

The Haliplidae of Atlantic Canada: new records, distribution, and faunal composition

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Abstract

The Haliplidae (crawling water beetles) of Atlantic Canada are surveyed. Sixteen species are now known in the region. Four, including *Haliplus fasciatus* Aubé, *Peltodytes duodecimpunctatus* (Say), *Peltodytes lengi* Roberts, and *Peltodytes litoralis* Matheson, are newly recorded in the region, and *P. litoralis* is newly recorded in Canada. Six species are newly recorded in New Brunswick and four in Nova Scotia for a total of 10 new provincial records. *Peltodytes muticus* (LeConte) and *P. duodecimpunctatus* are removed from the faunal list of Nova Scotia. The zoogeography of the Haliplidae in Atlantic Canada is briefly discussed.

Keywords

Coleoptera, Haliplidae, *Haliplus*, *Peltodytes*, Atlantic Canada, new records

Introduction

The Haliplidae (the crawling water beetles) are a group of aquatic beetles found throughout the world, being particularly common at temperate latitudes. They swim by moving their legs alternately (crawling), hence the name of the family. Periodically they rise to the water surface to replenish their air supply. They are found in a variety of aquatic habitats, preferring small ponds, lakes, quiet streams, and other quiet and slow-moving water bodies. Adults are omnivorous. Besides vegetable food, usually the same

as eaten by the larvae, all kinds of animal food are taken such as insect eggs, larvae of Chironomidae, other water insects, worms, Crustaceans, etc. Larvae are herbivorous, some species eat all kinds of filamentous algae; other species eat Characeans and seed-plants are also used as food plants. Adults are active year-round as weather permits (Roughley 2000).

In North America 67 species are known in the genera *Haliplus* Latreille, *Pelto-dytes* Régimbart, *Apteraliplus* Chandler, and *Brychus* Thompson (Vondel 2005; Vondel and Spangler 2008). Thirty-seven species were reported from Canada and Alaska by Roughley (1991) including five from Atlantic Canada (New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island). Majka (2008) recently reported six species from Prince Edward Island.

In Atlantic Canada, investigations of haliplids have been sporadic and regionally variable. David Larson's (formerly at Memorial University) comprehensive fieldwork on aquatic Coleoptera throughout insular Newfoundland has thoroughly defined the fauna there. Laurent LeSage's (at the Canadian National Collection of Insects, Arachnids, and Nematodes) research in Cape Breton Highlands National Park in Nova Scotia, and Yves Alarie's (at Laurentian University) research on Prince Edward Island (unpublished) have resulted in a good understanding of the haliplid fauna in these areas. David Larson and Barry Wright (formerly at the Nova Scotia Museum) collected haliplids at many sites in central Nova Scotia, and Reginald Webster has investigated several areas in southwestern New Brunswick. Elsewhere fieldwork has been meager. In the course of on-going research on the biodiversity of Atlantic Canadian beetles we have found specimens of additional species of haliplids that are reported herein.

Conventions

Abbreviations (following Evenhuis 2009) of collections referenced in this study are:

CBU	Cape Breton University, Sydney, Nova Scotia, Canada
CNC	Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada
GFC	Garth Foster Collection, Ayr, Scotland
JOC	Jeffrey Ogden collection, Truro, Nova Scotia, Canada
MUN	Memorial University of Newfoundland collection, St. John's, Newfoundland, Canada (currently on long term loan to the Canadian Forest Service, Edmonton, Alberta)
NSNR	Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada
RWC	Reginald Webster Collection, Charters Settlement, New Brunswick, Canada
STFX	St. Francis Xavier University, Antigonish, Nova Scotia, Canada
UMNB	Université de Moncton, Moncton, New Brunswick, Canada

A total of 547 specimens were examined in the course of the study, 75 from New Brunswick, 205 from Newfoundland and Labrador, 219 from Nova Scotia, and 48 from Prince Edward Island. A list of all the collections consulted in this study (seventeen of which have haliplid specimens collected in the region) is included in Appendix 1.

Key to the Haliplidae of Atlantic Canada and Adjacent Regions

In order to facilitate the identification of haliplids found in Atlantic Canada, a key to genera, subgenera, and species found in the region and in adjacent jurisdictions is presented below. It is adapted from Brigham (1996), Downie and Arnett (1996), Roughley (2000), Vondel (1991), and Wallis (1933).

Key A: Genera of Haliplidae Aubé

- 1 Pronotum with two large spots on posterior margin; metacoxal plates margined and large, exposing only apical abdominal sternum; apical segments of maxillary and labial palpi longer than penultimate segment..... ***Peltodytes Regimbart***
- Pronotum without two large spots on posterior margin; metacoxal plates not margined and shorter, exposing last three abdominal sterna; apical segments of maxillary and labial palpi considerably shorter than penultimate segment..... ***Haliplus Latreille***

Key B: *Peltodytes* Regimbart

- 1 Meta-femora entirely black, brown, or pale..... **2**
- Meta-femora black, ringed with yellow at distal end..... **7**
- 2(1) Meta-femora pale, knees dark..... **3**
- Meta-femora black or brown, knees also dark..... **4**
- 3(2) Length 3.5 mm; yellowish or reddish-yellow; elytra with seven distinct spots..... ***Peltodytes litoralis* Matheson**
- Length 4.5–5.0 mm; greenish-yellow; elytra with six indistinct, poorly-defined spots..... ***Peltodytes tortulosus* Roberts**
- 4(2) Elytra with sub-humeral spot..... **5**
- Elytra without sub-humeral spot..... **6**
- 5(4) Median elytral spots coalescent on suture forming dark blotch [3.5–4.0 mm]..
..... ***Peltodytes muticus* (LeConte)** – recorded in Québec
- Median elytral spots not coalescent on suture [3.5 mm].....
..... ***Peltodytes sexmaculatus* Roberts** – recorded in Maine
- 6(4) Apical sternite shiny, polished [3.3–5.0 mm].....
..... ***Peltodytes pedunculatus* Blatchley** – recorded in Maine

