Natural Science Specimens of Prince Edward Island:

An Updated Inventory

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PEI MUSEUM AND HERITAGE FOUNDATION

A Prince Edward Island Museum and Heritage Foundation Project

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Contents

Introduction

In 1983 an Inventory of Natural Science Specimens of Prince Edward Island was developed by Kathy Martin with the assistance of Geoff Hogan from the Prince Edward Island Natural History Society (Martin, 1983). This report provided a good representation of the specimens scattered over the continent, but now 31 years later, the PEI Museum and Heritage Foundation decided to update this inventory and make the report widely available to the scientific community and the public.

In Prince Edward Island, specimens are spread geographically across institutions and across independent computer systems. In comparison with the 1983 report, developed without internet or digitized datasets, it was easier to find PEI specimen in 2014. However, there are still many institutions that have not digitized their collection and therefore datasets and specimen information could not be exported.

Since Prince Edward Island has never established a natural sciences museum, this project is an initial step towards the possible development of a provincial natural sciences collection. Such a collection, with supporting documentation enables both public education and scientific research. The lack of a central repository of natural science specimens has resulted in the loss and destruction of some PEI specimen collections. Our goal is to contribute to the knowledge base needed to understand the species biodiversity of Prince Edward Island. This report represents a compilation of existing natural science specimens collected in Prince Edward Island. There are specimens recorded in the 1983 report and new records from the late 1800's up to 2014. This inventory shows some of the gaps in research and specimen collection.

The ability to integrate specimen data and associated information with current research will enable critical studies related to changing species distributions, climate change, changing land use, and other questions key to understanding the past, and predicting the future of species and ecological environments. Natural history collections, including higher and lower plants, invertebrates and vertebrates, marine and freshwater species, the common and the rare are a crucial first step in understanding and, ultimately, protecting biodiversity. Without a public natural history museum we cannot effectively utilize the information obtained for this report, nor build a collection for the years to come.

Acknowledgements

I am indebted to many kind individuals for helping me gather information for this report. Without their assistance I would not have been able to produce the comprehensive summary of Prince Edward Island natural science specimen collections, found in various institutions and in private collections scattered across the continent.

A special thanks to Rosemary Curley, Conservation Biologist for the Prince Edward Island Department of Agriculture and Forestry - Forests, Fish and Wildlife Division who shared her many contacts in the field of Natural History and provided valuable information and editorial assistance. I am also grateful to David Keenlyside and the staff of the PEI Museum and Heritage Foundation; they made me feel at home in my temporary work place, and were very accommodating during the process of writing this report. Lastly, a big thank you to the following people who either arranged a tour of their institution or provided extensive information for this project:

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Approach

Several methods were adopted to develop this inventory. All institutions on Prince Edward Island, The Maritimes, other Canadian provinces and the United States that potentially had natural history specimen in their collection were approached. Potential collections were first identified by reviewing the list of institutions indicated in the 1983 inventory report and in particular the institutions that were holding PEI specimens in their collection. Sixty-five letters were sent in January 2014; 25 responses were received (Appendix 2).

Web portals with multiple institutions' databases and individual institutional digital databases were consulted and explored.

In addition, researchers who collected specimens on the Island and published their information were contacted to determine where specimens were deposited. Contacting researchers in the field led to more contacts and new leads to find PEI data. A collective total of 71 researchers, museum curators and people in the field of natural history were contacted via email or phone (Appendix 3).

Three Maritime institutions were visited over the course of this project: The New Brunswick Museum, The Nova Scotia Museum and the E.C. Smith Herbarium at Acadia University.

A request for information on PEI science specimens was advertised on the Museum and Heritage Foundation website and Facebook page; Nature PEI - The Natural History Society of PEI; Island Nature Trust, and shared via other Facebook pages, such as Birding on PEI. An introduction to the project and request for information on PEI science specimens was made during the Nature PEI meeting February 4, 2014.

A Survey of Natural History Collections; where is everything?

Prince Edward Island

Provincial Government

- Department of Agriculture and Forestry: Forests, Fish and Wildlife Division
- PEI Museum and Heritage Foundation – Artifactory

University of Prince Edward Island

- UPEI Biology Museum
- Herbarium Specimen Collection
- Canadian Wildlife Health Cooperative– Atlantic Veterinary College

Prince Edward Island National Park

Agriculture and Agri-Food Canada, Charlottetown and Harrington

PEI Community Museums Association

Holland College - Wildlife Conservation Technology Program

Island Nature Trust

MacPhail Woods Ecological Forestry Project

Hillsborough River Eco-Centre, Mt. Stewart

Taxidermy PEI

New Brunswick

- New Brunswick Museum, Saint John, NB
- Connell Memorial Herbarium, Fredericton, NB
- ARC Fisheries and Oceans Biological Station, St. Andrew, NB
- Gulf Fisheries Centre, Department of Fisheries and Oceans, Moncton, NB

Nova Scotia

- Nova Scotia Museum, Halifax, NS
- E.C. Smith Herbarium, Acadia University and Biology Department, Wolfville, NS
- Cape Breton University, Sydney, NS
- Thomas McCulloch Museum, Dalhousie University, Faculty of Science – Biology.

Canada

- Biodiversity Institute of Ontario, Herbarium, Guelph, ON
- Canadian Museum of Nature, Ottawa, ON
- Royal Ontario Museum, Toronto, ON
- Royal British Columbia Museum, Victoria, BC
- Royal Alberta Museum, Edmonton, AB
- The Manitoba Museum, Winnipeg, MB
- Canadian National Collection - K.W. Neatby Building on the historic Central Experimental Farm in Ottawa, Ontario
- University of British Columbia - Beaty Biodiversity Museum, Cowen Museum, Vancouver, BC
- National Resources Canada, Ottawa and Calgary
- Louis-Marie Herbarium at Laval University, Quebec, QC
- Marie-Victorin Herbarium at the University of Montréal, QC
- Kamloops, BC, Robert Forsyth Collection
- B. A. Bennett Herbarium, Yukon Government
- Lyman Entomological Museum and Research Laboratory, McGill University, Ste-Anne-de-Bellevue, QC
- University of Alberta Vascular Plant Herbarium, Edmonton, AB
- Redpath Museum, McGill University, Montreal, QC
- Laval University, Quebec QC

