscidae, Haliplidae, Noteridae)

H.V. SHAVERDO & R.E. ROUGHLEY †

Abstract

Eighty-seven species of Dytiscidae, ten species of Haliplidae, and two species of Noteridae were collected from 37 sampling stations in Ontario and western Quebec during an excursion in August, 2002. First records are provided for one species from Ontario, two species from Quebec, and one species from the Boreal Shield ecozone. In accordance with the present study and data from the literature, the list of aquatic Adephaga of Ontario contains 161 species of Dytiscidae, 17 species of Haliplidae, and two species of Noteridae; 149 species of Dytiscidae, 18 species of Haliplidae, and two species of Noteridae are known from Quebec. For the first time, the fauna of the adephagous water beetles of Manitoulin Island has been explored; and 37 species are reported from eight sampling stations. A taxonomic problem of *Oreodytes laevis* (FALL) is revealed. New data on bionomics of most of the species are presented.

Key words: Coleoptera, Dytiscidae, Haliplidae, Noteridae, faunistics, taxonomy, Canada, Ontario, Quebec.

Introduction

Ontario and Quebec are relatively well explored in terms of adephagous water beetles. Faunistic data on Dytiscidae, Haliplidae, and Noteridae of these provinces can be found in several papers: DOWNIE & ARNETT (1996), LARSON et al. (2000), LARSON & ROUGHLEY (1991), ROUGHLEY (1991), and SHAVERDO (2005). So far, a total of 160 species of Dytiscidae, 17 species of Haliplidae, and two species of Noteridae are known from Ontario; 148 species of Dytiscidae, 18 species of Haliplidae, and one species of Noteridae are known from Quebec.

During our collecting trip undertaken in summer 2002, we found three species new for the region and gathered new data on distribution and habitats of the adephagous water beetles. The fauna of the aquatic Adephaga of Manitoulin Island has been studied for the first time. Also a taxonomic problem of *Oreodytes laevis* (FALL) is revealed. Results of these studies are presented below.

The manuscript was in preparation when Rob Roughley died. It has taken me considerable time to complete it, but I thought it would be the right thing to do. I would like to express my thanks to Rob and honour his memory in this way. Without him, my life would not have been enriched with one of the nicest experiences, a trip across Ontario.

Material and methods

We collected water beetles on a field trip across Ontario (ON) and western Quebec (QC) carried out from 7 to 25 August, 2002. About 2500 adult specimens of Dytiscidae, Haliplidae, and Noteridae were collected. Thirty-seven aquatic sites were sampled (Fig. 1).

For collecting, mainly D-frame, aquatic nets were used to take samples within the littoral zone. The net bag containing the samples was then inverted onto a metal screen with 1 cm mesh,

suspended over a plastic bowl or Rubbermaid® bins (52 cm × 25 cm × 19 cm). The majority of beetles was separated from the plant debris in this manner. The plant debris also was searched by hand. The beetles were concentrated by means of an aspirator. In the field, beetles were preserved either in 70 % ethanol or acetic-alcohol.

The specimens were identified using the relevant taxonomic literature and with reference to authoritatively identified specimens and deposited in the collections of the J.B. Wallis Museum, Department of Entomology, University of Manitoba, Winnipeg, Canada, and in the Naturhistorisches Museum Wien, Austria. LARSON et al. (2000) was consulted for data about the natural history of the species, and their provincial and ecozone distribution.

For most of the species we have obtained new bionomic data, which can be gained from the descriptions of the sampling sites, the list of the species, and the list of sampled sites with collected species.

Description of the region of the sampling sites

Ontario (ON) and Quebec (QC) are the central-eastern provinces of Canada. Most of our sampling sites were situated in Ontario and only two of them were in western Quebec (Fig. 1). They were distributed more evenly among two ecozones (Boreal Shield – 23 sites and Mixedwood Plains – 14 sites), as identified by Ecological Stratification Working Group (1996).

The Boreal Shield covers a wide swath from Alberta to Newfoundland and is the largest of Canada's ecozones (Canadian Biodiversity Web Site 2011). This ecozone presents the intersection of the boreal forest and the Canadian Shield, with its Precambrian granite bedrock commonly exposed here. Often glacial activity has resulted in the series of depressions and deposits, which have formed millions of lakes, wetlands, and other habitats suitable for water beetles. Summers have roughly the same average temperature throughout the area, about 13°C. The maritime influence in the east gives it a milder winter, with a mean temperature of about -1°C, while the western edges suffer through average winter temperatures of -20°C. Forest fires create a patchwork of forest types in different stages of recovery from the fire. Trees to the north are mainly coniferous, but broadleaf, deciduous trees appear further south and trees normally found in much warmer climates, such as the yellow birch and sugar maple, can be found in the south of the ecozone. Bogs and other wetlands, some of the most diverse and productive areas in the Boreal Shield, cover one-fifth of the land. The Mixedwood Plains, the smallest of Canada's ecozones, extends along the Quebec City-Windsor corridor (Canadian Biodiversity Web Site 2011). Its cool winters (average temperature -5°C) and warm summers (average temperature 17°C) are prone to highly changeable weather, as the ecozone is in one of the major storm tracks of North America. The geology of the ecozone is characterized by carbonate-rich Palaeozoic bedrock. Deposits from ancient water bodies and glaciers make the soil here the most productive in Canada and form plains and gently rolling hills. Several major waterways and lakes, from three of the Great Lakes to the St. Lawrence River and its tributaries, dominate much of the region. Urbanization and agriculture have reduced the ancient forest drastically. A mix of coniferous (e.g. white pine, red pine, eastern hemlock, and black spruce) and deciduous trees (e.g. sugar maple, red maple, white oak, red oak, white elm, yellow birch, trembling aspen, and balsam poplar) are found here.