- Apical sternite dull, rugose [3.5–4.0 mm].....
.....*Peltodytes shermani* Roberts – recorded in Maine
- 7(1) Elytra with sub-humeral spot [3.5–4.0 mm].....
.....*Peltodytes duodecimpunctatus* (Say)
- Elytra without sub-humeral spot..... **8**
- 8(7) Base of head with black collar; apicies of metacoxal plates angulate [3.5–4.0 mm]*Peltodytes edentulus* (LeConte)
- Base of head without black collar; apicies of metacoxal plates rounded [4.0 mm] *Peltodytes lengi* Roberts

Key C: *Haliplus* Latreille

- 1 Metatibia with a longitudinal setigerous striole on dorsal face – subgenus *Liaphlus* Guignot **9**
- Metatibia without longitudinal setigerous striole on dorsal face **2**
- 2(1) Base of pronotum with a short longitudinal plica – subgenus *Haliplus* Latreille **3**
- Pronotum without basal longitudinal plica – subgenus *Paraliaphus* Wallis.... **6**
- 3(2) Apicies of elytra strongly sinuate [3.0 mm]
..... *Haliplus blanchardi* (Roberts) – recorded in Québec
- Apicies of elytra not strongly sinuate; rounded or almost subtruncate and feebly sinuate **4**
- 4(3) Basal pronotal plica less than 1/4 the length, measured from base of plica along plica, to anterior margin of pronotum; prosternal process deeply channeled longitudinally; elytra with six black spots in a half ellipse enclosing a common sutural spot; in some, spots almost completely absent [2.5–3.0 mm].....*Haliplus immaculicollis* Harris
- Basal pronotal plica more than 1/4 the length, measured from base of plica along plica, to anterior margin of pronotum; prosternal process not or feebly channeled longitudinally; elytra without, or with indistinct, spots **5**
- 5(4) Left paramere of male with hairs sparsely placed along nearly the entire ventral side; aedeagus evenly curved, not narrowed apically [2.8–3.1 mm]
..... *Haliplus falli* Mank – recorded in Québec
- Left paramere of male with hairs confined to apical third of the ventral side; aedeagus elongate, narrowed apically [2.7–3.0 mm].....
..... *Haliplus longulus* LeConte
- 6(2) Elytral apicies strongly sinuate; penultimate labial palpomere dilated inward forming prominent angle [2.5–3.0 mm]..... *Haliplus borealis* LeConte
- Elytral apicies at most feebly sinuate; penultimate labial palpomere not dilated..... **7**
- 7(6) Meso-trochanters with deep, coarse punctures [4.0–4.2 mm]
.....*Haliplus leopardus* Roberts

- Meso-trochanters without or with few punctures **8**
- 8(7) Tarsal claws short; aedeagus abruptly bent down in apical fifth [3.0–4.0 mm] *Haliplus triopsis* Say – recorded in Maine
- Tarsal claws long; aedeagus almost evenly curved from base to apex [3.5–4.0 mm] *Haliplus pantherinus* Aubé
- 9(1) Prosternal ridge and metasternal process margined at sides **10**
- Prosternal ridge and metasternal process not margined at sides **12**
- 10(9) Pronotum with dark mark on anterior margin [4.1 mm]
..... *Haliplus apostolicus* Wallis
- Pronotum without dark mark on anterior margin **11**
- 11(10) Apicies of elytra distinctly denticulate; sutural stripe narrow, not extending to sutural striae [4.0 mm]..... *Haliplus connexus* Matheson
- Apicies of elytra little, if at all, denticulate; sutural stripe broad, extending to sutural striae [4.0–4.5 mm] *Haliplus fasciatus* Aubé
- 12(9) Middle of metasternum deeply depressed behind metacoxae..... **13**
- Middle of metasternum at the same level behind as between metacoxae [3.8–4.2 mm]..... *Haliplus fulvus* (Fabricius)
- 13(12) Length greater than 4.5 mm; punctation of elytral striae coarse [4.5–5.0 mm]..... *Haliplus cribrarius* LeConte
- Length less than 3.8 mm; punctation of elytral striae finer [3.8 mm]
..... *Haliplus canadensis* Wallis

Results

Sixteen species of Haliplidae are now known to occur in Atlantic Canada. Four, including *Haliplus fasciatus* Aubé, *Peltodytes duodecimpunctatus* (Say), *Peltodytes lengi* Roberts, and *Peltodytes litoralis* Matheson, are newly recorded in the region, and *P. litoralis* is newly recorded in Canada. Six species are newly recorded in New Brunswick and four in Nova Scotia for a total of 10 new provincial records (Table 1). *Peltodytes muticus* (LeConte) and *P. duodecimpunctatus* are removed from the faunal list of Nova Scotia. Specific details of new specimen records follow.

Haliplus (*s. str.*) *dorsomaculatus* Zimmerman, 1924

Haliplus dorsomaculatus was reported from Newfoundland by Roughley (1991), however, Kenner (2005) re-described and reviewed *H. dorsomaculatus* and has established that it is a western North American species found from southern British Columbia to northern California, and east to Montana and Wyoming. There is no evidence that it occurs in Newfoundland.

Table 1. The Haliplidae of Atlantic Canada.

