

**NOTE****New records of ground beetles for Newfoundland and Labrador (Coleoptera: Carabidae)****Stephen D. Langor, Matthew W. Langor, Shelley Pardy Moores, Meaghan O'Neill and, David W. Langor**

Renowned Swedish carabidologist, Carl H. Lindroth, participated in a Fennoscandinavian expedition to the island of Newfoundland (NF) in the summer of 1949, for the purpose of sampling its fauna of insects and other terrestrial arthropods (Krogerus et al. 1960). In the summer of 1951, Lindroth returned alone to sample in other parts of NF as well as in southern Labrador (LB), Nova Scotia, and the French islands of St.-Pierre-et-Miquelon, near the south coast of NF (Evenden 2021). Altogether, sampling occurred at 153 localities in NF, six in LB and 2 in Saint Pierre-et-Miquelon (Lindroth 1955; Evenden 2021). Although Lindroth was particularly interested in ground beetles (Coleoptera: Carabidae), he (and colleagues) collected broadly. The combined taxonomic and distributional data about ground beetles acquired during these expeditions serves as a comprehensive baseline of Carabidae in NL and was the first in-depth analysis of the carabid fauna for any Canadian province. Lindroth (1963) later published «The fauna history of Newfoundland, illustrated by carabid beetles», which was one of the most thorough analyses of an insect fauna in North America (Larson and Langor 1982). Larson (1978) reported the establishment of *Leistus ferrugineus* (Linnaeus) in St. John's, NF. Larson and Langor (1982) reported five new ground beetle species additions to the provincial faunal record (bringing the total to 171 species) and detected range extensions for several species compared to distributions reported by Lindroth 30 years prior. Herein, almost 75 years after Lindroth's final NL expedition, we provide 30 new jurisdictional records for the province.

METHODS

The new jurisdictional records are based almost totally on specimens collected since 1982 and accessioned in the insect collection of Memorial University of Newfoundland and in the collection of David Langor. The large majority of these two collections have recently been donated to the Provincial Museum of NL ("The Rooms"; codon NFM); however, some specimens were donated to collections of the Canadian Forest Service in Corner Brook, NL (CFS-CB), the Canadian Museum of Insects, Arachnids and Nematodes in Ottawa, Ontario (CNC), and the Northern Forestry Centre of the Canadian Forest Service in Edmonton, Alberta (NFRC). The majority of ground beetles were identified by David Langor and some by David J. Larson and Yves Bousquet.

Specimen label data were digitally recorded for almost all carabids collected in NF during the 1949 and 1951 Fennoscandinavian Expeditions, as reported by Lindroth (1955). The records from LB were extracted from Lindroth (1961-1969) and from label data of voucher specimens deposited in the CNC. There was one entry for each collection

Received August 2025. Accepted for publication October 2025. Published on the Acadian Entomological Society website at www.acadianes.ca/journal.php on February 2026.

Stephen D. Langor: Cumming School of Medicine, University of Calgary, 3330 Hospital Dr. NW, Calgary, AB, T2N 2T8

Matthew W. Langor: 10403 – 18 Ave. NW, Edmonton, AB, T6J 5J3

Shelley Pardy Moores: Wildlife Division, Department of Fisheries, Forestry and Agriculture, 192 Wheeler's Road, Corner Brook, NL, A2H 7S1

Meaghan O'Neill: Environmental Science, Grenfell Campus, Memorial University, 20 University Dr., Corner Brook, NL, A2H 5G5

David W. Langor: Natural Resources Canada, Canadian Forest Service, 5320 – 122 St. NW, Edmonton, T6H 3S5

Corresponding author (email: david.langor@nrcan-rncan.gc.ca)

locality X date event, irrespective of the number of specimens collected. As well, label data were digitally captured for other NL carabid specimens in the following Canadian collections: Agriculture and Agri Food Canada in St. John's, NL (AAFC), CNC, NFM and NFRC. To date there are over 12,800 records. From these records we calculated species richness and proportion of non-native species. Data are accessible for examination and use by others by contacting the corresponding author.

RESULTS

New species records. Of the 30 new jurisdictional records for Carabidae in NL, eight constitute new provincial records, 20 are new records for LB of species previously recorded from NF, and two are new records for NF of species previously reported from LB. None of the records are particularly surprising as all newly reported species are distributed across most of the country and are present in the nearby Maritime Provinces (Bousquet et al. 2013).

Nebriinae: Nebriini

***Notiophilus semistriatus* Say, 1823**

In Canada, this Nearctic species is distributed from British Columbia to LB (Bousquet et al. 2013). Herein we report it for the first time from NF where it was found on coastal limestone barrens and in a conifer forest.