Manitoulin Island is an island in Lake Huron, in the province of Ontario (Wikipedia, the free encyclopedia: Manituolin Island 2011). It is the largest island in a freshwater lake in the world and has an area of 2766 km^2.

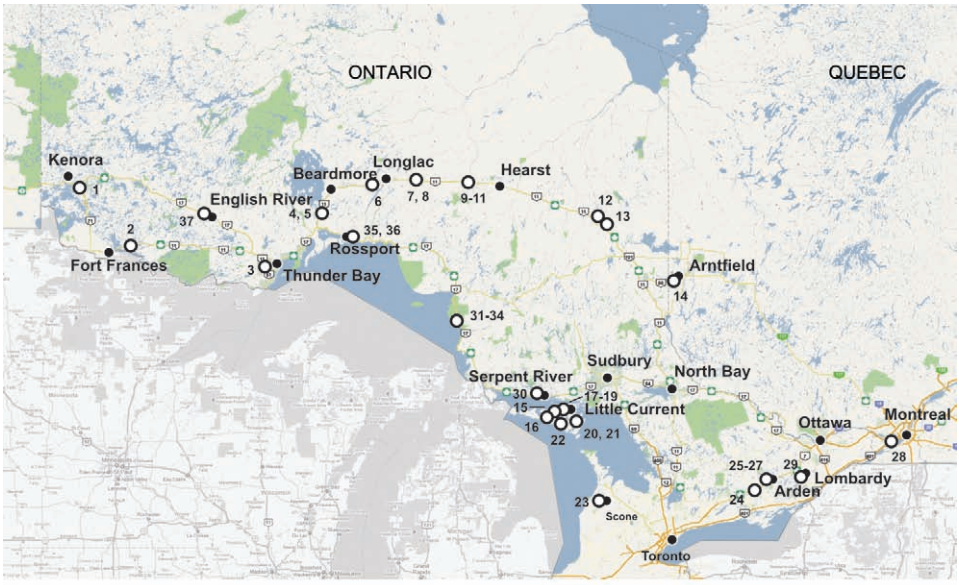

Fig. 1: Map of Ontario and western Quebec showing sampling sites.

Fig. 2: Map of Manitoulin Island showing sampling sites.

The island separates the larger part of Lake Huron to its south and west from Georgian Bay to its east and the North Channel to the north. Manitoulin Island itself has 108 lakes, some of which have their own islands; in turn several of these "islands within islands" have their own ponds. This intensive water-system is enriched by four major rivers: the Kagawong River, Manitou River, Blue Jay Creek, and Mindemoya River. The island lies within the Mixedwood Plains ecozone. We sampled only eight sites (stations 15–22); they are situated in the central-eastern part of the island (Fig. 2).

The detailed descriptions of the different types of aquatic habitats are given below. In this section we give details about the locality and a description of the habitat and assign each of them either to the lentic (standing water) or to the lotic (running water) type, for they have distinctively different elements of the water beetle fauna. The habitats considered to be lentic comprises 22 (60 %) sites, and there are 15 lotic sites (40 %).

St. 1: ON, Kenora District, Hwy 71, 1 km N Rushing River Provincial Park; 49°41'23"N, 94°14'22"W; 7.VIII.2002, field note 2002-50. Lentic. *Carex* marsh, former beaver pond, extensive area with small areas of various aquatic and submerged vegetation, shores covered with *Carex*, bottom substrate: mud, decaying plant material.

St. 2: ON, Rainy River District, Hwy 11, 50 km E Fort Frances; 48°44'48"N, 92°46'13"W; 8.VIII.2002, field note 2002-51. Lentic. *Carex* marsh with small ditches (50 cm–3 m wide), collected in moss of ditch shores, bottom substrate: debris, decaying *Carex* (Fig. 3).

St. 3: ON, Thunder Bay District, Hwy 588, Kaministiquia River in Stanley, near Kakabeka Falls Provincial Park; 48°21'56"N, 89°34'01"W; 8.VIII.2002, field note 2002-52. Lotic. Larger river, 15–20 m wide, silt banks covered with plenty of Arrow Head (*Sagittaria*), some submerged vegetation, bottom substrate: very fine mud.

St. 4: ON, Thunder Bay District, Hwy 11, 46 km S Beardmore; 49°15'27"N, 88°08'26"W; 9.VIII.2002, field note 2002-53. Lentic. Pool in *Carex* marsh, with shores destroyed by animals: small amount of *Carex*, little moss, *Chara* in its middle, bottom substrate: mud.

St. 5: ON, Thunder Bay District, Hwy 11, 46 km S Beardmore; 49°15'27"N, 88°08'26"W; 9.VIII.2002, field note 2002-53A. Lentic. Large lake, shore with *Typha*, bottom substrate: decaying vegetation.

St. 6: ON, Thunder Bay District, Kenogamisis Lake, MacLeod Provincial Park, near Geraldton; 49°41'26"N, 86°53'06"W; 9.VIII.2002, field note 2002-54. Lentic. Lake, shoreline covered with irises, little aquatic vegetation, bottom substrate: granite, sand, decaying vegetation, and mud.

St. 7: ON, Thunder Bay District, Hwy 11, ca. 60 km E Longlac, "Klotz Lake" picnic area; 49°47'59"N, 85°51'49"W; 10.VIII.2002, field note 2002-55A. Lotic. Spring-brook at Klotz-Lake, ca. 50 cm wide, undercut bank with *Equisetum*, without aquatic vegetation, bottom substrate: sand (Fig. 4).