United States

- New York Botanical Gardens, NY
- University of Maine at Fort Kent Herbarium, ME
- Austin Peay State University Herbarium, TN
- Stanley L. Welsh Herbarium; Brigham Young University, Provo, UT
- Intermountain Herbarium, Utah State University, Logan, UT
- Rocky Mountain Herbarium, University of Wyoming, Laramie, WY
- Farlow Herbarium at Harvard University, Cambridge, MA
- Gray Herbarium at Harvard University, Cambridge, MA
- Delaware Museum of Natural History, Newark, DE
- University of Minnesota Lichen Herbarium, MN
- Museum of Southwestern Biology, University of New Mexico, Albuquerque, NM
- Museum of Vertebrate Zoology, University of California, Berkeley, CA
- Museum of Comparative Zoology, Harvard University, Cambridge, MA
- Smithsonian National Museum of Natural History, Washington, DC
- University of Washington Herbarium (Burke Museum), Seattle, WA

- Washington State University, Marion Ownbey Herbarium, Pullman, WA
- Field Museum of Natural History, Chicago, IL
- University of Michigan Herbarium, MI
- Missouri Botanical Garden, St Louis, MO
- The Academy of Natural Sciences, Philadelphia, PA
- University of Georgia, GA
- Fitchburg State University, Fitchburg, MA
- University of Idaho, Stillinger Herbarium, Moscow, ID
- University of Alaska, Museum of the North, Fairbanks, AK
- Monte L. Bean Life Science Museum, Brigham Young University, Provo, UT
- C.P. Gillette Museum of Arthropod Diversity, Department of Bioagricultural Sciences and Pest Management, Fort Collins, Colorado
- Moore Laboratory of Zoology, Occidental College, Los Angeles, CA
- Cornell University Museum of Vertebrates in Ithaca, NY

United Kingdom

- Royal Botanic Gardens, Kew, England

What was studied and collected in Prince Edward Island?

Geology (Rocks)

1. The PEI Museum and Heritage Foundation Artifactory, Charlottetown has a rock - fossil collection of 30+ samples collected by Francis W.Bain (February 25, 1842 – November 20, 1894) donated by his granddaughter Mrs. Noami Newson. Bain was a farmer, author and scientist from North River, Prince Edward Island. In 1865 he began a career as an amateur naturalist, collecting and cataloguing the flora, fauna, and seashells of the Island. He was especially interested in geology, and became an expert on the bedrock and fossils of PEI. Bain wrote on natural history in a column in the *Daily Examiner*, as well as publishing many papers in scholarly journals. He authored two books "*The natural history of Prince Edward Island*" (Bain, 1890) and "*Birds of Prince Edward Island* "(Bain, 1891). Francis Bain is also known for an 1882 study, in which he explored the possibility to dig a tunnel under the Northumberland Strait, fulfilling the federal government's commitment to have a fixed link with the mainland.

2. Earle Kennedy was an amateur fossil/mineral collector who donated a large collection consisting of almost 190 rocks and fossils that were collected primarily at Miminegash, Victoria beach, and Hillsborough Bay. Earle Kennedy was a colonel and Second World War veteran, Clerk of the Legislature and author. The collection includes 16 specimens from Nova Scotia and was catalogued at the Museum and Heritage Foundation Artifactory in 1985. Part of the collection is on long-term loan to the UPEI fossil collection at the biology museum.

Earle Kennedy collection, described as: mineral-barite-fossil-tree stem, collected at Hillsborough Bay.

3. Natural Resources Canada has 396 rock samples at the NRC Calgary facility (Appendix 4).
4. The Royal Ontario Museum, Toronto, Ontario has a single geological specimen in the form of a saponite sample. Saponite is a soft mineral that exists in veins and cavities in serpentinite (rock) and basalt (volcanic rock). It was found at Hog Island, Richmond Bay at the NW Coast of PEI. It has accession number M6470, drawer 207-8. It was accessioned March 1st, 1913, from the W.F. Ferrier collection.

Palaeontology (Fossils): Invertebrate and Vertebrate

1. The Academy of Natural Sciences of Philadelphia, Drexel University, Philadelphia, Pennsylvania has a significant Prince Edward Island fossil in its collection: *Bathygnathus borealis* (Leidy). This unique fossil of a dimetrodon or sail-backed reptile (a scaly carnivorous animal that could grow 3 meters in length) was found in 1845 in French River, PEI and was examined by Joseph Leidy and donated to the museum in 1854. Dimetrodon prospered during the middle Permian period, between 280 and 265 million years ago. The first dinosaurs, according to the current state of our knowledge, evolved in South America during the middle Triassic period, about 50 million years later. John DeGrace wrote an article about the fossil for the Island Magazine Fall/Winter 1992 edition titled “Bathygnathus comes Home,” in which he tells about the cast of the specimen that was provided to the UPEI Biology Department. The specimen is also featured on a silver coin issued by the Royal Canadian Mint in 2013.

Replica of *Bathygnathus borealis* (Leidy) at the University of Prince Edward Island

2. A Reptile fossil was found by Michael Arsenault from Summerside on the shores of Egmont Bay c. 1992. The original fossil is approximately nine inches in length. It was bought by the Royal Ontario Museum, which provided the finder with a plaster cast replica. This fossil depicts a reptile that lived in Prince Edward Island 285 million years ago.

Reptile fossil, found at Egmont Bay. Photo credit: Betty Sheen

Fossil trackway found at Selkirk. Photo credit: Matt Stimson

3. A fossil track way was found in Selkirk in 2012. Geology student Matt Stimson and Danielle Horne found the prints on a rock on the shore near Belfast Highland Greens golf course. The prints look like they may have been made by an amphibian, or a reptile, or something in between. There are eight footprints in a single trackway and 2 different foot prints side by side presumingly from the same species. There is a third trackway with smaller foot prints crossing the larger track about 90 degrees. Its estimates that the prints were made in the Permian Period, 290 million years ago. Interestingly, some of the trackway footprints have a 6^{th} toe. It's speculated that this could be a cartilaged toe, a genetic defect or dewclaw. More studies will be conducted. Finder Mat Stimson is working on a publication on this find.
4. There is a collection of 40-50 Island fossil specimens at the University of Prince Edward Island and the PEI Museum and Heritage Foundation, collected by amateur palaeontologist John DeGrace. The collection contains several specimens showing Pecoptris sp. (tree fern), Walchia (ground fern) and Calamite plant stems.