	NB	PE	NS	CB	NF	LB	Regional Distribution
subgenus <i>Haliplus</i> Latreille							
<i>Haliplus immaculicollis</i> Harris	1	1	1	1	1	1	CT, LB, MA, ME, NB, NF, NH, NS, NY, ON, QC, PE, RI
<i>Haliplus longulus</i> LeConte	1	1	1				MA, NB, NH, NS, NY, ON, PE, QC, RI
subgenus <i>Paraliaphlus</i> Wallis							
<i>Haliplus borealis</i> LeConte	1		1				NB, NS, NY, ON, QC
<i>Haliplus leopardus</i> Roberts	1		1				CT, MA, ME, NB, NS, NY, ON, RI
<i>Haliplus pantherinus</i> Aubé	1		1				MA, ME, NB, NH, NS, NY, ON, QC, RI
subgenus <i>Liaphlus</i> Guignot							
<i>Haliplus apostolicus</i> Wallis			1				NH, NS, QC
<i>Haliplus canadensis</i> Wallis		1	1	1	1		MA, NS, ON, PE, QC, VT
<i>Haliplus connexus</i> Matheson	1		1				CT, MA, ME, NB, NH, NS, NY, ON, QC, VT
<i>Haliplus cribrarius</i> LeConte	1	1	1	1	1	1	CT, LB, MA, ME, NB, NF, NH, NS, NY, ON, PE, QC, VT
<i>Haliplus fasciatus</i> Aubé			1				CT, MA, ME, NH, NS, ON, QC, RI
<i>Haliplus fulvus</i> (Fabricius)	1		1		1		MA, ME, NB, NF, NS, NY, ON, QC
<i>Peltodytes duodecimpunctatus</i> (Say)	1						MA, ME, NH, NB, NY, ON, QC, RI
<i>Peltodytes edentulus</i> (LeConte)	1	1	1	1			MA, NB, NH, NS, NY, ON, QC, PE, RI
<i>Peltodytes lengi</i> Roberts	1						NB, NY, ON, QC
<i>Peltodytes litoralis</i> Matheson	1						NB, NH
<i>Peltodytes tortulosus</i> Roberts	1	1	1				ME, NB, NH, NS, NY, ON, PE, QC
Total	13	6	13	4	4	2	

Notes: NB, New Brunswick; PE, Prince Edward Island; NS, mainland Nova Scotia; CB, Cape Breton Island; NF, insular Newfoundland; LB, Labrador.

Regional Distribution: CT, Connecticut; MA, Massachusetts; ME, Maine; NH, New Hampshire; NY, New York; ON, Ontario; QC, Québec; RI, Rhode Island; VT, Vermont. Information is derived from Brigham (1996), Chandler (2001), Majka (2008), Roughley (1991), Sikes (2004), and Vondel (2005).

For the purposes of this treatment, northeastern North America is taken to consist of the following jurisdictions: Connecticut, Labrador, Massachusetts, Maine, New Brunswick, New Hampshire, New York, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Québec, Rhode Island, Saint-Pierre et Miquelon, and Vermont.

***Haliplus (s. str.) immaculicollis* Harris, 1828**

Haliplus immaculicollis is probably the commonest and most widespread haliplid in Atlantic Canada and is found throughout the region (Fig. 1 & 5). It was recorded from New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island by Roughley (1991). It is widespread on Cape Breton Island and is found on Sable Island (Wright 1985). In Atlantic Canada there are many records from small ponds, ditches, beaver ponds, oxbows in rivers, and in marshes where *Scirpus*, *Carex*, *Juncus*, and *Typha* grow.

***Haliplus (s. str.) longulus* LeConte, 1850**

NEW BRUNSWICK: Kent Co.: Kouchibouguac National Park, 2.VII.1977, J.R. Vockeroth, (1, CNC); **Kings Co.:** 5 km north of Bayswater, 19.VIII.1983, D. Larson, (1, MUN); **Queens Co.:** near Jemseg, 45° 49.443' N, 66° 07.510' W, 7.VI.2003, 1.VII.2003, R.P. Webster, silver maple forest, marsh among emergent sedges and reeds (3, RWC); **Westmorland Co.:** Tantramar Marsh near Sackville, 17.VIII.1983, D. Larson, (1, MUN); **York Co.:** East Branch Lyons Stream east of Harvey, 21.VIII.1983, D. Larson, (4, MUN); Fredericton Junction, 27.IV.1986, D. Larson, (1, MUN); New Maryland off Hwy 2, E of Baker Brook, 45.8764°N, 66.6248°W, 4.VI.2005, R.P. Webster, old growth cedar swamp, in small brook with sandy/clay bottom and areas of leaf debris, (1, RWC); New Maryland, Charters Settlement, 45° 49.80' N, 66° 44.08' W, 3.VI.2003, R.P. Webster; mixed forest in small sedge marsh in water filled pools, (2, RWC); New Maryland, Charters Settlement, 45° 50.57' N, 66° 43.67' W, 4.V.2003, R.P. Webster, mixed forest in small sedge marsh in small pools among sedges (2, RWC).

Haliplus longulus is newly recorded from New Brunswick (Fig. 3). It was previously reported from Nova Scotia by Matheson (1912) (although Roughley (1991) failed to note this record) and from Prince Edward Island by Vondel (2005) and Majka (2008). In Atlantic Canada there are records from small pools, ponds, ditches, and small brooks.

***Haliplus (Paraliaplus) borealis* LeConte, 1850**

Haliplus borealis was reported from New Brunswick and Nova Scotia by Brigham (1996). We have not found specimens of this species in any reference collection, nor published records of the species from either province. It is not listed from either province in any of the published references provided by Brigham (1996) for this species, however, Brigham (1996) did include records from unpublished material in his checklist. Brigham passed away in 1996 and consequently there is no way of checking the source of this report. Consequently we provisionally retain this species in the faunal lists of New Brunswick and Nova Scotia. Its presence in the region should be further investigated and confirmed. Kenner (2008) suggests that this species should be re-assigned to the subgenus *Haliplus (s. str.)* based on the asymmetry of the sutural margin.