St. 8: ON, Thunder Bay District, Hwy 11, ca. 60 km E Longlac, "Klotz Lake" picnic area; 49°47'59"N, 85°51'49"W; 10.VIII.2002, field note 2002-55B. Lotic. The same spring-brook but at margin of Klotz Lake, ca. 2 m wide, without aquatic vegetation, small amounts of blue-green algae, bottom substrate: sand.

St. 9: ON, Cochrane District, Shekak River at jctn. Hwy 11 with Hwy 631, 53 km W Hearst, picnic area; 49°45'14"N, 84°24'26"W; 10.VIII.2002, field note 2002-56A. Lotic. Shallow water of river near shore, abundant aquatic vegetation.

St. 10: ON, Cochrane District, Jctn. Hwy 11 with Hwy 631, 53 km W Hearst, picnic area; 49°45'14"N, 84°24'26"W; 10.VIII.2002, field note 2002-56B. Lentic. Ditch, 2–3 m wide, shallow, not much *Typha*, *Carex*, *Equisetum*, bottom substrate: decaying vegetation.

St. 11: ON, Cochrane District, Shekak River at jctn. Hwy 11 with Hwy 631, 53 km W Hearst, picnic area; 49°45'14"N, 84°24'26"W; 10.VIII.2002, field note 2002-56C. Lotic. Rocky pool on Shekak River.

St. 12: ON, Cochrane District, Hwy 668, Lloyd Lake, 8 km N Hunta, Greenwater Provincial Park; 49°11'02"N, 81°16'06"W; 11.VIII.2002, field note 2002-57. Lentic. Shallow water near shore of Lloyd Lake, not much aquatic vegetation (*Elodea*?), bottom substrate: sand, decaying vegetation.

St. 13: ON, Cochrane District, Hwy 11, 1 km W Cochrane, Niven's Meridian picnic area; 49°03'33"N, 81°04'24"W; 11.VIII.2002, field note 2002-58. Lentic. Ditch near road, 1–2 m wide, with moss, *Chara*, little of *Typha*, bottom substrate: blue clay.

St. 14: QC, jctn. Hwy 117 and Hwy 101, 1 km W Arntfield, picnic area on Lake Opasatica; 48°11'01"N, 79°16'22"W; 11.VIII.2002, field note 2002-59B. Lotic. Small ditch (spring-brook), 20–70 cm wide, without aquatic vegetation, decaying twigs, vegetation, branches, banks open or with *Carex*, bottom substrate: blue clay, stones, pieces of logs.

St. 15: ON, Manitoulin Island, Hwy 540, 42 km SW Little Current, 2 km S Kagawong; 45°53'46"N, 82°13'41"W; 12.VIII.2002, field note 2002-60. Lentic. Swamp, rather deep ditch-like, with *Lemna* abundant on surface, among *Phragmites*, small amount of *Typha angustifolia* L. (Fig. 5).

St. 16: ON, Manitoulin Island, Lake Huron at Hwy 540, "Campbell Bay" picnic area; 45°49'34"N, 82°33'12"W; 12.VIII.2002, field note 2002-61. Lentic. Shallow water of the lake, near shore without much vegetation, aquatic vegetation absent, little *Chara*, bottom substrate: sand.

St. 17: ON, Manitoulin Island, Hwy 540, 21.9 km W Little Current; 45°53'03"N, 82°06'14"W; 13.VIII.2002, field note 2002-62. Lotic. Spring-brook, 2–3 m wide, no aquatic vegetation, bottom substrate: stones (5 × 5 cm, 20 × 30 cm diameter), with moss on stones, gravel, collected in unshaded portion (Fig. 6).

St. 18: ON, Manitoulin Island, Hwy 540, 22.8 km W Little Current, 0.9 km from the stream; 45°52'32"N, 82°06'15"W; 13.VIII.2002, field note 2002-63. Lentic. Roadside ditch, 0.5–2.0 m wide, with small amounts of *Typha* and *Phragmites*, blue-green algae, bottom substrate: decaying vegetation on sand from the road.

St. 19: ON, Manitoulin Island, Hwy 540, 22.8 km W Little Current, 0.9 km from the stream; 45°52'32"N, 82°06'15"W; 13.VIII.2002, field note 2002-63A. Lentic. Woodland pool in maple forest, deeply shaded, no aquatic vegetation, bottom substrate: leaf litter.

St. 20: ON, Manitoulin Island, Hwy 6, 7 km N Manitowaning; 45°47'58"N, 81°51'10"W; 13.VIII.2002, field note 2002-64A. Lotic. Stream above falls, shallow, 2–4 m wide, with abundant blue-green algae.

St. 21: ON, Manitoulin Island, Hwy 6, 7 km N Manitowaning; 45°47'58"N, 81°51'10"W; 13.VIII.2002, field note 2002-64B. Lentic-lotic. Pond and outflowing stream below falls; deep pool size: 7 × 7 m; collected on rock margin covered with moss and blue-green algae; stream, 10 cm wide, bottom substrate: stones and gravel.

St. 22: ON, Manitoulin Island, Mindemoya Lake at Hwy 542, 4.5 km W Mindemoya; 45°42'45"N, 82°12'57"W; 13.VIII.2002, field note 2002-65. Lentic. Lake with stony, sandy shore, roots of shoreline trees, some isolated *Scirpus* but otherwise without aquatic vegetation.

St. 23: ON, Bruce County, Saugeen River near Scone; 44°18'16"N, 81°04'38"W; 14.VIII.2002, field note 2002-66. Lotic. Stream, 8–10 m wide, rather shallow, shores exposed and without aquatic vegetation except *Chara*, bottom substrate: rocky: limestone, very fine sand, blue clay mud, pieces of wood near shore, some parts with stones, gravel and marl.