5. Three community museums have potential fossil collections; the Garden of the Gulf Museum in Montague has one undetermined fossil and there is a potential fossil in the Alberton Museum that came from the Mrs. Oulton collection. There is possible fossilized whalebone in the basement of the Keir Museum in Malpeque. These potential fossils need further examination, but there wasn't access to the museums due to snow and some of the museums were still closed when the inventory was developed.
6. The New Brunswick Museum holds three PEI fossils, including a plaster replica of *Bathygnathus borealis*. There is a walrus tusk *Odobenus rosmarus,* found at the Gulf of St. Lawrence and a fossil representing three sets of footprints, including *Gilmoreichnus kablikae,* a tetrapod footprint track way found in Point Prim. The fossil was found in 1986 at the south shore of the Hillsborough Bay (Mossman and Place, 1989).
7. Natural Resources Canada has 76 records of fossils in their Ottawa facility (Appendix 5).
8. Redpath Museum at McGill University has a few replica reptilia and 31 paleobotanical specimens, including 4 specimens collected by Francis Bain. Most specimens were collected at Gallows Point and Miminigash; collection dates are unknown (Appendix 5B).

Botany: Phycology/Algae, Lichens, Fungi, Bryophytes and Vascular plants

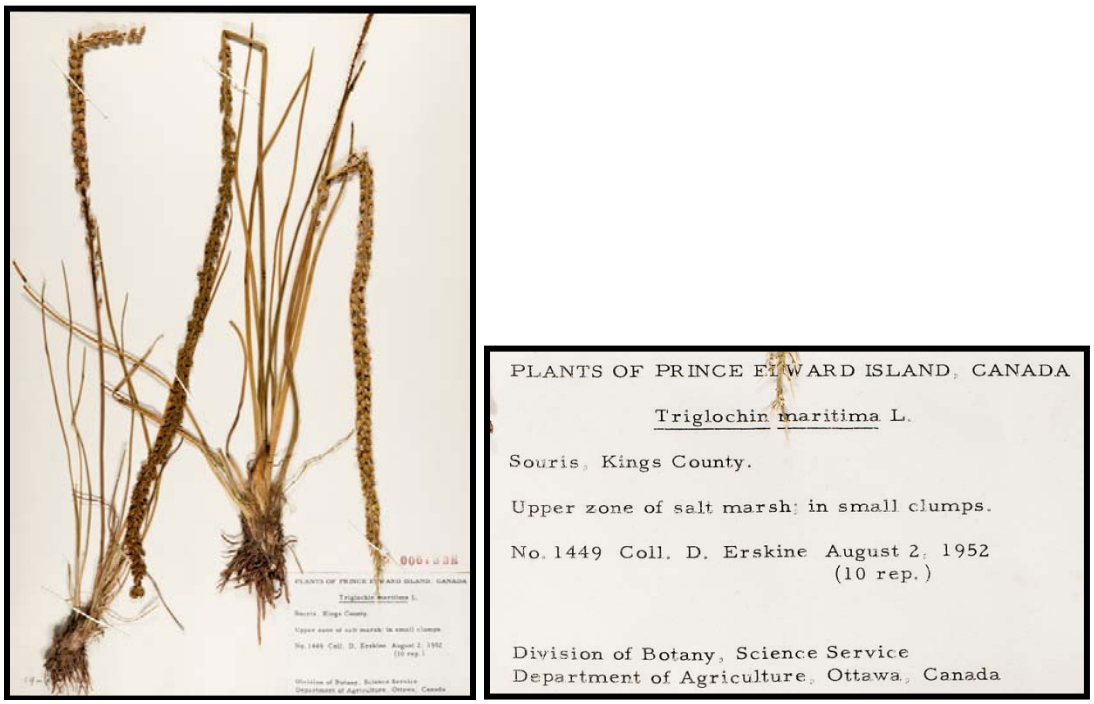
The Plants of Prince Edward Island by David Erskine and published in I960 (out of print), was a very popular publication. A lot of relevant research to the flora of Prince Edward Island has been conducted and more information on vegetational history and geology has become available after the 1960 edition. Vascular plant species that were not known before, had been discovered on the Island, and additional localities were discovered for some rare species. The book was reprinted in 1985 to improve its utility (Erskine 1985). Since then, plants have been collected for a planned new edition of the Flora of Prince Edward Island.

"Plants of Prince Edward Island" (1960) and "The Plants of Prince Edward Island" (1985)

Institutions with multiple Taxa in one data set

1. The University of Prince Edward Island digital herbarium collection has 2072 specimens. This digital database has scanned images of the collection and is composed of plant samples collected by the Biology Department, University of Prince Edward Island and a collection that was moved from Agriculture and Agri-Foods Canada. Plant samples have been collected since 1969 and the digital version of the collection was created in August 2010 by the UPEI Robertson Library. The herbarium sheets can be found at the UPEI biology museum in the Duffy Science Centre on the UPEI campus (Appendix 6)
2. Agriculture and Agri-food Canada has a herbarium divided into 168 plant families with folders that contain 1 to 30+ sheets at the research station at Brackley Point Road in Harrington. The specimens were primarily collected from the 1940s -70s. Most specimens were collected by David Erskine for the "Plants of Prince Edward Island" book, first published in 1960. Included in the herbarium is a 1988 reference collection of weed seeds with approximately 124 species from which it is not sure if they were collected in PEI. Some of the botany collection was moved to the UPEI-biology department when the Agiculture Canada library was closed. There are no digitized records of the herbarium (Appendix 7).
3. Island Nature Trust has herbarium sheets from various projects. A large collection of 620 mounted specimens from various plant communities were collected in 1984 and donated to the Museum and Heritage Foundation, but kept at the Trust. This collection will eventually be moved to the MHF. Other collections contain work for the PEI National Park, Maritime Electric – transmission line work and the "Flora of Prince Edward Island" book project, which were mainly collected in 2003 and 2005. Rare specimens were sent to the E.C. Smith herbarium at Acadia University or to the UPEI herbarium. The ratio of mounted and unmounted specimens for the latest projects is 4:1 with approximately 50 mounted and 200 unmounted specimens.
4. The Holland College Wildlife Conservation Technology Program botany teaching collection (uncatalogued), represents different communities such as beach and dune, bogs, pond/riparian, forest, plus a winter twig collection.
5. The E.C. Smith Herbarium at Acadia University, Wolfville, NS contains over 200,000 specimens, including vascular plants, bryophytes, and fungi. It is the largest herbarium in Atlantic Canada and the first Canadian herbarium to have digital database with scanned images of the collection. There are 4232 PEI specimens of 1260 species; description is in alphabetical order by Family, Genus and Specific Epithet/Species order (Appendix 8).