Specimens examined: **NEWFOUNDLAND:** Burnt Cape, 51.575°N, 55.754°W, 7-21.viii.2003, *Dryas* rock garden, pitfall trap, A.M. Hynes (1, NFRC; det. D. Langor); Burnt Cape, 51.576°N, 55.746°W, 7-21.viii.2003, crowberry patch, pitfall trap, A.M. Hynes (1, NFM, Accession No. 09-841; det. D. Langor); Burnt Cape, 51.576°N, 55.745°W, 10-24.vii.2003, cow parsnip patch, pitfall trap, A.M. Hynes (1, NFM, Accession No. 09-842; 1, NFRC; det. D. Langor); Glide Lake, 30.vi.1994, Wade Bowers (1, CFS-CB; det. Y. Bousquet); Glide Lake, 14.vii.1994, Wade Bowers (1, CFS-CB; det. Y. Bousquet).

Carabinae: Carabini

***Carabus chamissonis* (Fischer von Waldheim, 1820)**

In Canada, this Nearctic species is distributed from British Columbia to LB (Bousquet et al. 2013). In LB, it is common in coastal heath. We now record it from two locations at the northern tip of NF; both are situated in coastal limestone barrens. It was common at Burnt Cape but rarely collected ca. 12 km west at Cape Norman. In 2024, this species was targeted through deployment of pitfall traps in coastal barrens at nine sites along the Great

Northern Peninsula. It was not detected at the eight sites south of Cape Norman where the faunas were dominated by the non-native *Pterostichus melanarius* (Illiger).

Specimens examined: **NEWFOUNDLAND:** Burnt Cape, 51.576°N, 55.746°W, 7-24.vii.2003, crowberry patch, pitfall trap, A.M. Hynes (21, NFM, Accession Nos 09-721 to 09-732, 09-748 to 09-753, 09-757, 09-758, 09-760; 1, CFS-CB; det. D. Langor); Cape Norman, 51.622°N, 55.899°W, 15.vi-30.vii.2024, Brody Harris (1, NFM; det. D. Langor).

***Carabus serratus* Fischer von Waldheim, 1820**

In Canada, this Nearctic species occurs from British Columbia to NF (Bousquet et al. 2013). Although it is widespread in NF, until now it has not been recorded from LB where it was abundant in open conifer forest.

Specimens examined: **LABRADOR:** Muskrat Falls, 53.2606°N, 60.7844°W, 3-12.viii.2005, boreal forest stand, pitfall trap, Shelley Pardy (1, NFM, Accession No. 09-771; det. D. Langor); Ibid. except 17.vi.to 5.vii.2005 (4, NFM, Accession No. 09-772 to 09-775; det. D. Langor); Ibid. except 2-17.vi.2005 (3, NFM, Accession No. 09-776 to 09-778; det. D. Langor); Ibid. except 19.vii. to 3.viii.2005 (1, NFM, Accession No. 09-779; 1, NFRC; det. D. Langor).

Trechinae: Bembidiini

***Bembidion bruxellense* Wesmael, 1835**

In Canada, this Palearctic species is distributed from Quebec to NF (Bousquet et al. 2013). It is synanthropic and widespread in NF. We report the first LB records of this species from human-disturbed habitats at two localities.

Specimens examined: **LABRADOR:** L'Anse au Loup, 51.526°N, 56.823°W, 18m, 24.vi.2009, sand blow-out and small slough, David Langor (1, NFM, Accession No. 17-23252; det. D. Langor); Port Hope Simpson, 52.542°N, 56.308°W, 32m, 26.vi.2009, log deck and pool, David Langor & Shelley Pardy (5, NFM, Accession No. 17-23247 to 17-23251; det. D. Langor).

***Bembidion castor* Lindroth, 1963**

This is a Nearctic species widely distributed in Canada from Alberta to NF (Bousquet et al. 2013). It is widespread in riparian habitats in the western half of NF, and now we report it for the first time from LB where one specimen was collected at a mercury vapor light close to a large river.

Specimens examined: **LABRADOR:** Muskrat Falls, 53.254°N, 60.777°W, 114m, 30.vi.2009, MV light, David Langor & Doug Macaulay (1, NFRC; det. D. Langor).

***Bembidion chalconeum* Dejean, 1831**

Distributed from British Columbia to NF in Canada (Bousquet et al. 2013), this Nearctic riparian species is found only in the western part of NF. Here we report the first record from LB.

Specimens examined: **LABRADOR:** Goose Bay, 200m N Otter Creek float plane base, 53.3542°N, 60.4125°W, 15m, 29.vii.2008, lake shore, Greg Pohl & David Langor (1, NFRC; det. D. Langor).

***Bembidion concolor* (Kirby, 1837)**

This Nearctic riparian species is distributed in Canada from British Columbia to NF (Bousquet et al. 2013). In NF, it has been collected in the western half of the island. Here we report the first record for LB.