St. 24: ON, Hastings County, Skootamatta River at junction of Hwy 7 with Hwy 37, 179 km E Ottawa, near Actinolite, picnic area; 44°33'08"N, 77°19'22"W; 15.VIII.2002, field note 2002-67. Lotic. Larger river ca. 10–20 m wide, aquatic vegetation almost absent except *Vallisneria*, bottom substrate: basaltic rocks or fine sand, gravel with mud (Fig. 7).

St. 25: ON, Renfrew County, Salmon River at Hwy 7, near Arden, "Salmon River" picnic area; 44°44'19"N, 76°56'11"W; 15.VIII.2002, field note 2002-68A. Lentic. Bay of river, 5–10 m wide, with maples, willows, birch, along river bank with little submerged vegetation (mainly *Nuphar*), shore line exposed, with little vegetation, bottom substrate: sand, with leaf litter.

St. 26: ON, Renfrew County, Salmon River at Hwy 7, near Arden, "Salmon River" picnic area; 44°44'19"N, 76°56'11"W; 15.VIII.2002, field note 2002-68B. Lentic. Bay of Salmon River, blue-green algae, much aquatic vegetation (*Elodea*) at shore, bottom substrate: sand, with much leaf litter.

St. 27: ON, Renfrew County, Salmon River at Hwy 7, near Arden, "Salmon River" picnic area; 44°44'19"N, 76°56'11"W; 15.VIII.2002, field note 2002-68C. Lentic. North side of river, puddles among basaltic rocks at shoreline of Salmon River, blue-reen algae, shore line with *Potamogeton* and *Scirpus*.

St. 28: QU, Sante Anne de Bellevue, McGill University, Arboretum Stoneycroft Farm; 45°25'44"N, 73°56'20"W; 19-20.VIII.2002; R.E. Roughley coll., field note 2002-69. Lentic. Large pond, with diverse aquatic vegetation (*Scirpus*, *Typha*, *Carex*, *Sagittaria*, *Lythrum*), bottom substrate: deep mud.

St. 29: ON, Leeds & Grenfell County, 8.5 km SW Lombardy on Hwy 15, 5.2 km N on Hwy 38 (Hwy 38 = Briton-Houghton Bay Road), Mill Pond Conservation Area; 44°46'22"N, 76°11'00"W; 21.VIII.2002, field note 2002-70. Lentic. Lake, boat ramp, vegetation (*Nuphar*, *Typha angustifolia*, *Scirpus*, *Potamogeton*, *Elodea*), bottom substrate: sand, covered with decaying vegetation.

St. 30: ON, Algoma District, Serpent River at Hwy 17, 1 km W Serpent River, picnic area; 46°12'36"N, 82°30'57"W; 22.VIII.2002, field note 2002-71. Lentic. Large river, 20–30 m wide, near shore with *Equisetum*, *Nuphar*, bottom substrate: blue clay and embayment without aquatic vegetation, large rocks, stones, gravel.

St. 31: ON, Algoma District, Lake Superior margin at Katherine Cove – Lake Superior Provincial Park; 47°26'37"N, 84°45'00"W; 23.VIII.2002, field note 2002-72A. Lotic due to wave action. Large lake margin among large stones, bottom substrate: sand, twigs, small pieces of leaves, blue-green algae also in gravel.

St. 32: ON, Algoma District, spring-brook at Katherine Cove – Lake Superior Provincial Park; 47°26'37"N, 84°45'00"W; 23.VIII.2002, field note 2002-72B. Lotic. Spring-brook at Lake Superior margin, on sandy beach, tree roods, no aquatic vegetation, bottom substrate: sand.

St. 33: ON, Algoma District, spring-brook at Katherine Cove – Lake Superior Provincial Park; 47°26'37"N, 84°45'00"W; 23.VIII.2002, field note 2002-72C. Lotic. The same spring-brook further upstream, 1.0–1.5 m wide, rather deep, very cold water, slowly flowing, undercut banks, densely covered with *Sphagnum*, bottom substrate: stones.

St. 34: ON, Algoma District, Lake Superior margin at Katherine Cove – Lake Superior Provincial Park; 47°26'37"N, 84°45'00"W; 23.VIII.2002, field note 2002-72D. Lentic. Boggy area of rocky pools: puddles between granite rocks and stones (20 × 20 cm to 5 × 5 m), some puddles very deep, rocks covered with moss, bottom substrate: gravel, decaying plant material.

St. 35: ON, Thunder Bay District, Lake Superior margin, 1 km E Rossport, picnic area; 48°50'17"N, 87°29'23"W; 24.VIII.2002, field note 2002-73A. Lotic due to wave action. Margin of large lake with little aquatic vegetation except blue-green algae; bottom substrate: sandy-gravel beach, between stones among gravel at waterline.

St. 36: ON, Thunder Bay District, Lake Superior margin, 1 km E Rossport, picnic area; 48°50'17"N, 87°29'23"W; 24.VIII.2002, field note 2002-73B. Lentic. Rocky pools among granite shore of Lake Superior, 1 × 2 m across and 6–12 cm deep, fully exposed to sun, very warm, with green algae and decaying leaf vegetation (Fig. 8).

St. 37: ON, Kenora District, Lodge Lake at Hwy 17, 12 km W English River, picnic area "Lodge Lake"; 49°15'08"N, 91°06'43"W; 25.VIII.2002, field note 2002-74. Lentic. Lake with diversity of emergent vegetation: *Vallisneria*, *Brasenia* (dominant), *Sagittaria*, *Carex*, *Scirpus*; bottom substrate: sand, gravel, with decaying vegetation.