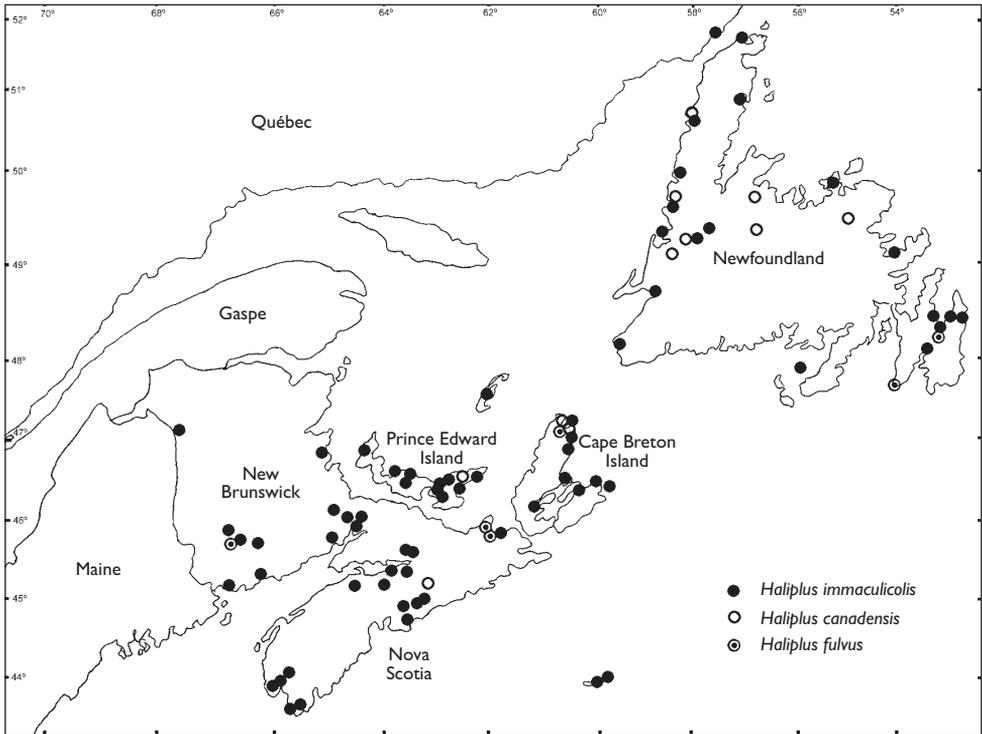


Figure 1. Distribution of *Haliplus immaculicollis*, *Haliplus canadensis*, and *Haliplus fulvus* in Atlantic Canada. Most Labrador records of *H. immaculicollis* are shown in Figure 5.

Vondel et al. (2006) state that with respect to all character states, except the pronotal plicae, *H. borealis* belongs to *Haliplus* (*s. str.*).

Haliplus (Paraliaphlus) leopardus Roberts, 1913

NOVA SCOTIA, Halifax Co.: Lake Egmont, 29.IX.1989, 15.VIII.1990, 4.IX.1990, B. Wright, (5, NSMC); Lake Egmont, 30.IV.1990, B. Wright, weedy shallows near bridge, (12, NSMC).

Haliplus leopardus is newly recorded in Nova Scotia (Fig. 2). It was reported from New Brunswick by Vondel (2005). In Atlantic Canada there are records from the margins of shallow lakes.

Haliplus (Paraliaphlus) pantherinus Aubé, 1938

Haliplus pantherinus was recorded in New Brunswick and Nova Scotia by Vondel (2005) (Fig. 2). Schmude (2002) recorded it from lakes, ponds, and stream margins.

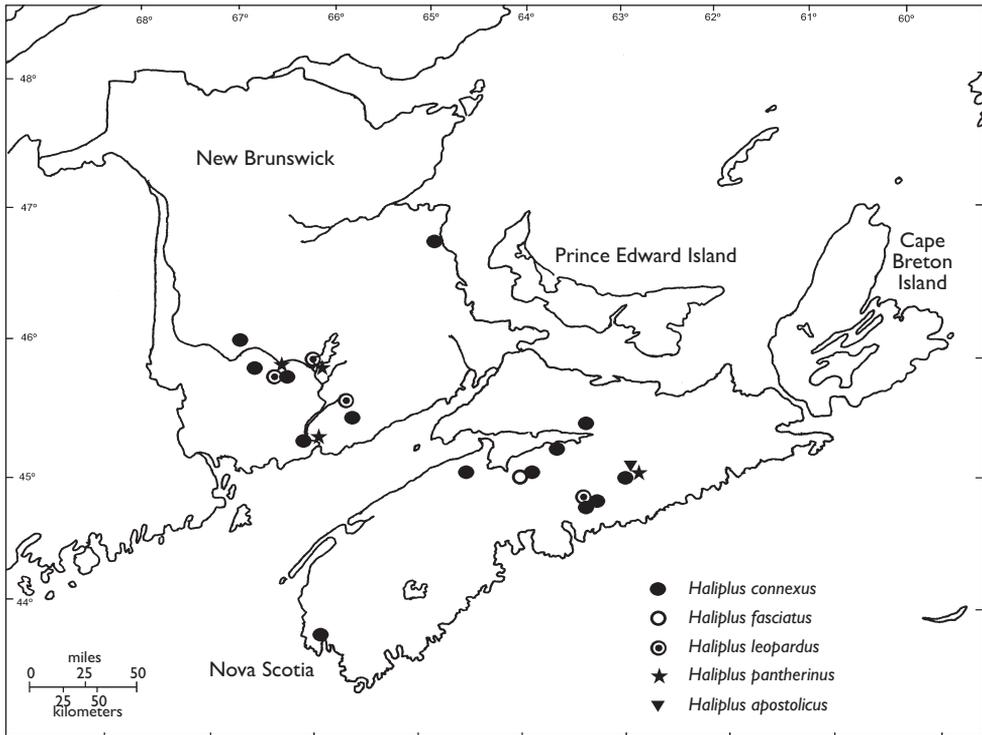


Figure 2. Distribution of *Haliplus connexus*, *Haliplus fasciatus*, *Haliplus leopardus*, *Haliplus pantherinus*, and *Haliplus apostolicus* in Atlantic Canada.