Specimens examined: **LABRADOR:** North West River, 53.52371°N, 60.13516°W, 5m, 30.vii.2008, lakeshore, under debris, Greg Pohl & David Langor (1, NFRC; det. D. Langor).

***Bembidion concretum* Casey, 1918**

This Nearctic species is distributed in Canada from British Columbia to NF (Bousquet et al. 2013). It is very common in riparian habitats throughout the entirety of NF. We report the first record from LB.

Specimens examined: **LABRADOR:** Goose Bay, 29-30.vii.1984, David Larson & Ray Morris (5, NFRC; det. D. Larson).

***Bembidion fortetrium* (Motschulsky, 1845)**

This riparian Nearctic species is found from British Columbia to NF in Canada (Bousquet et al. 2013). It is found in the eastern half of NF but is uncommonly collected. Here we report the first LB record.

Specimens examined: **LABRADOR:** Minipi drainage, Anne Marie Lake, 25.vii.1984, Butt & David Larson (1, NFRC; det. D. Larson).

***Bembidion immaturum* Lindroth, 1954**

This Nearctic riparian species is distributed from Ontario to NF in Canada (Bousquet et al. 2013). In NF, it is found in the western half of the island. The first records from LB are herein reported from three localities.

Specimens examined: **LABRADOR:** Churchill River shoreline, 53.176°N, 60.948°W, 1.vii.2009, shoreline, David Langor & Shelley Pardy (4, NFM, Accession No. 17-23619 to 17-23622; 2, NFRC; det. D. Langor); Muskrat Falls, 53.254°N, 60.777°W, 114m, 30.vi.2009, MV light, David Langor & Doug Macaulay (4, NFM, Accession No. 17-23623 to 17-23626; det. D. Langor); Pinware River, 51.7379°N, 56.591°W, 99m, 24.vi.2009, sand spit,

David Langor & Shelley Pardy (2, NFM, Accession No. 17-23627, 17-23628; 1, NFRC; det. D. Langor).

***Bembidion planatum* (LeConte, 1847)**

In Canada, this Nearctic species is distributed from British Columbia to NF although there are no records from Manitoba and Saskatchewan (Bousquet et al. 2013). In NF, the species is relatively common over the western half of the island. We report the first record from LB, taken on the shore of Churchill River.

Specimens examined: **LABRADOR:** Churchill River, Gull Island access, 52.9721°N, 61.4381°W, 4.viii.2008, clay/sand/gravel beach, Greg Pohl & David Langor (1, NFRC; det. D. Langor).

***Bembidion punctatostriatum* Say, 1823**

In Canada, this Nearctic riparian species is distributed from British Columbia to Nova Scotia (Bousquet et al. 2013). The single specimen collected in LB along the shore of the Churchill River thus represents a new provincial record.

Specimens examined: **LABRADOR:** Churchill River shoreline, 53.176°N, 60.948°W, 1.vii.2009, shoreline, David Langor & Shelley Pardy (1, NFRC; det. D. Langor).

***Bembidion quadratum* Notman, 1920**

Despite being widely distributed in Canada from British Columbia to NF (Bousquet et al. 2013), this Nearctic riparian species, until now, has not been recorded from LB.

Specimens examined: **LABRADOR:** Goose Bay vicinity, Grand Lake Road, ca. 12 km W jct. North West River Road, 53.447°N, 60.5587°W, 1.viii.2008, Greg Pohl & David Langor (1, NFRC; det. D. Langor).

***Bembidion quadrimaculatum oppositum* Say, 1823**

This Nearctic species occurs from Alberta to NF (Bousquet et al. 2013) in open, dry habitats (Lindroth, 1955). In NF, the species seems limited to the west coast. Until now there has been no record from LB.

Specimens examined: **LABRADOR:** Goose Bay, 29.vii.1984, David Larson & Ray Morris (1, NFM, Accession No. 08-1687; det. D. Larson); Trans-Labrador Highway, ca. 40 km W. Goose Bay, 53.194°N, 60.989°W, 85m, 30.vi.2009, sand blow-out, David Langor (1, NFRC; det. D. Langor).

***Bembidion sordidum* (Kirby, 1837)**

This Nearctic species is distributed from British Columbia to northeastern Quebec (Bousquet et al. 2013). Herein we report it from both NF and LB where it occurs in a variety of habitats including recently burned and unburned boreal

forest, on sand along a river margin, and under rocks in the riparian zone of a river. This is a new provincial record. Lindroth (1955) recorded it from “Natashquan, LB”; but this site, although close to LB, is in QC.