Figs. 3–8: Habitats, 3) station 2: *Carex* marsh, Rainy River District, 50 km E Fort Frances; 4) station 7: spring-brook at Klotz Lake, Thunder Bay District, ca. 60 km E Longlac; 5) station 15: swamp, Manitoulin Island, 2 km S Kagawong; 6) station 17: spring-brook, Manitoulin Island, 21.9 km W Little Current; 7) station 24: Skootamatta River, Hastings County; 8) station 36: rocky pools among granite shore of Lake Superior, Thunder Bay District.

Results

Collected beetles were assigned to 87 species of Dytiscidae, ten species of Haliplidae, and two species of Noteridae (Table 1). *Laccophilus undatus* AUBÉ is reported for the first time from Ontario. *Uvarus falli* YOUNG and *Suphisellus puncticollis* CROTCH are recorded for the first time from Quebec. *Hydrovatus pustulatus* (MELSHEIMER), considered as endemic of the Mixedwood Plains, is reported for the first time from the Boreal Shield. The fauna of the adephagous water beetles of Manitoulin Island is explored for the first time, and 37 species from two families are recorded.

Table 1: List of adephagous water beetles collected in Ontario and western Quebec, during August, 2002. The list of the species is accompanied with the numbers of sampled sites, in which the species were collected. The species collected on Manitoulin Island are marked with an asterisk.

No	Species	Sites
	DYTISCIDAE	
1	*Bidessonotus inconspicuus* (LECONTE)	25, 26, 27
2	**Liodessus affinis* (SAY)	4, 5, 7, 9–13, 15–17, 20, 21, 23, 24, 26–28, 32, 34, 37
3	*Liodessus crotchi* NILSSON	2, 37
4	*Liodessus obscurellus* (LECONTE)	1, 2
5	*Uvarus falli* YOUNG	24, 27–29
6	**Uvarus granarius* (AUBÉ)	20, 21, 24, 37
7	*Heterosternuta pulcher* (LECONTE)	23, 30
8	**Heterosternuta wickhami* (ZAITZEV)	17, 21, 23, 24, 30
9	**Hydrocolus paugus* (FALL)	2, 4, 7, 13, 17–19, 33, 37
10	*Hydrocolus persimilis* (CROTCH)	33
11	*Hydroporus badiellus* FALL	2
12	*Hydroporus columbianus* FALL	2
13	**Hydroporus dentellus* FALL	2, 13, 14, 18–21
14	*Hydroporus dichrous* MELSHEIMER	28
15	*Hydroporus fuscipennis* SCHAUM	13
16	*Hydroporus larsoni* NILSSON	28
17	*Hydroporus melsheimeri* FALL	28, 29
18	**Hydroporus niger* SAY	15, 17, 18, 28
19	**Hydroporus notabilis* LECONTE	7, 13, 20
20	*Hydroporus obscurus* STURM	2
21	*Hydroporus rectus* FALL	2, 13
22	*Hydroporus signatus* MANNERHEIM	1, 13
23	**Hydroporus striola* (GYLLENHAL)	2, 5, 7, 9, 10, 13, 15, 17–20, 28
24	*Hydroporus tartaricus* LECONTE	33
25	**Hydroporus tenebrosus* LECONTE	2, 5, 7, 13, 17–19
26	**Hydroporus tristis* (PAYKULL)	1, 2, 13, 15, 28, 33, 34, 37
27	*Nebrioporus rotundatus* (LECONTE)	3, 7, 8
28	*Neoporus carolinus* (FALL)	7, 14
29	**Neoporus clypealis* (SHARP)	17, 24–27, 30
30	*Neoporus dimidiatus* (GEMMINGER & HAROLD)	3, 7–9
31	*Neoporus spurius* (LECONTE)	24
32	*Neoporus superioris* (BALFOUR-BROWNE)	6, 9
33	*Neoporus mellitus* (LECONTE)	24
34	*Neoporus tennetum* (WOLFE)	23