6. The Nova Scotia Museum of Natural History botany collection in Halifax contains more than 60,000 specimens. These include a herbarium of 20,000 sheets of vascular plants. Significant collectors include the Erskines - David and his father, John. The herbarium contains over 1300 Island specimens (Appendix 9).

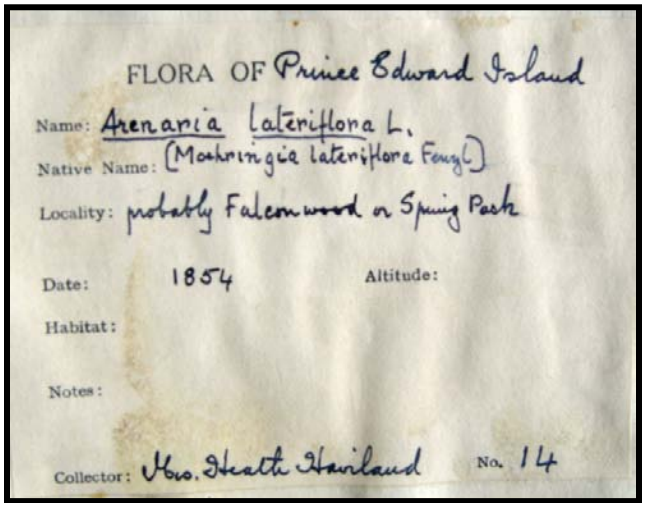


Sea Arrowgrass, *Triglochin maritime L.*, collected in Souris in 1952 by David Erskine. Photo provided by Marian Munro, Nova Scotia Museum.

7. The Canadian Museum of Nature in Ottawa has 1,182 bryophyte, 160 lichen, 592 vascular plant records, and 2 alga records. The earliest collections were made by Macoun, J.; Fernald, Merritt L.; Bartram, Edwin B.; Long, Bayard; St. John, Harold in the late 1800's and early 1900s. A large number of bryophyte specimens were collected by Fabiszewski, J.; Grandtner, Miroslav M. in the PEI National Park in 1970. This collection contains 5 Isotypes, 1 Syntype and 10 Paratype specimens (Appendix 10).

A Type specimen is a specimen selected to serve as a reference point when a plant species is first named. As a result, these specimens are extremely important to botanists who are attempting to determine the correct application of a name. A Holotype is the single specimen designated as the type of a species by the original author at the time the species name and description was published. The Isotype is a duplicate specimen of the holotype. Syntype: Any of two or more specimens listed in the original description of a taxon when a holotype was not designated. Paratype are specimens not formally designated as a type but cited along with the type collection in the original description of a taxon (source: New York Botanical Garden-Type definition).

8. About 900 PEI bryophytes, lichens, fungi and vascular plants are databased in the New Brunswick Museum but there is a backlog of about 1500 uncatalogued specimens, mostly of fungi, and some lichens.
9. The Consortium of Pacific Northwest Herbaria has a web searchable database, with 172 PEI records divided between the University of British Columbia, University of Washington Herbarium and Washington State University-Marion Ownbey Herbarium. Some of these records are already represented in other databases compiled.
10. Harvard University Herbaria (Gray Herbarium and Farlow Herbarium) currently have 48 vascular and non-vascular plant records collected in Prince Edward Island. Two Fly agaric, *Amanita muscaria*, collected on August 16 and 24, 1888 and a Blusher mushroom, *Amanita rubescens* were collected by J. Macoun on August 19, 1888 (FH). M. L. Fernald, B. H. Long and H. St. John collected in 1912 and the latest specimens were collected by D. B. Strongman in 2002 and 2004. This dataset contains a number of Type, Holotype, Isotype and Syntype specimen collected in the early 1900's. The specimens are searchable online and a dataset was provided with 39 specimens (Appendix 11).
11. The Herbarium at the Royal Botanic Gardens, Kew, England, houses approximately 7 million specimens, collected from all around the world. It holds what is known as the *earliest* PEI botany collection, which was deposited by Miss Margaret Grubbe in 1944. The specimens were collected between 1849 and 1854 by Miss Grubbe's great-grandaunt, Ann Elizabeth Grubb-Haviland, wife of Father of Confederation, Thomas Heath Haviland Jr. (Vass 1994).


FLORA OF Prince Edward Island

Name: Arenaria lateriflora L.

Native Name: (Moehringia lateriflora Fenzl)

Locality: probably Falconwood or Spring Park

Date: 1854 Altitude:

Habitat:

Notes:

Collector: Mrs. Heath Haviland No. 14

Label for Mrs. Heath Haviland's plant sheet; Courtesy of the Royal Kew Gardens.

The small collection of 32 specimens collected by Mrs. Grubb-Haviland was given to Mrs. M.M. Whiting who was connected to the Kew Gardens and wrote an article on this PEI collection in the Kew Bulletin (Whiting 1948). The collection included *Cornus*

Canadensis, Rhodora Canadensis, Kalmia angustifolia, Ledum latifolium, Epigaea repens, Moneses uniflora, Linnaea borealis, Betula papyrifera, two species of Pyrola and four Lycopodium (Appendix 66).