Specimens examined: **LABRADOR:** Goose Bay, 13.vii.1981, P. Rideout (1, NFM, Accession No. 17-23502; det. D. Langor); Goose River, 7 km N Goose Bay, 53.392°N, 60.421°W, 20m, 31.vii.2008, sand flats, Greg Pohl & David Langor (1, NFM, Accession No. 17-24798; det. D. Langor); Middle Brook, 53.3785°N, 63.1429°W, 17.vi. to 4.vii.2005, boreal forest stand, pitfall trap, Shelley Pardy (1, NFRC; det. D. Langor); Ossak Camp, 53.413°N, 65.295°W, 27.ix to 8.iii.2004, recently burned forest, pitfall trap, Shelley Pardy (1, NFM, Accession No. 17-23507; det. D. Langor); Ossak Camp, 53.413°N, 65.295°W, 11.vii. to 1.viii.2004, recently burned forest, pitfall trap, Shelley Pardy (2, NFM, Accession No. 17-23508 to 17-23509; det. D. Langor); Ibid. except 11.vii. to 1.viii.2004 (2, NFM, Accession No. 17-23510 to 17-23511; det. D. Langor); Ibid. except 11-29.viii.2004 (9, NFM, Accession No. 17-23512 to 17-23519, 17-24797; det. D. Langor). **NEWFOUNDLAND:** Gros Morne National Park, Alexis River, 52.554°N, 56.302°W, 11m, 28.vi.2009, river shore, under rocks, David Langor & Shelley Pardy (3, NFRC; det. D. Langor).

***Bembidion tetracolum tetracolum* Say, 1823**

This Palearctic species is non-native in North America. In Canada, it is distributed in British Columbia and from Ontario to NF (Bousquet et al. 2013). It is found throughout NF in a variety of riparian habitats (e.g., rivers, vernal pools, bog pools). Here we report it for the first time from LB.

Specimens examined: **LABRADOR:** Goose Bay, 24-26.ix.1981, Murray Colbo (4, NFM, Accession No. 08-1352 to 08-1355; 3, NFRC; 1, CFS-CB; det. D. Larson).

***Tachyta angulata* Casey, 1918**

This Nearctic species is distributed across Canada from British Columbia to Nova Scotia (Bousquet et al. 2013). Here we report it from under the bark of a conifer log at one locality in LB. This constitutes a new provincial record.

Specimens examined: **LABRADOR:** Cartwright Highway, 53.0742°N, 60.5082°W, 5.viii.2008, under bark of spruce logs, Greg Pohl & David Langor (1, NFRC; det. D. Langor).

Trechinae: Trechini

***Trechus quadristriatus* (Schrank, 1781)**

This Palearctic species is non-native in Canada with a distribution from Ontario to Nova Scotia (Bousquet et al. 2013). Herein we report it for the first time from

the province of NL based on a record from St. John's.

Specimens examined: **NEWFOUNDLAND:** St. John's, Newfoundland Drive, 47.6010°N, 52.7117°W, 83m, small grove of trees in vacant urban lot, David Langor (3, NFM, Accession No. 17-24626 to 17-24628; 3, NFRC; det. D. Langor).

***Trechus rubens* (Fabricius, 1792)**

This Palearctic species is non-native in North America and, in Canada, is distributed from Quebec to NF (Bousquet et al. 2013). It is widely distributed in NF where it is found in wet and dry habitats. Here we report the first records for LB.

Specimens examined: **LABRADOR:** Charlottetown, 52.772°N, 56.116°W, 26.vi.2009, spruce forest, David Langor (11, NFM, Accession No. 17-23935 to 17-23944, 17-24676; det. D. Langor); Ibid. except 52.743°N, 56.120°W, 73m, MV light, clearing in black spruce forest (3, NFRC; det. D. Langor); Port Hope Simpson, 52.5185°N, 56.2660°W, 24m, 5-22.vii.2004, black spruce forest, pitfall trap, Shelley Pardy (1, NFM, Accession No. 09-858; det. D. Langor); Ibid. except 5-25.viii.2004 (2, NFM, Accession No. 09-859, 09-860; det. D. Langor); Ibid. except 22.vii. to 5.viii.2004 (1, NFM, Accession No. 09-872; det. D. Langor); Port Hope Simpson, 52.542°N, 56.308°W, 32m, 26.vi.2009, log deck and pool, David Langor & Shelley Pardy (1, NFM; det. D. Langor).

Harpalinae: Harpalini

***Bradycellus lugubris* (LeConte, 1847)**

This Nearctic species is distributed from Alberta to NF (Bousquet et al. 2013). It is widespread in NF where it is typically found near water. Here we report the first record from LB.

Specimens examined: **LABRADOR:** Goose Bay, 24-26.ix.1981, Murray Colbo (1, CFS-CB; det. D. Larson).