35	**Neoporus undulatus* (SAY)	3, 5–7, 9, 12, 15, 17, 18, 20–22, 24–30, 32, 37
36	*Neoporus vitiosus* (LECONTE)	24, 26, 27
37	*?Oreodytes laevis* (FALL)	35, 36
38	*Oreodytes scitulus* (LECONTE)	31
39	*Sanfilippodytes pseudovilis* (YOUNG)	7, 33
40	*Hydrovatus pustulatus* (MELSHEIMER)	1, 28, 29
41	*Hygrotus falli* (WALLIS)	37
42	**Hygrotus impressopunctatus* (SHALLER)	7, 13, 16, 28
43	**Hygrotus laccophilinus* (LECONTE)	1, 14, 15, 18–21, 24, 28, 37
44	**Hygrotus picatus* (KIRBY)	7, 13, 14, 18, 19
45	**Hygrotus sayi* BALFOUR-BROWN	1, 2, 9, 12, 13, 15, 16, 18, 20, 21, 24, 26–28, 37
46	**Hygrotus suturalis* (LECONTE)	3, 8, 16
47	**Hygrotus turbidus* (LECONTE)	15, 28
48	**Desmopachria convexa* (AUBÉ)	1–3, 15, 17–21, 24, 28, 29, 37
49	*Laccornis conoideus* (LECONTE)	13
50	*Celina hubbelli* YOUNG	28, 29
51	**Agabus ambiguus* (SAY)	2, 5, 7, 10, 13, 17–19, 21
52	**Agabus anthracinus* MANNERHEIM	2, 4, 7, 13, 14, 18
53	*Agabus bifarius* (KIRBY)	2, 3
54	*Agabus confinis* (GYLLENHAL)	13
55	**Agabus phaeopterus* (KIRBY)	10, 19
56	*Agabus semipunctatus* (KIRBY)	8
57	*Ilybiosoma seriatum* (SAY)	7, 10, 14
58	**Ilybius biguttulus* (GERMAR)	1, 9–14, 18, 20, 28
59	*Ilybius discedens* SHARP	2, 34
60	*Ilybius erichsoni* (GEMMINGER & HAROLD)	13, 14
61	**Ilybius ignarus* (LECONTE)	15, 18, 19
62	*Ilybius confusus* AUBÉ	12
63	*Ilybius larsoni* (FERY & NILSSON)	14, 33, 34
64	*Ilybius picipes* (KIRBY)	14
65	*Ilybius pleuriticus* LECONTE	2, 4, 6, 12, 14, 37
66	**Platambus semivittatus* (LECONTE)	17
67	*Colymbetes sculptilis* HARRIS	7
68	**Rhantus binotatus* (HARRIS)	8, 15, 17
69	*Rhantus consimilis* MOTSCHULSKY	28
70	**Rhantus sinuatus* (LECONTE)	20
71	*Rhantus suturellus* (HARRIS)	37
72	**Copelatus glyphicus* (SAY)	17
73	*Coptotomus longulus lenticus* HILSENHOFF	1, 3, 8, 9, 12, 25, 27, 28
74	*Coptotomus loticus* HILSENHOFF	25, 26, 27
75	*Agabetes acuductus* (HARRIS)	28
76	**Laccophilus maculosus maculosus* SAY	1, 3, 9, 13, 15–17, 23, 24, 27–29, 33, 34
77	*Laccophilus undatus* AUBÉ	25, 26
78	*Acilius mediatus* (SAY)	2, 13
79	*Acilius sylvanus* HILSENHOFF	28
80	**Acilius semisulcatus* AUBÉ	1, 6, 8, 9, 17, 20, 28
81	*Graphoderus fascicollis* (HARRIS)	1
82	*Graphoderus liberus* (SAY)	1, 28
83	*Graphoderus perplexus* SHARP	1
84	**Dytiscus cordieri* AUBÉ	15
85	**Dytiscus fasciventris* SAY	21

86	*Dytiscus verticalis* SAY	28
87	**Hydaticus aruspex* CLARK	18, 19
	HALIPLIDAE	
1	**Haliplus immaculicollis* HARRIS	1, 3, 4, 6, 12–21, 26–28
2	**Haliplus longulus* LECONTE	10, 13, 18, 19
3	*Haliplus connexus* MATHESON	27
4	*Haliplus canadensis* WALLIS	3
5	*Haliplus cribrarius* LECONTE	3, 14
6	**Haliplus pantherinus* AUBÉ	16, 24
7	*Haliplus subguttatus* CROTCH	3, 28
8	*Haliplus triopsis* SAY	24
9	*Peltodytes duodecimpunctatus* (SAY)	24, 27
10	**Peltodytes edentulus* (LECONTE)	16, 24, 29
	NOTERIDAE	
1	*Hydrocanthus iricolor* SAY	29
2	*Suphisellus puncticollis* CROTCH	28

In accordance with the present study and data from the literature, the list of aquatic Adephaga of Ontario consists of 161 species of Dytiscidae, 17 species of Haliplidae, and two species of Noteridae; similarly, there are 149 species of Dytiscidae, 18 species of Haliplidae, and two species of Noteridae known from Quebec.

List of sampled sites with collected species

St. 1. Dytiscidae: *Liodessus obscurellus*, *Hydroporus signatus*, *H. tristis*, *Hydrovatus pustulatus*, *Hygrotus laccophilinus*, *H. sayi*, *Desmopachria convexa*, *Ilybius biguttulus*, *Coptotomus longulus lenticus*, *Laccophilus maculosus maculosus*, *Acilius semisulcatus*, *Graphoderus fascicollis*, *G. liberus*, *G. perplexus*, **Haliplidae:** *Haliplus immaculicollis*.

St. 2. Dytiscidae: *Liodessus crotchi*, *L. obscurellus*, *Hydrocolus paugus*, *Hydroporus badiellus*, *H. columbianus*, *H. dentellus*, *H. obscurus*, *H. rectus*, *H. striola*, *H. tenebrosus*, *H. tristis*, *Hygrotus sayi*, *Desmopachria convexa*, *Agabus ambiguus*, *A. anthracinus*, *A. bifarius*, *Ilybius discedens*, *I. pleuriticus*, *Acilius mediatus*.

St. 3. Dytiscidae: *Nebrioporus rotundatus*, *N. dimidiatus*, *N. undulatus*, *Hygrotus suturalis*, *Desmopachria convexa*, *Agabus bifarius*, *Coptotomus longulus lenticus*, *Laccophilus maculosus maculosus*, **Haliplidae:** *Haliplus immaculicollis*, *H. canadensis*, *H. cribrarius*, *H. subguttatus*.

St. 4. Dytiscidae: *Liodessus affinis*, *Hydrocolus paugus*, *Agabus anthracinus*, *Ilybius pleuriticus*, **Haliplidae:** *Haliplus immaculicollis.*

St. 5. Dytiscidae: *Liodessus affinis*, *Hydroporus striola*, *H. tenebrosus*, *Neoporus undulatus*, *Agabus ambiguus*.

St. 6. Dytiscidae: *Neoporus superioris*, *N. undulatus*, *Ilybius pleuriticus*, *Acilius semisulcatus*, **Haliplidae:** *Haliplus immaculicollis*.