Ann Elizabeth Grubb-Haviland (1818-1902), with her daughter, Blanche (Vass, 1994).

Phycology (Algae)

1. Dr. Jack McLauchlan collected seaweed in Prince Edward Island and all of the collections, originally deposited at the National Research Council, are now housed in the NS Museum herbarium, where PEI seaweeds are well represented. The National Research Council Research Press in Ottawa provided an article about Irish moss, *Chondrus crispus* from its archives co-written by Dr. McLachlan, mentioning comparative growth of Irish moss around the Maritimes, specifically in PEI (Chen and McLachlan, 1972).
2. Dr. Irene Novaczek collected seaweed specimens for various research projects while working for the National Research Council (Novaczek and McLachlan, 1989). Some of her specimens can be found at the Nova Scotia Museum. She has a small collection of specimens (29) dating back to the early 80s, collected by D. LeVangie. Digital images are available at the Museum and Heritage Foundation (LeVangie, 2009).

3. University of British Columbia – Beaty Biodiversity Museum, Vancouver, Department of Botany has 3 records of marine algae collected by John Macoun and found in the online UBC Herbarium database. Irish moss, *Chondrus crispus*, was collected at Brackley Point on June 22, 1888, Goat tang, *Polyides rotundus* (Hudson) Gaillon, collected on June 26, 1888 (no location indicated), and Bushy Ahnfelt's Seaweed, *Ahnfeltia fastigiata* collected at Brackley Point on July 30, 1888.
4. Canadian Museum of Nature, Ottawa has 407 phycology records from PEI. The earliest record is *Fucus spiralis*, a brown alga, with the common name of spiral wrack or flat wrack, collected by J. Macoun at Brackley Point on July 3, 1880. An image is available online. Red seaweed, *Corallina officinalis,* was collected and identified by R.K.S. Lee. This specimen was collected on August 1, 1968 about 300 yards off-shore from Miminegash Harbour and dredged from an Irish moss rake of dragger, at 2-4 m depth.

Corallina officinalis, Red seaweed collected at Miminegash Harbour, Museum of Nature.

5. The Smithsonian National Museum of Natural History has 133 records consisting mostly of algae collected by Dixon, P. S. (1960), Adey, W. H. (1964) and Lee, R. K. S., Sutherland, A. in 1969 (Appendix 12).

Fungi (Including Mushrooms and their relatives)

1. The New Brunswick Museum has 247 catalogued fungi in their collection. There is a backlog of 1500 uncatalogued specimens, mostly of fungi, and some lichens. Most fungi were provided to the museum by Adrian Carter (234) and David Malloch (12) (Appendix 13).

2. The University of British Columbia – Beaty Biodiversity Museum, Department of Botany has 9 records in its fungi online database. The specimens were collected in 1888, 1912 and 1964. The 1888 (July 17) record is Norwegian ruststift, *Stemonitis ferruginea,* found at Brackley Point by John Macoun. *Stemonitis* is a distinctive genus of slime moulds found throughout the world (except Antarctica). They are characterised by the tall brown sporangia, supported on slender stalks, which grow in clusters on rotting wood. Identification within the genus is difficult, and can only be performed with confidence using a microscope. This specimen was found on birch bark.
3. The University of Washington Herbarium (Burke Museum) has three PEI fungi records. The specimens were collected by J. Traquair in 1977; two records of Destroying angel, *Amanita virosa* (a deadly mushroom when eaten accidentally), and one Roundhead, *Stropharia.* Details on these specimens can be found via the Consortium of Pacific Northwest Herbaria searchable web database.
4. University of Maine at Fort Kent Herbarium has specimens collected and published by Steven Selva for his "Calicioid Lichens and Fungi, with Substrates study for Prince Edward Island" publication (Selva 1998). A list of Species and Substrates can be found in (Appendix 14)
5. *Ejectosporus trisporus* Strongman (no common name known), a "Paratype" specimen was found by Strongman in Tyne Valley on August 18, 2010. Interestingly, the host of this fungus was a Pygmy stonefly, *Allocapnia pygmaea.* The specimen was deposited at Harvard University Herbarium (Appendix 11).

Lichens

Much of the information below has been summarized in a recent paper by Troy MacMullin (McMullin et al. 2012).

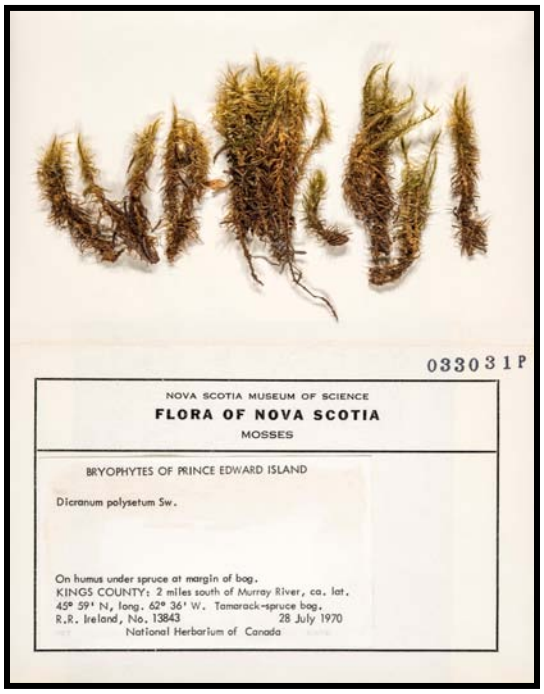
1. The first known lichen collection made on PEI was in 1888 by Canada's first "Dominion Botanist", John Macoun (McMullin 2012). His collection is stored at the Canadian Museum of Nature and was published in 1902 (Macoun 1902). There are 160 digitized records of lichens at the Museum of Nature (Appendix 10).
2. The next collection on the Island was made in 1904, by James Fowler. It is a single specimen Pincushion Sunburst Lichen*, Xanthoria polycarpa* housed at the Farlow Herbarium at Harvard University.
3. It was not until 1953 that another collection was made by David Erskine, which is also a single record; Reindeer Lichen, *Cladonia rangiferina,* is stored at the Canadian Museum of Nature.