***Bradycellus nigrinus* (Dejean, 1829)**

In Canada, this Nearctic species is distributed from British Columbia to NF (Bousquet et al. 2013). It is widespread and abundant in NF where it is typically found near water. This first record from LB was collected near a vernal pool.

Specimens examined: **LABRADOR:** near Mary's Harbour, 52.353°N, 56.047°W, 51m, 28.vi.2009, near temporary water pool, David Langor & Shelley Pardy (1, NFRC; det. D. Langor).

***Stenolophus conjunctus* (Say, 1823)**

In Canada, this Nearctic species is distributed from British Columbia to Nova Scotia (Bousquet et al. 2013). Here we report it for the first time from the province of NL.

Specimens examined: **NEWFOUNDLAND:** Searston, 47.828°N, 59.329°W, 7m, 23.vi.2010, sweep of vegetation on shoreline sand flats, David Langor (1, NFM; det. D. Langor).

Harpalinae: Licinini***Diplocheila obtusa* (LeConte, 1847)**

This Nearctic species is distributed from British Columbia to Nova Scotia in Canada. Here we report it from NL for the first time based on a single specimen found at Cape St. George in western NF.

Specimens examined: **NEWFOUNDLAND:** Cape St. George, Port-au-Port Peninsula, 48.4649°N, 59.2673°W, 29m, 28.vi.2011, under rocks in open area, David Langor & Greg Pohl (1, NFRC; det. D. Langor).

Harpalinae: Platynini***Agonum anchomenoides* Randall, 1838**

In Canada, this Nearctic species is distributed from British Columbia to NF (Bousquet et al. 2013). In NF, this species has been reported from only two localities near Deer Lake in 1949 and 1951. Thus, it is apparently not very common. Here we report the first records from LB.

Specimens examined: **LABRADOR:** Churchill River shoreline, 53.176°N, 60.948°W, 1.vii.2009, riparian, David Langor & Shelley Pardy (5, NFM; det. D. Langor); Muskrat Falls, 53.254°N, 60.777°W, 114m, 30.vi.2009, MV light, David Langor & Doug Macaulay (2, NFRC; det. D. Langor); Northwest River, 53.52371°N, 60.13616°W, 5m, 30.vii.2008, under debris on lakeshore, Greg Pohl & David Langor (1, NFM; det. D. Langor).

***Agonum cupripenne* Say, 1823**

In Canada, this Nearctic species is distributed from British Columbia to Nova Scotia but has not been previously collected in NL (Bousquet et al. 2013). Thus, this constitutes a new provincial record.

Specimens examined: **NEWFOUNDLAND:** Pasadena, 20.vi.1982, David Langor & Art Raske (1, NFRC; det. D. Langor); Pasadena, 49.022°N, 57.608°W, 31m, 25.vi.2010, lake shore and river bank, David Langor (1, NFRC; det. D. Langor).

***Agonum piceolum* (LeConte, 1879)**

This Nearctic species is distributed in Canada from British Columbia to New Brunswick. It has previously been recorded from the province based on three specimens from two localities in western NL. Here we report the first record from LB.

Specimens examined: **LABRADOR:** Churchill Falls, 21-26.vi.1996, field, pantrap, R.J. Penney (1, CNCI; det. D. Langor); Ibid. except 11-18.vii.1996, forest (1, CNCI; det. D. Langor)

***Agonum picicornoides* Lindroth, 1966**

This hygrophilic Nearctic species is distributed across Canada

from British Columbia to Nova Scotia (Bousquet et al. 2013). Thus, this record from LB constitutes a new provincial record.

Specimens examined: **LABRADOR:** Labrador Highway, 52.875°N, 58.331°W, 354m, 27.vi.2009, mossy river edge, David Langor & Shelley Pardy (3, NFRC; det. D. Langor).

Harpalinae: Pterostichini***Pterostichus pensylvanicus* LeConte, 1873**

This common Nearctic species is distributed from British Columbia to NF Canada (Bousquet et al. 2013). Although previously recorded from NF, these are the first records from LB.

Specimens examined: **LABRADOR:** Churchill River shoreline, 53.176°N, 60.948°W, 1.vii.2009, shoreline, David Langor & Shelley Pardy (1, NFM, Accession No. 17-24449; 1, NFRC; det. D. Langor); Goose Bay, 13.vii.1982, Murray Colbo (1, NFM, Accession No. 08-2387); Goose Bay, 24-26.ix.1981, Murray Colbo (1, NFM, Accession No. 08-2388); Muskrat Falls, 53.2606°N, 60.7844°W, 25.viii. to 13.ix.2005, boreal forest stand, pitfall trap, Shelley Pardy (2, NFM, Accession No. 09-1100, 09-1101; det. D. Langor); Ibid. except 2-17.vi.2005 (4, NFM, Accession No. 09-1131, 09-1132, 09-1135, 09-1136; det. D. Langor); Ibid. except 17.vi. to 5.vii.2005 (3, NFM, Accession No. 09-1139, 09-1142, 09-1645; det. D. Langor).