St. 7. Dytiscidae: *Liodessus affinis*, *Hydrocolus paugus*, *Hydroporus notabilis*, *H. striola*, *H. tenebrosus*, *Nebrioporus rotundatus*, *Neoporus carolinus*, *N. dimidiatus*, *N. undulatus*,

Sanfilippodytes pseudovilis, *Hygrotus impressopunctatus*, *H. picatus*, *Agabus ambiguus*, *A. anthracinus*, *Ilybiosoma seriatum*, *Colymbetes sculptilis*.

St. 8. Dytiscidae: *Nebrioporus rotundatus*, *Neoporus dimidiatus*, *Hygrotus suturalis*, *Agabus semipunctatus*, *Rhantus binotatus*, *Coptotomus longulus lenticus*, *Acilius semisulcatus*.

St. 9. Dytiscidae: *Liodessus affinis*, *Hydroporus striola*, *Neoporus dimidiatus*, *N. superioris*, *N. undulatus*, *Hygrotus sayi*, *Ilybius biguttulus*, *Coptotomus longulus lenticus*, *Laccophilus maculosus maculosus*, *Acilius semisulcatus*.

St. 10. Dytiscidae: *Liodessus affinis*, *Hydroporus striola*, *Agabus ambiguus*, *A. phaeopterus*, *Ilybiosoma seriatum*, *Ilybius biguttulus*, **Haliplidae:** *Haliplus longulus*.

St. 11. Dytiscidae: *Liodessus affinis*, *Ilybius biguttulus*.

St. 12. Dytiscidae: *Liodessus affinis*, *Neoporus undulatus*, *Hygrotus sayi*, *Ilybius biguttulus*, *I. confusus*, *I. pleuriticus*, *Coptotomus longulus lenticus*, **Haliplidae:** *Haliplus immaculicollis*.

St. 13. Dytiscidae: *Liodessus affinis*, *Hydrocolus paugus*, *Hydroporus dentellus*, *H. fuscipennis*, *H. notabilis*, *H. rectus*, *H. signatus*, *H. striola*, *H. tenebrosus*, *H. tristis*, *Hygrotus impressopunctatus*, *H. picatus*, *H. sayi*, *Laccornis conoideus*, *Agabus ambiguus*, *A. anthracinus*, *A. confinis*, *Ilybius biguttulus*, *I. erichsoni*, *Laccophilus maculosus maculosus*, *Acilius mediatus*, **Haliplidae:** *Haliplus immaculicollis*, *H. longulus*.

St. 14. Dytiscidae: *Hydroporus dentellus*, *Neoporus carolinus*, *Hygrotus laccophilinus*, *H. picatus*, *Agabus anthracinus*, *Ilybiosoma seriatum*, *Ilybius biguttulus*, *I. erichsoni*, *I. larsoni*, *I. picipes*, *I. pleuriticus*, **Haliplidae:** *Haliplus immaculicollis*, *H. cribrarius*.

St. 15. Dytiscidae: *Liodessus affinis*, *Hydroporus niger*, *H. striola*, *H. tristis*, *Neoporus undulatus*, *Hygrotus laccophilinus*, *H. sayi*, *H. turbidus*, *Desmopachria convexa*, *Ilybius ignarus*, *Rhantus binotatus*, *Laccophilus maculosus maculosus*, *Dytiscus cordieri*, **Haliplidae:** *Haliplus immaculicollis*.

St. 16. Dytiscidae: *Liodessus affinis*, *Hygrotus impressopunctatus*, *H. sayi*, *H. suturalis*, *Laccophilus maculosus maculosus*, **Haliplidae:** *Haliplus immaculicollis*, *H. pantherinus*, *Peltodytes edentulus*.

St. 17. Dytiscidae: *Liodessus affinis*, *Heterosternuta wickhami*, *Hydrocolus paugus*, *Hydroporus niger*, *H. striola*, *H. tenebrosus*, *Neoporus clypealis*, *N. undulatus*, *Desmopachria convexa*, *Agabus ambiguus*, *Platambus semivittatus*, *Rhantus binotatus*, *Copelatus glyphicus*, *Laccophilus maculosus maculosus*, *Acilius semisulcatus*, **Haliplidae:** *Haliplus immaculicollis*.

St. 18. Dytiscidae: *Hydrocolus paugus*, *Hydroporus dentellus*, *H. niger*, *H. striola*, *H. tenebrosus*, *Neoporus undulatus*, *Hygrotus laccophilinus*, *H. picatus*, *H. sayi*, *Desmopachria convexa*, *Agabus ambiguus*, *A. anthracinus*, *Ilybius biguttulus*, *I. ignarus*, *Hydaticus aruspex*, **Haliplidae:** *Haliplus immaculicollis*, *H. longulus*.

St. 19. Dytiscidae: *Hydrocolus paugus*, *Hydroporus dentellus*, *H. striola*, *H. tenebrosus*, *Hygrotus laccophilinus*, *H. picatus*, *Desmopachria convexa*, *Agabus ambiguus*, *A. phaeopterus*, *Ilybius ignarus*, *Hydaticus aruspex*, **Haliplidae:** *Haliplus immaculicollis*, *H. longulus*.

St. 20. Dytiscidae: *Liodessus affinis*, *Uvarus granarius*, *Hydroporus dentellus*, *H. notabilis*, *H. striola*, *Neoporus undulatus*, *Hygrotus laccophilinus*, *H. sayi*, *Desmopachria convexa*, *Ilybius biguttulus*, *Rhantus sinuatus*, *Acilius semisulcatus*, **Haliplidae:** *Haliplus immaculicollis*.