Haliplus (Liaphlus) apostolicus Wallis, 1933

Haliplus apostolicus was recorded from Nova Scotia by Vondel (2005) (Fig. 2).

Haliplus (Liaphlus) canadensis Wallis, 1933

Haliplus canadensis was recorded in Newfoundland, Nova Scotia, and Prince Edward Island by Vondel (2005) (Fig. 1). In Atlantic Canada it has been found in small ponds and along slow-flowing river margins associated with *Typha*. This species was recorded by Schmude (2002) from lentic habitats.

Haliplus (Liaphlus) connexus Matheson, 1912

Haliplus connexus is a common and widely distributed species in both New Brunswick and on mainland Nova Scotia (Fig. 2). It was recorded from both provinces by Roughley (1991) and from Nova Scotia by Matheson (1912) and Wallis (1933).

It has not been reported from Cape Breton Island. In Atlantic Canada there are records from small streams, eutrophic ponds, river margins, slow streams, and temporary ponds.

Haliphus (Liaphus) cribrarius LeConte, 1850

Haliphus cribrarius was recorded from Newfoundland, Labrador, and Nova Scotia by Matheson (1912), from New Brunswick by Roughley (1991), and from Prince Edward Island by Vondel (2005) and Majka (2008) (Fig. 3). In Atlantic Canada there are records from small eutrophic ponds, shallow lake margins, river margins (in association with *Typha* sp.), in a stream, and from a cattail swamp.

Haliphus (Liaphus) fasciatus Aubé, 1838

NOVA SCOTIA: Hants Co.: Centre Rawdon, 17.VII.1971, P. Budd, (1, CNC).

Haliphus fasciatus is newly recorded in Atlantic Canada (Fig. 2).

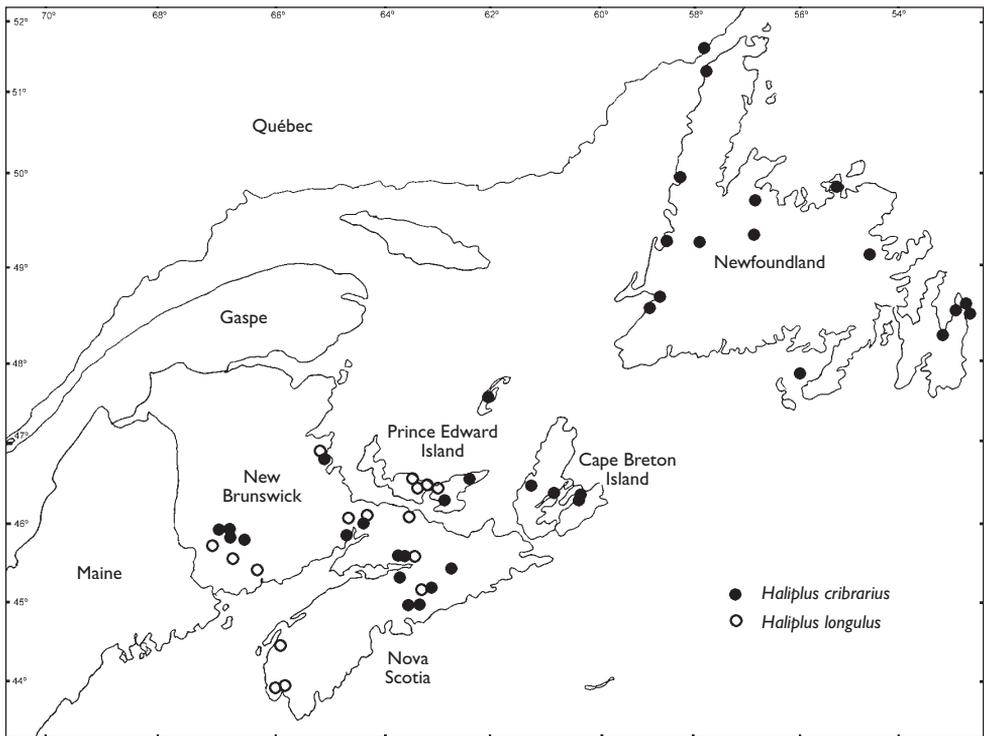


Figure 3. Distribution of *Haliphus cribrarius* and *Haliphus longulus* in Atlantic Canada. Labrador records of *H. cribrarius* are shown in Figure 5.

***Haliplus (Liaphlus) fulvus* (Fabricius, 1801)**

NEW BRUNSWICK: York Co.: New Maryland, Charters Settlement, 45° 49.55' N, 66° 43.32' W, 18.V.2003, R. P. Webster, coll., mixed forest in small eutrophic pond in dense vegetation (4, RWC).

This widely distributed Holarctic species was formerly known in North America as *Haliplus (Liaphlus) subguttatus* Crotch, 1873 and *Haliplus (Liaphlus) salinarius* Wallis, 1933, two names that were synonymized by Vondel (1991). Brigham (1996) accepted the synonymy of *H. fulvus* and *H. salinarius*, but disagreed about *H. subguttatus*. Since 1991, long series of both Nearctic species have been examined by BJV, but no reliable characters have been found to distinguish the two species and the shape of the aedeagus of *H. subguttatus* falls within the range of variation exhibited by specimens of *H. fulvus*. Accordingly, the synonymy of Vondel (1991) is maintained here.

This species was recorded from Nova Scotia by Wallis (1933), and then from Newfoundland by Roughley (1991) and Vondel (1991) (Fig. 1). In the Old World it is widely distributed from Iceland throughout Europe, south to North Africa, east through the Middle East, south to Iraq, and across Central Asia and Siberia as far as Lake Baikal (Vondel 1991). Vondel (1991) summarized its biology, indicating that it is found in clear or peaty stagnant or slowly running water, in lakes, pools, canals, rivers, and ditches, and has even been recorded in brackish water. Larvae probably feed on algae such as *Nitella* while adults are omnivorous feeding on algae, pollen, and invertebrates such as oligochaetes.