***Pterostichus tenuis* (Casey, 1924)**

In Canada, this Nearctic species is distributed from Alberta to NF (Bousquet et al. 2013). This is the first record from LB.

Specimens examined: **LABRADOR:** Red Bay, 51.7343°N, 56.4262°W, 18m, 25.vi.2009, David Langor & Shelley Pardy (1, NFRC; det. D. Langor).

Harpalinae: Zabriini***Amara patruelis* Dejean, 1831**

This Holarctic species is distributed in Canada from British Columbia to NF (Bousquet et al. 2013). Herein we report the first record from Labrador.

Specimens examined: **LABRADOR:** Makkovik, 30.vi.1983, Doreen Winters (1, NFRC; det. D. Langor); Makkovik, 29.vi.1983, Kevin Pardy (1, NFRC; det. D. Langor).

Notes on other species***Abax parallelepipedus* (Piller and Mitterpacher, 1783)**

This large-bodied Palaearctic species was first recorded from NL by Bousquet et al. (1991) based on information provided by D. Langor; however, no locality records have

been published to date from the province. The earliest collection was from Corner Brook in 1989, and it appears that the species was well established there at that time. By 2011, the species was detected in Pasadena, about 25 km away (D. Langor, unpublished). Although not detected by pitfall traps deployed in Barachois Pond Provincial Park in 2012, a few specimens were trapped there in 2023. This park is located 60 km southwest of Corner Brook.

Locality records: **NEWFOUNDLAND**: Barachois Pond Provincial Park, UTM 214 406326 5370918, 24.v.-5.viii.2023, mixed conifer-birch forest, Meaghan O'Neill (3, CFS-CB; det. M. O'Neill); Corner Brook, 48.941°N, 57.970°W, 12.v.1989, field, G. Holloway (2, NFM, Accession Nos 08-2631, 08-2632; det. D. Langor); Corner Brook, near Prince Edward Park, 48.967°N, 57.889°W, 2m, 29.vi.2010, seaside beach, David Langor (1, NFM, Accession No. 17-24356; 1, NFRC; det. D. Langor); Curling, 48.964°N, 58.016°W, 3m, 29.vi.2010, seaside beach under detritus, David Langor (1, NFM, Accession No. 17-24358; det. D. Langor); Marble Mountain, 48.9492°N, 57.8302°W, 12m, 19.vi.2010, mixed forest, David Langor & Doug Macaulay (1, NFM, Accession No. 17-24363; 1, NFRC; det. D. Langor); Pasadena, 41.0121°N, 57.6106°W, 2m, 25.vii.2011, in litter in coniferous forest, David Langor & Greg Pohl (2, NFM, Accession Nos 17-24365, 17-24367; 1, CFS-CB; det. D. Langor); Steady Brook, 48.948°N, 57.826°W, 70m, 9.vii.2012, under rocks along forest path, David Langor & Greg Pohl (3, NFM, Accession No. 17-24359, 17-24360, 17-24362; 1, NFRC; det. D. Langor).

***Bembidion mimus* Hayward, 1897**

This Nearctic species was not recorded from LB by Bousquet et al. (2013). This is an omission because Lindroth (1955) reported it from there.

***Bembidion morulum* LeConte, 1863**

This Nearctic species is distributed mainly from British Columbia to Ontario (Bousquet et al. 2013). The only record east of Ontario is from Cook's Harbour, NF in 1949 (4 specimens). It may be that this species was introduced to NF from its range in central or western Canada or the USA. These specimens, which reside at the University of Lund (Sweden) should be re-examined to confirm identity.

***Carabus taedatus* Fabricius, 1787**

This large-bodied native species was reported from NF by Lindroth (1955) based on one specimen collected in 1949 in a coastal grassland at Port-a-Choix (50.711°N, 57.363°W) located on the Great Northern Peninsula (GNP) in western NF. The species was not collected

again until 2003 when several specimens were pitfall trapped on coastal limestone barrens at Burnt Cape (51.577°N, 55.745°W) on the northern tip of the GNP. In the summer of 2024, pitfall traps were deployed at nine coastal barrens sites (most with underlying limestone) along the west coast of the GNP, from Cape Norman in the north to Bellburns in the south. The only site in which *Carabus taedatus* was trapped was at Port-au-Choix.

Locality records: **NEWFOUNDLAND**: Port au Choix 50.7084°N, 57.3969°W, 15.vi-30.vii.2024, Brody Harris (1, NFM; det. D. Langor).