St. 21. Dytiscidae: *Liodessus affinis*, *Uvarus granarius*, *Heterosternuta wickhami*, *Hydroporus dentellus*, *Neoporus undulatus*, *Hygrotus laccophilinus*, *H. sayi*, *Desmopachria convexa*, *Agabus ambiguus*, *Dytiscus fasciventris*, **Haliplidae:** *Haliplus immaculicollis*.

St. 22. Dytiscidae: *Neoporus undulatus.*

St. 23. Dytiscidae: *Liodessus affinis*, *Heterosternuta pulcher*, *H. wickhami*, *Neoporus tennetum*, *Laccophilus maculosus maculosus*.

St. 24. Dytiscidae: *Liodessus affinis*, *Uvarus falli*, *Uvarus granarius*, *Heterosternuta wickhami*, *Neoporus clypealis*, *N. spurius*, *N. mellitus*, *N. undulatus*, *N. vitiosus*, *Hygrotus laccophilinus*, *H. sayi*, *Desmopachria convexa*, *Laccophilus maculosus maculosus*, **Haliplidae:** *Haliplus pantherinus*, *H. triopsis*, *Peltodytes duodecimpunctatus*, *P. edentulus*.

St. 25. Dytiscidae: *Bidessonotus inconspicuus*, *Neoporus clypealis*, *N. undulatus*, *Coptotomus longulus lenticus*, *C. loticus*, *Laccophilus undatus*.

St. 26. Dytiscidae: *Bidessonotus inconspicuus*, *Liodessus affinis*, *Neoporus clypealis*, *N. undulatus*, *N. vitiosus*, *Hygrotus sayi*, *Coptotomus loticus*, *Laccophilus undatus*, **Haliplidae:** *Haliplus immaculicollis.*

St. 27. Dytiscidae: *Bidessonotus inconspicuus*, *Liodessus affinis*, *Uvarus falli*, *Neoporus clypealis*, *N. undulatus*, *N. vitiosus*, *Hygrotus sayi*, *Coptotomus longulus lenticus*, *C. loticus*, *Laccophilus maculosus maculosus*, **Haliplidae:** *Haliplus immaculicollis*, *H. connexus*, *Peltodytes duodecimpunctatus.*

St. 28. Dytiscidae: *Liodessus affinis*, *Uvarus falli*, *Hydroporus dichrous*, *H. larsoni*, *H. melsheimeri*, *H. niger*, *H. striola*, *H. tristis*, *Neoporus undulatus*, *Hydrovatus pustulatus*, *Hygrotus impressopunctatus*, *H. laccophilinus*, *H. sayi*, *H. turbidus*, *Desmopachria convexa*, *Celina hubbelli*, *Ilybius biguttulus*, *Rhantus consimilis*, *Coptotomus longulus lenticus*, *Graphoderus liberus*, *Agabetes acuductus*, *Laccophilus maculosus maculosus*, *Acilius sylvanus*, *A. semisulcatus*, *Dytiscus verticalis*, **Haliplidae:** *Haliplus immaculicollis*, *H. subguttatus*, **Noteridae:** *Suphisellus puncticollis*.

St. 29. Dytiscidae: *Uvarus falli*, *Hydroporus melsheimeri*, *Neoporus undulatus*, *Hydrovatus pustulatus*, *Desmopachria convexa*, *Celina hubbelli*, *Laccophilus maculosus maculosus*, **Haliplidae:** *Peltodytes edentulus*, **Noteridae:** *Hydrocanthus iricolor*.

St. 30. Dytiscidae: *Heterosternuta pulcher*, *Heterosternuta wickhami*, *Neoporus clypealis*, *N. undulatus*.

St. 31. Dytiscidae: *Oreodytes scitulus*.

St. 32. Dytiscidae: *Liodessus affinis*, *Neoporus undulatus*.

St. 33. Dytiscidae: *Hydrocolus paugus*, *Hydrocolus persimilis*, *Hydroporus tartaricus*, *H. tristis*, *Sanfilippodytes pseudovilis*, *Ilybius larsoni*, *Laccophilus maculosus maculosus*.

St. 34. Dytiscidae: *Liodessus affinis*, *Hydroporus tristis*, *Ilybius discedens*, *I. larsoni*, *Laccophilus maculosus maculosus*.

St. 35. Dytiscidae: ?*Oreodytes laevis*.

St. 36. Dytiscidae: ?*Oreodytes laevis*.

St. 37. Dytiscidae: *Liodessus affinis*, *L. crotchi*, *Uvarus granarius*, *Hydrocolus paugus*, *Hydroporus tristis*, *Neoporus undulatus*, *Hygrotus falli*, *H. laccophilinus*, *H. sayi*, *Desmopachria convexa*, *Ilybius pleuriticus*, *Rhantus suturellus*.

Taxonomic note on *Oreodytes laevis*

Only one species of the adephagous water beetles was collected in rather large numbers (35 exs.) from sites 35 and 36 – sandy-gravel beach and rocky pools of Lake Superior at the picnic area near Rossport. First it was assigned to *Oreodytes laevis*, however close study and comparison with specimens from the Northwest Territories revealed significant morphological differences, especially of the median lobe of the aedeagus. At present, *O. laevis* is considered to have four synonyms (NILSSON 2001) including *O. duodecimlineatus* LECONTE, which was described from Lake Superior, Les Ecrits (LECONTE 1850) and was synonymised by ZIMMERMANN (1920). Perhaps, this species is valid and our specimens belong to it. It is most likely that *O. laevis* is a complex of at least two morphotypes, which could either be treated as subspecies or distinct species. Further work on the taxonomy of this species group will be undertaken as a result of these findings.

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Dr. Helena V. SHAVERDO
Naturhistorisches Museum Wien, Burgring 7, 1010 Wien, Austria (shaverdo@mail.ru)