***Peltodytes duodecimpunctatus* (Say, 1825)**

NEW BRUNSWICK: Carleton Co.: Wakefield, Meduxnekeag Valley Nature Reserve, 46.1890° N, 67.6706° W, 6.VI.2005, R. P. Webster, old growth cedar stand, spring fed seepage in moss and debris in small pools, (1, RWC); **Sunbury Co.:** Juvenile Settlement at South Branch Oromocto River, 45.5341° N, 66.6096° W, 27.VI.2006, M. Giguère & R. P. Webster, (1, RWC).

Peltodytes duodecimpunctatus is newly recorded in Atlantic Canada (Fig. 4). It was reported from Nova Scotia by Downie and Arnett (1996), however, we have not found specimens in any reference collection consulted, there are no published specimen records of the species from Nova Scotia, and it was not reported from the province by Roughley (1991). Consequently we remove it from the faunal list of Nova Scotia. However, since it has been found in neighbouring New Brunswick it should be sought in Nova Scotia.

***Peltodytes edentulus* (LeConte, 1863)**

NEW BRUNSWICK: Kent Co.: St. Marie, 24.IX.1977, M. Roy, (1, UMN); **Queens Co.:** Welsford near Nerepis River, 45.4441° N, 66.33.00° W, 27.VI.2006, R. P. Webster, river margin in trailing vegetation, (1, RWC); **Westmorland Co.:**

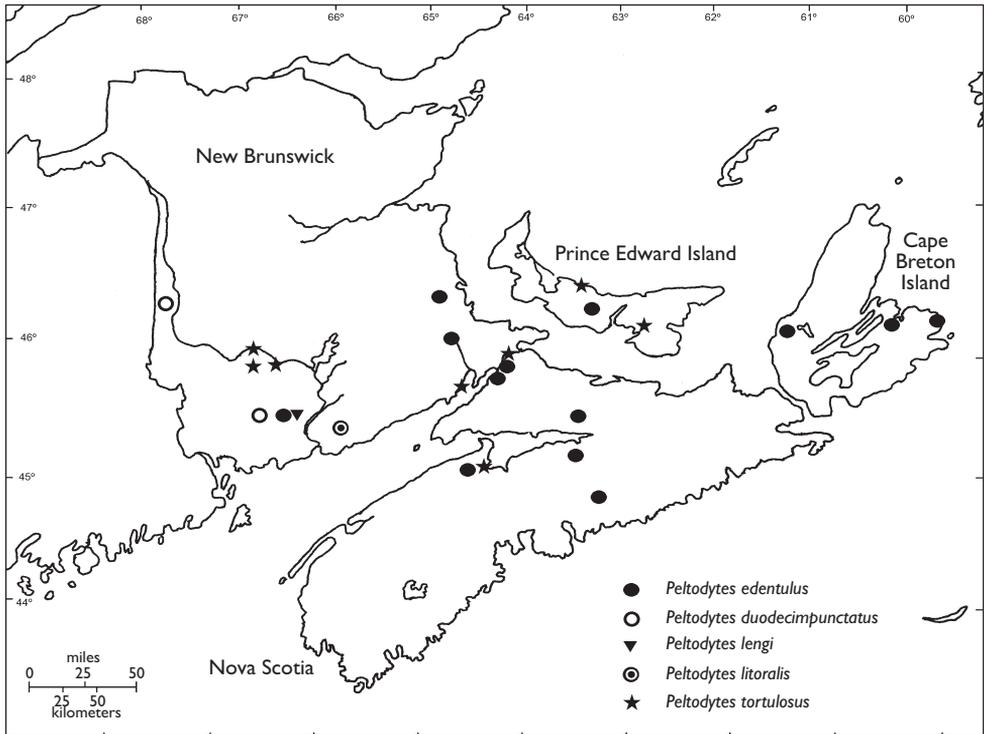


Figure 4. Distribution of *Peltodytes edentulus*, *Peltodytes duodecimpunctatus*, *Peltodytes lengi*, *Peltodytes litoralis*, and *Peltodytes tortulosus* in Atlantic Canada.

Moncton, 17.IX.1994, J. Bourque, (1, UMN); Moncton, 2.X.1975, Jacinte L., (1, UMN); Moncton, 7.VI.1983, P. Tremblay, (1, UMN); Moncton, 15.IX.2005, P. Duerr, (1, UMN). **NOVA SCOTIA: Cape Breton Co.:** Schooner Pond, 6.IX.2003, C. W. D’Orsay, (1, CBU); Gillis Lake, 5.VII.1990, B. Wright, (5, NSMC); Sydney River, 5.VII.1990, B. Wright, (5, NSMC); **Colchester Co.:** Debert, 3.VI.1994, 14.VII.1996, J. Ogden, (2, NSNR); **Cumberland Co.:** Amherst, 4.V.1996, J. Ogden, pond, (2, JOC); Amherst Point, Layton’s Lake, 8.IX.1978, D. S. Davis, (2, NSMC); Lower River Hebert, 23.VI.1992, B. Wright, (1, NSMC); **Halifax Co.:** Lake Egmont, 15.VI.1990, B. Wright, (3, NSMC); **Hants Co.:** Sound Maitland, Hayes Cave, 19.VI.1978, 29.VI.1978, 16.V.1979, B. Wright, (6, NSMC); **Inverness Co.:** Black River, 16.VII.1992, J. Gilhen, (1, NSMC); **Kings Co.:** Coldbrook, 26.VIII.1993, B. Wright, (2, NSMC).

Peltodytes edentulus is newly recorded from New Brunswick and Nova Scotia (Fig. 4). It was previously reported from Prince Edward Island by Majka (2008). In Atlantic Canada there are records from ponds and river margins.