***Cicindela limbalis* Klug, 1834**

This Nearctic species, also known as the claybank tiger beetle, has been collected from only one site in NF: two specimens from Humbermouth (Corner Brook) in 1912 by C. Leng (Lindroth, 1955). One of us (DWL) borrowed the specimens from the American Museum of Natural History and confirmed their identification. This species is found on moist, steep clay banks adjacent to rivers and streams, but also on open hilltops and on clay banks along dirt roads. The family Carabidae has been very well surveyed in NF. The fact that *Cicindela limbalis* has not subsequently been found suggests it has a very small distribution and/or low populations in NL or that it is extirpated. Surveys for this species were conducted in suitable habitat around Humbermouth in 2012 and 2022, along the Humber River in 2022 and 2023 and along the lower reaches of Crabbes River, Middle Barachois River, and Robinson's River and in a quarry at Hughes Brook in 2023 and 2024. No specimens of *C. limbalis* were found. Much suitable habitat still remains to be searched in NF, so it seems premature to list this species as extirpated.

DISCUSSION

Newfoundland and Labrador was completely glaciated until about 10,000 years ago when the ice started to recede, slowly exposing a barren landscape. Due to its insular nature, it can be reasonably expected the island of NF was colonized by biota much more slowly and later compared to the nearest mainland to the south (now the Province of Nova Scotia, about 110 km away across the Cabot Strait). Because of its more northerly position, LB was much later deglaciated than NF, meaning there has been less time for recolonization there. Furthermore, the latitudinal biodiversity gradient means that species diversity in LB will naturally be lower than regions further south due to harsher climate, reduced growing season and low habitat diversity. Even though these new carabid records

increase the known NL fauna by 4%, to 204 species, it is no surprise the fauna is still relatively depauperate compared to that of NS, which has 292 recorded species (Bousquet et al. 2013). Furthermore, as expected, the carabid species richness for LB (121 spp.) is much lower than for the more southerly island of NF (186 spp.).

Although Carabidae are one of the best-documented families of insects in NL, there are undoubtedly other species that have not yet been detected because of their localized distribution or because they occur in poorly sampled regions or habitats. On the island of NF, which has had much more insect sampling activity than LB, 11 of the 186 recorded species are known from only one locality, and most of those from only one specimen. Some of these species may be vagrants that were blown across the Gulf of St. Lawrence and arrived on the shores of western NF but did not become established. Others may represent species that were established at one time but are now extirpated or have experienced steep decline in population size; *Cicindela limbalis* may represent such a species. Others may be localized due to microhabitat, e.g., *Carabus chamissonis* and *Carabus taedatus*. Some species are not well represented in the collection records because their microhabitat may be poorly sampled; e.g., *Tachyta angulatus* is associated with saproxylic habitats, which are not well sampled in NL and especially not in LB. In general, LB is poorly sampled and most of its ecoregions have received only cursory, if any, sampling effort. The northern portion of LB is subarctic in nature and this hard-to-access area has received almost no sampling attention.

Lindroth (1955) noted the high number of non-native species, of western Palearctic origin, on the island of NF and attributed this to the long history of movement of humans and goods between NF (especially the southeastern part) and western Europe (especially England). For Carabidae, which are ground-dwelling, the transfer of ballast (mostly soil) from coastal England to the shores of NF in the 17th to 19th centuries (Evenden 2021) was undoubtedly responsible for the introduction of many species. Many of the non-native species Lindroth encountered in NF in the mid-20th century likely arrived in this manner, many of which were already widespread on the island by then (Lindroth 1955). Some non-native species were likely introduced to NF on multiple occasions. As well, there is evidence some non-native species have been inadvertently transported by ferries and transport ships between NF and mainland Canada (Larson and Langor, 1982). Irrespective of their route and mode of arrival, non-native species constitute over 15% of the fauna of the island of NF. In terms of percent

of fauna represented by non-native, western Palearctic species, NF, especially the Avalon Peninsula, is one of the most “Europeanized” areas in North America (Larson and Langor, 1982). Interestingly, since the publication of Larson and Langor (1982), no additional non-native carabids have been reported from NL, suggesting a possible decline in rate of transfer of non-native species into the province.

Some places in NF have a very high load of non-native carabids in terms of species richness, abundance and biomass. For example, pitfall trapping in conifer forest in Notre Dame Provincial Park in 2011 captured four carabid species of which three, including two of the largest species, were non-native: *Carabus nemoralis* Mueller, *Notiophilus biguttatus* (Fabricius), and *Pterostichus melanarius*; these represent 75% of carabid species richness, >85% of catch and >82% of biomass (David Langor, unpublished data). The other dominant groups captured by the traps were, in order of biomass, non-native gastropods (Mollusca: Gastropoda), non-native earthworms (Clitellata: Lumbricina), non-native sowbugs (Isopoda: Oniscidea), rove beetles (Coleoptera: Staphylinidae) (some non-native) and spiders (Arachnida: Araneae) (not identified). Over 95% of total invertebrate biomass was non-native. Pitfall trapping at three sites in western NF in 2023 yielded similar results with non-native carabid species richness ranging from 75% to 100% of the total and catch ranging from >82% to 100% of the total (O’Neill 2023). Biomass of carabids was not calculated but is estimated to be about the same as abundance for non-native species. There were other non-native groups present in abundance, including gastropods, earthworms and sowbugs. With such heavy loads of non-native species in native habitats, invasional meltdown may be occurring, a hypothetical process by which multiple non-native species facilitate each other’s establishment or exacerbate each other’s impacts leading to a possible ecosystem degradation (e.g., Collins et al. 2020).