4. Hinrich Harries of Mount Allison University and his student Daryl Guignon collected about 60 specimens of macrolichens in Kings and Queens Counties in 1965 and 1969; these are now housed at the New Brunswick Museum.
5. Robert Ireland made collections in 1967 and 1970, all of which are stored at the Canadian Museum of Nature.
6. The University of British Columbia – Beaty Biodiversity Museum, Department of Botany has three lichen records, the earliest collection date is 1963. Two Maritime Sunburst Lichen, *Xanthoria parietina* were collected by R.F Cain in Kensington on August 2, 1963 and Strigose Beard Lichen, *Usnea strigosa,* by Trevor Goward and Miss Fredrickson in 1977; location unknown.
7. Jerzy Fabiszewski made a collection in 1970; the collection is housed at the Canadian Museum of Nature, the Louis-Marie Herbarium at Laval University and the University of Minnesota Lichen Herbarium (McMullin et al. 2012).
8. University of Maine at Fort Kent Herbarium has a collection of Calicioid Lichens and Fungi, with Substrates collected from PEI in 1995 and 1997 (Selva, 1998: Appendix 14).
9. Vegetation classification studies carried out by Sean Basquill in 2007-2009 included lichens; the relevant collections are at the New Brunswick Museum.
10. In 2002, Jean Gagnon made collections on Hog Island and the Conway Sand Hills, all of which are stored at Louis-Marie Herbarium at Laval University. Jean Gagnon has 72 records of lichens identified by Troy McMillan, who noted that the list include new species to the PEI checklist (Appendix 15).
11. Irwin Brodo made a collection in 2003 as did Frances Anderson in 2008; these are housed at Canadian Museum of Nature and the Biodiversity Institute of Ontario Herbarium, respectively.
12. Nova Scotia Museum of Natural History-David Richardson made the most recent collection in 2011 in the Townshend Woodlot Natural Area. The species in his collection that had not previously been recorded at this site were donated to the Nova Scotia Museum of Natural History.
13. Several additional collections were made by the staff of the Prince Edward Island Department of Environment, Energy and Forestry that were identified by Troy McMullin and stored at the Institute of Ontario Herbarium and the Prince Edward Island Museum and Heritage Foundation. These collections were made by Glen Kelly in 2007 and 2008, Michelle Hewitt in 2008, and Sandra Keough in 2010 (Appendix 16).
14. Rosemary Curley and Sandra Keough collected extensively for the PEI Department of Environment, Energy and Forestry in 2010; a total of 430 specimens were collected (Appendix 17). Lichens (71) were collected by Rosemary Curley (PEI Department of Agriculture and Forestry – Forest, Fish and Wildlife division) and Jennifer Doubt,

Canadian Museum of Nature, Ottawa in 2003, 2011 and 2013. Specimens were determined by Troy McMullin (Appendix 18).

15. There are 211 catalogued lichens at the New Brunswick Museum, primarily collected in PEI by Stephen R. Clayden, Hinrich Harries and Daryl Guignion. There is a backlog of some specimens (Appendix 19).

Bryophytes (Mosses and their relatives)



Rugose Fork-moss, *Dicranum polysetum Sw*, collected on July 28, 1970 by R.R. Ireland and stored at the Nova Scotia Museum Herbarium. Photo provided by Marian Munro, NS Museum

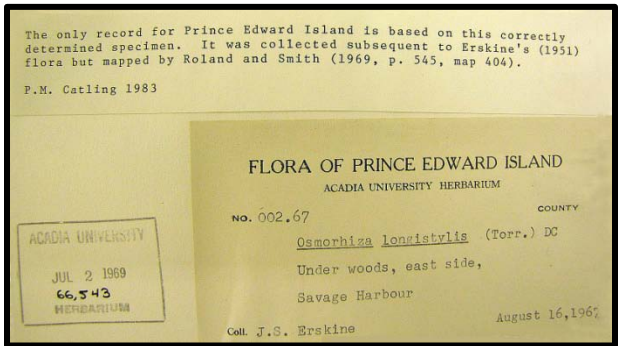
1. Forty-nine PEI Bryophyte specimens were collected for the PEI Department of Agriculture and Forestry – Forest, Fish and Wildlife division in 2007, 2008 and 2011 by R. Curley, G. Kelly and J. Doubt. Specimens were identified at the Canadian Museum of Nature in Ottawa and deposited at the PEI Museum and Heritage Foundation (Appendix 20).
2. There are 27 Bryoria specimens collected by Rosemary Curley in 2011 and 2013. Specimens were determined by Troy McMullin at the Biodiversity Institute of Ontario Herbarium and returned to the PEI Department of Agriculture and Forestry to be deposit at the PEI Museum and Heritage Foundation (Appendix 21).
3. The New Brunswick Museum has 80 catalogued bryophyte specimens. The oldest collection is by J. Macoun in 1888 and the latest collection was by C.S Blaney in 2011. (Appendix 22).
4. Jean Gagnon has ~50 bryophyte specimens at the Herbier Louis-Marie at Université Laval herbarium, collected in PEI that are not yet identified.

5. Canadian Museum of Nature has 1,182 bryophyte records, which can be found in Appendix 10. “CANM” in the dataset indicate bryophyte specimens.
6. The Royal Alberta Museum has 268 bryophyte specimens collected by Robert R. Ireland in 1970 (Ireland, 1982: Appendix 23).
7. University of British Columbia – Beaty Biodiversity Museum, Department of Botany Herbarium online database has 384 records with predominantly Robert R. Ireland specimens collected in 1970 and one specimen collected by John Macoun in 1888. The latest collection is from René J. Belland in 1991 at PEI National Park, (Belland 1995).
8. The New York Botanical Garden Online database, Advanced Search, shows 363 PEI specimens. These results reflect mainly bryophyte/mosses, but include phylum other than Bryophyta, (6 Pinophyta/Pine records by D.S Erskine) (Appendix 24). There are a total of 138 catalogued bryophytes in the herbarium. A collection of 50 John Macoun and some Robert Ireland liverwort specimens can be found in Appendix 25.
9. The University of Alaska, Fairbanks - Museum of the North has 17 cryptogam/bryophyte records that were found at the Consortium of Pacific Northwest Herbaria online resources. Specimens were collected in the summer of 1970 by R.R. Ireland (Appendix 26).
10. University of Michigan Herbarium has a record of Cypress-leaved plait-moss or hypnum moss, *Hypnum renauldii* Kindb. in Macoun in Hunter River collected by J. Macoun on July 3, 1888 and published in 1892 (Macoun 1892). This is a Bryophyte “Type” collection. Three duplicates were deposited at the Farlow Herbarium at Harvard University, Cambridge, MA. Formerly used as a filling for cushions, the association with sleep is originated in the genus name “Hypnum”, from the Greek word Hypnos.
11. The Smithsonian National Museum of Natural History in Washington, DC has *Hypnum renauldii* Kindb collected in Hunter River in their collection as a type registered specimen (Appendix 12).