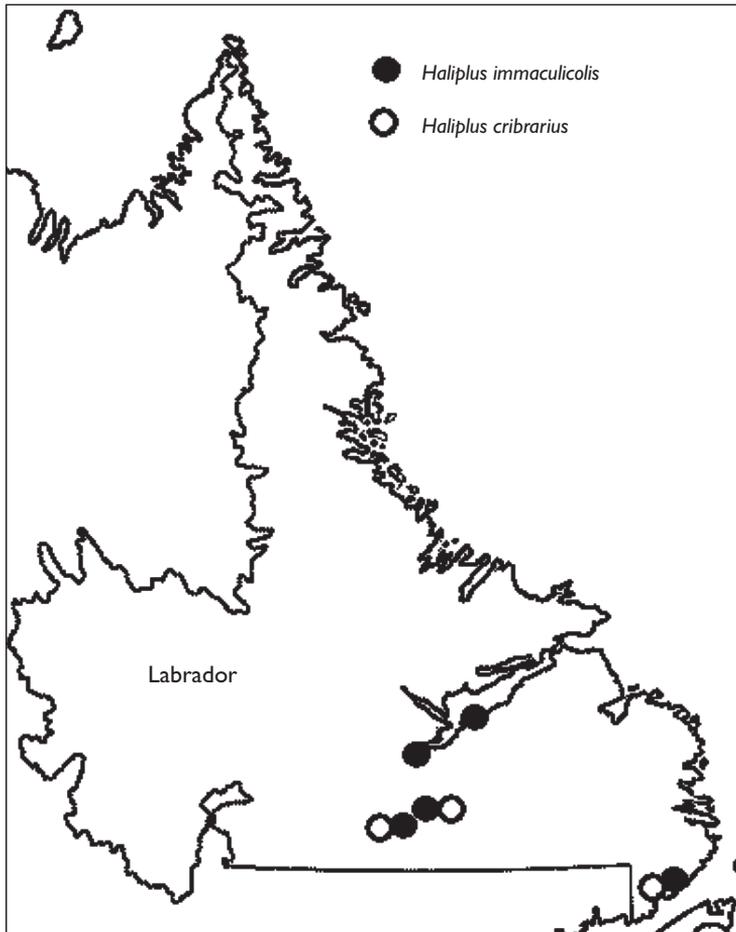


Figure 5. Distribution of *Haliplus immaculicollis* and *Haliplus cribrarius* in Labrador.

***Peltodytes lengi* Roberts, 1913**

NEW BRUNSWICK: Queens Co., Welsford near Nerepis River, 45.4441° N, 66.3300° W, 27.VI.2006, R. P. Webster, coll., river margin in tailing vegetation (2, RWC).

Peltodytes lengi is newly recorded from New Brunswick (Fig. 4).

***Peltodytes litoralis* Matheson, 1912**

NEW BRUNSWICK: Kings Co.: Hampton Marsh at Hammond River, 45.4776° N, 65.89.92° W, 13.VII.2005, R. P. Webster, sandy to clay bottom with emergent sedges, (1, RWC).

Peltodytes litoralis is newly recorded in Canada (Fig. 4).

***Peltodytes muticus* (LeConte, 1863)**

Peltodytes muticus was reported from Nova Scotia by Downie and Arnett (1996), however, we have not found specimens of this species in any reference collection consulted, there are no published specimen records of the species from Nova Scotia, and it was not reported from the province by Matheson (1912), Roughley (1991), Brigham (1996), or Vondel (2005). Consequently we remove it from the faunal list of Nova Scotia.

***Peltodytes tortulosus* Roberts, 1913**

NEW BRUNSWICK: Albert Co.: Shepody National Wildlife Area, Mary's Point Section, 45.7330° N, 64.6795° W, 16.VI.2004, R. P. Webster, cattail/sedge marsh, in small pool, (1, RWC); **Sunbury Co.:** Burton, 45° 45.448' N, 66° 34.413' W, 31.V.2003, R. P. Webster, red maple swamp, slow stream in emergent vegetation (1, RWC). **York Co.:** Fredericton, 9.V.2003, R. P. Webster, red maple swamp, margin of small outflow stream from cattail marsh among grasses, (1, RWC); New Maryland, Charters Settlement, 45° 49.55' N, 66° 43.32' W, 18.V.2003, R. P. Webster, mixed forest in small eutrophic pond in dense vegetation (1, RWC); New Maryland, Charters Settlement, 45° 49.80' N, 66° 44.08' W, 3.VI.2003, R. P. Webster, mixed forest in small sedge marsh in small pool (1, RWC). **NOVA SCOTIA: Cumberland Co.:** Amherst, 1.V.1999, J. Ogden, pond, (1, JOC); **Kings Co.:** Wolfville, 14.IX.1988, J. Ogden, irrigation pond, (1, JOC).

Peltodytes tortulosus is newly recorded from New Brunswick and Nova Scotia (Fig. 4). It was previously reported from Prince Edward Island by Vondel (2005) and Majka (2008). In Atlantic Canada there are records from small ponds, eutrophic ponds, irrigation ponds, slow stream margins, and in outflows associated with cattail and sedge marshes.

Discussion

The present records, in combination with those presented by Vondel (2005) and Majka (2008) have added to the knowledge of the Haliplidae in Atlantic Canada. It is nevertheless clear that much still remains to be done. In comparison to the Dytiscidae, which have been extensively surveyed in Atlantic Canada by Larson et al. (2000), in New Brunswick by Webster (2008), and on Prince Edward Island by Majka (2008), research on the Haliplidae has been much less complete.