Although often trivialized, research to document and analyze the structure of faunas across temporal and spatial scales is the only means of detecting faunal change, and is a prerequisite to understanding cause, ecological and sociological impacts, and exploring possibilities of mitigation and adaptation. The attention to the carabid fauna of NL, especially the insular portion (NF), over the last 75 years has provided valuable insights into patterns and causes of change. Carabids are known to be valuable as ecological indicators and, since 1990, have been the focus of many community ecology studies across Canada that have documented ecological responses to environmental change and post-disturbance faunal recovery (Langor and

Spence, 2006). Such community ecology work should be the focus of the next phase of carabidology in NL. Use of this taxonomically and ecologically diverse group can be used to explore issues such as, e.g., successional trajectories under varying forest management prescriptions, ecological recovery following mining, ecological effects of agricultural practices, and especially, given the exceptionally high load (i.e., number of species, abundance and percent of biomass) of non-native species in NF, whether there is evidence of invasional meltdown and ecosystem degradation. We hope that new generations of carabidologists will emerge to address these issues and more in NL.

ACKNOWLEDGEMENTS

Funding was provided by the former Newfoundland Department of Fisheries and Land Resources (now Department of Fishery, Forestry and Agriculture), Natural Resources Canada – Canadian Forest Service, and Memorial University, Grenfell Campus.

REFERENCES

- Bousquet, Y. 1991. Family Carabidae. In Checklist of the Beetles of Canada and Alaska. Agriculture Canada Publication 1861, Ottawa, ON. Edited by Y. Bousquet. pp. 8-60.
- Bousquet, Y., Bouchard, P., Davies, A.E., and Sikes, D. 2013. Checklist of the beetles (Coleoptera) of Canada and Alaska, second edition. Series Faunistica No. 109, Pensoft Publishers, Sofia, Bulgaria, 402 pp.
- Collins, R.J., Copenheaver, C.A., Barney, J.N., and Radtke, P.J. 2020. Using invasional meltdown theory to understand patterns of invasive richness and abundance in forests of the northeastern USA. *Natural Areas Journal* **40**: 336-344. <https://doi.org/10.3375/043.040.0406>
- Evenden, M. 2021. Stowaway beetles: Carl Lindroth, the Ballast Theory, and Transatlantic science in the Cold War. *Environmental History* **26**: 1-26. doi: 10.1093/envhis/emabo22
- Krogerus, H., Lindroth, C.H., Palmén, E., and Tuomikoski, R. 1960. Zoological results of two expeditions to Newfoundland and adjacent areas. *Annales Entomologici Fennici* **26**: 58-69.
- Langor, D.W., and Spence, J.R. 2006. Arthropods as ecological indicators of sustainability in Canadian forests. *The Forestry Chronicle* **82**: 244-350.
- Larson, D.J. 1978. *Leistus ferrugineus* (L.) (Coleoptera: Carabidae), new to North America. *Coleopterist's Bulletin* **32**: 307-309.
- Larson, D.J., and Langor, D.W. 1982. The carabid beetles of insular Newfoundland (Coleoptera: Carabidae: Cicindellidae) – 30 years after Lindroth. *The Canadian Entomologist* **114**: 591-597.
- Lindroth, C.H. 1955. The carabid beetles of Newfoundland, including the French islands St. Pierre and Miquelon. *Opuscula Entomologica Supplementum* **12**: 1-168.
- Lindroth, C.H. 1961-1969. The ground beetles of Canada and Alaska. *Opuscula Entomologica Supplementum* **20**: 1-200; **24**: 201-408; **29**: 409-648; **33**: 649-944; **34**: 945-1192; **35**: I-XLVII.
- Lindroth, C.H. 1963. The fauna history of Newfoundland illustrated by carabid beetles. *Opuscula Entomologica Supplementum* **23**: 1-112.
- O'Neill, M. 2023. Terrestrial ground beetle abundance and species richness, and diet of introduced American toads in western Newfoundland. BSc Honours thesis. Memorial University of Newfoundland, Grenfell Campus, Corner Brook, NL.