Vascular plants (Including the Flowering plants, Conifers, Ferns, and allies)

1. The New Brunswick Museum has 371 catalogued specimens with the largest databased collection (2001-2008) by C.S. Blaney, followed by specimens collected in 1926 by M.O. Malte and H. Harries collected specimens in 1969/70 (Appendix 27).
2. The Connell Memorial Herbarium, Department of Biology, University of New Brunswick, is the oldest institutional collection in Canada (established in 1838). The herbarium houses over 63,000 specimens, with more than 43,000 currently available in the electronic database. The herbarium has 331 PEI vascular plant databased. Plants were collected from 1948 to 2000 (Appendix 28).

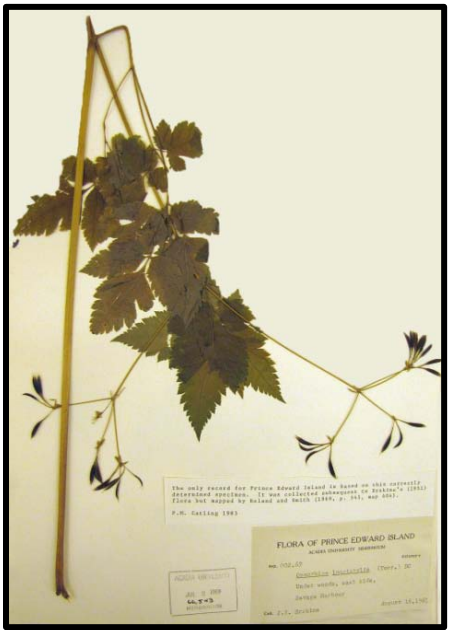
3. University of British Columbia – Beaty Biodiversity Museum, Department of Botany online database has 22 records. The earliest recorded specimen is *Acer nigrum* (Black maple), a species of maple closely related to *A. saccharum*, (sugar maple), and possibly identified as a subspecies by its collectors M.L. Fernald, Bayard Long and Harold St. John in 1912. This is a questionable record and not acknowledged by Erskine (1960). The largest collection was by W.G. Dore, Chris J. Marchant in 1967 and the two latest records are from 2012 by Jeffery M. Saarela.
4. The Manitoba Museum has 7 herbarium specimen records, collected from 1945-2002. Finly-nerved Sedge or Nerveless woodland sedge, *Carex leptonervia,* was collected in Marsfield by Dore, W.G.; Gorham, E. on June 24, 1945 (Appendix 29).


The only record for Prince Edward Island is based on this correctly determined specimen. It was collected subsequent to Erskine's (1951) flora but mapped by Roland and Smith (1969, p. 545, map 404).

P.M. Catling 1983

FLORA OF PRINCE EDWARD ISLAND
ACADIA UNIVERSITY HERBARIUM
NO. 002.67 COUNTY
Osmorhiza longistylis (Torr.) DC
Under woods, east side,
Savage Harbour
August 16,1967
Coll. J.S. Erskine

ACADIA UNIVERSITY
JUL 2 1969
66,543
HERBARIUM

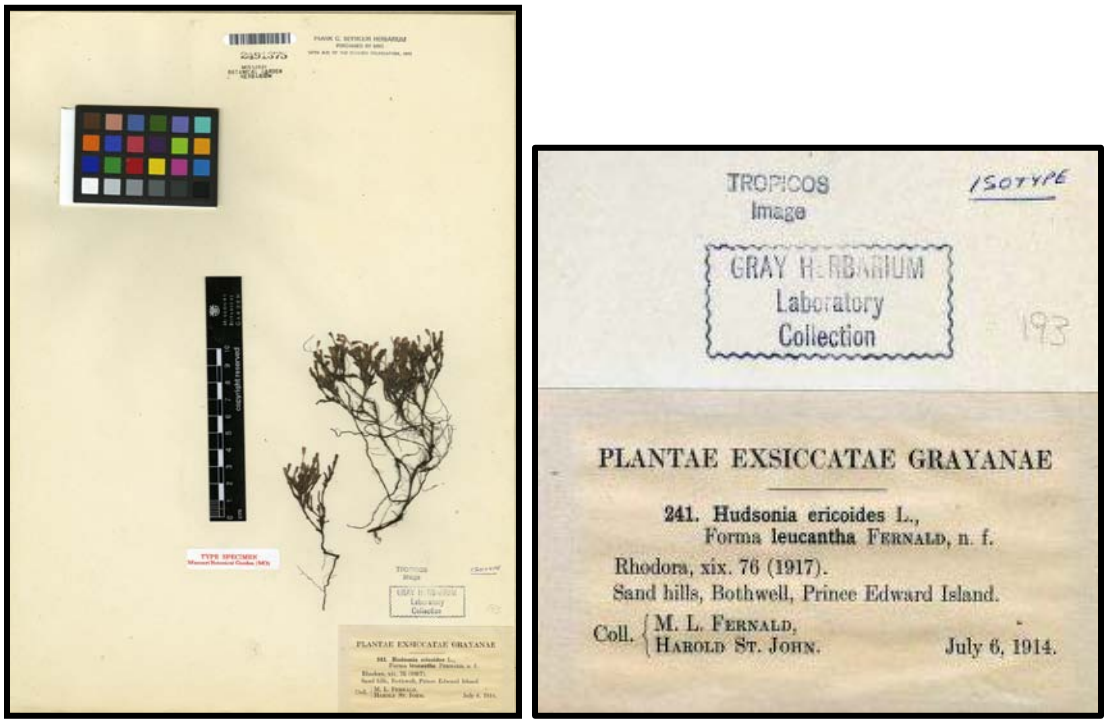


Sweet Cicely, Longstyle Sweetroot or Sweet Anise*, Osmorhiza longistylis*, is a native North America native perennial herb, collected by J.S Erskine in Savage Harbour on August 16, 1967. The E.C. Smith Herbarium holds this specimen.