Presently 13 species of haliplids are known from New Brunswick, 13 from Nova Scotia, six from Prince Edward Island, four from Cape Breton Island, four from insular Newfoundland, and two from Labrador; a cumulative regional fauna of 16 species. Newfoundland, mainland Nova Scotia, and Prince Edward Island have been comparatively well-surveyed, whereas the haliplid faunas of northern New Brunswick and Cape Breton Island are less completely known. All the haliplids found in the

region are native, Nearctic species with the exception of *H. fulvus* which is Holarctic in distribution.

Haliplus immaculicollis, *H. cribrarius*, and *H. canadensis* appear to be generally distributed in Atlantic Canada (although the latter species has not been recorded from New Brunswick). *Haliplus longulus* and *P. edentulus* appear to be generally distributed in the Maritime Provinces (New Brunswick, Nova Scotia, and Prince Edward Island). The distribution of other species of haliplids is as yet insufficiently well-known to draw substantive conclusions. Noteworthy are the records of *P. duodecimpunctatus* *P. lengi*, and *P. litoralis* in western and southern New Brunswick, particularly the latter species which is newly recorded in Canada. In the United States, *P. litoralis* has been recorded north to New Hampshire (Chandler 2001). Also noteworthy are the records of *H. fasciatus* and *H. apostolicus* on the mainland of Nova Scotia, neither of which have been recorded in other jurisdictions in Atlantic Canada.

In the state of Maine, adjacent to the Atlantic Canadian region, *Haliplus* (*Paraliaphlus*) *triopsis* Say, *Peltodytes pedunculatus* Blatchley, *Peltodytes sexmaculatus* Roberts, and *Peltodytes shermani* Roberts have been recorded (Matheson 1912; Malcolm 1971; Vondel 2005), while in the province of Québec, *Haliplus* (*Haliplus*) *blanchardi* (Roberts), *Haliplus* (*Haliplus*) *falli* Mank, and *Peltodytes muticus* (LeConte) have been recorded (Laplante et al. 1991). These species should also be looked for in Atlantic Canada, particularly in western portions of New Brunswick.

Additional fieldwork is clearly required to better discern the composition and distribution of the Haliplidae in the region. The habitat preferences and detailed ecology of species in the region have been little investigated, and ecological observations and research in these areas would also be worthwhile.

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Appendix I

The following collections (with appropriate abbreviations indicated) were consulted in the course of this study and data from any haliplid specimens originating in Atlantic Canada were integrated into the results:

Acadia University Collection, Wolfville, Nova Scotia, Canada (AUC); Agriculture Canada Nova Scotia, Kentville, Nova Scotia, Canada (ACNS); Agriculture Canada Prince Edward Island, Charlottetown, Prince Edward Island, Canada (ACPE); The Natural History Museum, London, England (BMNH); Collection Angelini, Brindisi, Italy (CAT); Cape Breton University, Sydney, Nova Scotia, Canada (CBU); Collection Hendrichs, Berlin, Germany (CBH); Collection Challet, California, USA (CC); Collection Claude Chantal, Varennes, Québec, Canada (CCQC); Collection Cuppen, Ede, The Netherlands (CCW); Christopher G. Majka Collection, Halifax, Nova Scotia, Canada (CGMC); Collection Hebauer, Grafing, Germany (CHG); Collection Huxley (CHX) [now in the Garth Foster Collection, Ayr, Scotland, Great Britain (GFC)]; Collection Jasper, Austin, Texas, USA (CJT); Collection Mazzoldi, Brescia, Italy (CM); Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada (CNC); Collection Nilsson, Umeå, Sweden (CNS); Collection Andrew Short, Lawrence, Kansas, USA (CS); Collection Vondel, Hendrik-Ido-Ambacht, The Netherlands (CV); Dalhousie University Collection, Halifax, Nova Scotia, Canada (DAL); Deutsches Entomologisches Institut, Eberswalde, Germany (DEI); David H. Webster Collection, Kentville, Nova Scotia, Canada (DHWC); Maine Forest Service, Augusta, Maine, USA (ELMF); Gary D. Selig Collection, Bridgewater, Nova Scotia, Canada (GDS); Illinois Natural History Survey, Champaign, Illinois, USA (INHS); Institute Royal des Sciences Naturelles, Bruxelles, Belgium (ISNB); J.B. Wallis Museum of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada (JBWM); Joyce Cook Collection (JCC) [now at the New Brunswick Museum (NBM)]; Jeffrey Ogden collection, Truro, Nova Scotia, Canada (JOC); Lyman Entomological Museum, Ste-Anne-de-Bellevue, Québec, Canada (LEMQ); Laurentian Forestry Centre (Insectarium R. Martineau), Québec City, Québec, Canada (LFC); Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN); Zoological Museum, Helsinki, Finland (MZH); Memorial University of Newfoundland collection, St. John's, Newfoundland, Canada (MUN) [currently on long term loan to the Canadian Forest Service, Edmonton, Alberta (NFRC)]; New Brunswick Museum, Saint John, New Brunswick, Canada (NBM); Naturhistorisches Museum, Basel, Switzerland (NHMB); National Museum of Natural History, Washington, District of Columbia, USA (NMNH); National Museum (Natural History), Prague, Czech Republic (NMPC); Naturhistorisches Museum Wien, Austria (NMW); Nova Scotia Museum, Halifax, Nova Scotia, Canada (NSMC); Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada (NSNR); Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RMNH); Reginald Webster Collection, Charters Settlement, New Brunswick, Canada (RWC); South Carolina State Museum, Columbia, South Carolina, USA (SCSM); St. Francis Xavier University, Antigonish, Nova Scotia, Canada (STFX); Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS); Saint Mary's University, Halifax, Nova Scotia, Canada (SMU); Beatty Biodiversity Museum, University of British Columbia, Vancouver, British Columbia, (UBCZ); Université de Moncton, Moncton, New Brunswick, Canada (UMNB); University of New Hampshire, Durham, New Hampshire, USA (UNH); University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada (UPEI); Zoological Museum ITZ, Amsterdam, The Netherlands (ZMAN).