5. The University of Alberta Vascular Plant online Herbarium has 6 records: Club moss, *Lycopodiella inundata* (L.), collected by Macoun, J. on July 27, 1888; Sheep's fescue, *Festuca ovina* L., collected by James Fowler in Malpeque on July 14, 1904. American beachgrass, *Ammophila breviligulata* Fernald, Saltmeadow cordgrass (2 specimens), *Spartina patens* (Aiton) Muhl. collected at North Lake Creek on August 24, 2002 by Saarela, J. M.; and slough grass or prairie cord grass, *Spartina pectinata* collected on the same date by Saarela J.M., Rarity S1, no specific location is indicated.
6. The Royal BC Museum has 9 specimens of two species of Siberian and Water worth water-milfoil, *Myriophyllum* that were collected in PEI in by Louis A. Hanic in 1980, and Diane Griffin and Rosemary Curley in 1987 (Appendix 30).

7. B. A. Bennett Herbarium, Yukon Government has three vascular plant records: Spinulose wood fern, *Dryopteris carthusiana* (Vill.) H.P. Fuchs, Common gypsyweed, *Veronica officinale* L., and Smooth white violet, *Viola maclowsky* Lloyd ssp. ssp. pallens collected by B.E Bennet in 2011. The records were found via the Consortium of Pacific Northwest Herbaria.
8. The Austin Peay State University Herbarium is the second largest herbarium in Tennessee with ca. 50,000 vascular plant specimens as well as several hundred bryophyte and lichen specimens. A rare PEI specimen, Mudwort, *Limosella australis* R. Br. was collected by M.L. Fernald and Harold St. John at a wet brackish sand flat in Grand Tracadie on August 22, 1914. This record was found via the South West Environmental Information Network database.
9. Stanley L. Welsh Herbarium, Brigham Young University, Provo, UT has 16 PEI botany records found in the South West Environmental Information Network database. Most specimens were collected by R. W. Coleman in June 1975. (App 31).
10. The Intermountain Herbarium at Utah State University has 12 PEI records. There are 8 records from 1914; the earliest record is Small pussytoes, *Antennaria petaloidea* (Fernald), collected in June 29 1914 by M.L. Fernald and Harold St. John in Morell. The latest record is from 1979: Tall manna grass, *Glyceria grandis S*. Wats., collected by J. McNeill near the Winter River in York on July 12, 1979. These records were found in the South West Environmental Information Network database.
11. Rocky Mountain Herbarium, University of Wyoming, Laramie, Wyoming, USA has one record from 1914, *Luzula campestris* (L.) DC. var. acadiensis was found in the South West Environmental Information Network database. The specimen was originally at the Gray Herbarium at Harvard University in Cambridge. According to the curator it is in excellent condition. The specimen can be found on the Rocky Mountain Herbarium website (Accession # 85141).
12. The Marie-Victorin Herbarium at the Université de Montréal is the second largest university herbarium in Canada and Quebec, and ranks fourth among all Canadian herbaria. It includes about 620,000+ vascular plants and 50,000+ bryophytes. Specimen preservation method is mounting. They have a collection of duplicates of PEI specimens from a large number of species from the Island, including specimens dating from the work for the original Flora of PEI (Appendix 32).
13. Field Museum of Natural History, Chicago, Illinois online database has one record, Rhodora, *Hudsonia ericoides f. Leucantha* Fernald, collected by M.L Fernald and H. St. John at Sand hills, Bothwell on July 6, 1914.

14. A duplicate of the previous specimen (Rhodora, *Hudsonia ericoides f. Leucantha* Fernald) was collected on the same day and housed at the University of Michigan Herbarium in Ann Arbor, Michigan. The herbarium also holds another Fernald specimen: Gulf of St. Lawrence aster, *Aster laurentianus,* collected at Brackley Point on August 31, 1912. This is the "Type" locality for this species.
15. Washington State University, Marion Ownbey Herbarium has one vascular plant record; Naked bishop's cap, *Mitella nuda* L., collected by M. L. Fernald on July 5, 1914 in Harmony, Kings Co.
16. The University of Idaho, Stillinger Herbarium in Moscow, ID has a mounted Cinnamon fern, *Osmunda cinnamomca. L*, collected at Malpeque Bay by James Fowler on July 16, 1904. The herbarium specimen data was provided by University of Idaho Stillinger Herbarium, (accessed through the Consortium of Pacific Northwest Herbaria web site).
17. While searching for the Grubb-Haviland collection, one specimen of Oldpasture bluegrass, *Poa saltuensis* was found in the Royal Kew Gardens herbarium. It was collected in open woods in Morell by Fernald M.L. and St. John, H. on June 29, 1914.
18. Golden-heather, *Hudsonia ericoides L.* collected by M.L. Ferald and H. St. John in Bothwell on July 6, 1914 was originally stored at the Gray Herbarium at Harvard University, Cambridge, MA. It was found in the Missouri Botanical Garden in St. Louis via the EOL (Encyclopedia of Life) online data records. Museums exchange specimens on occasion.



Golden-heather, *Hudsonia ericoides L.,* collected by M.L. Ferald and H. St. John in Bothwell on July 6, 1914; stored at the Missouri Botanical Herbarium in St Louis, MO

Molluscs

Institutions with multiple Taxa in one data set

1. The Nova Scotia Museum has 228 records of molluscs in its collection. There is a mixture of freshwater and terrestrial species collected in the mid-1960s by Ursula Grigg. There are 300 catalogued batches (averaging 5-10 per sample) of molluscs from PEI that have not yet been entered into the museum database (Appendix 33).

Mollusc species collected in the mid-1960s by Ursula Grigg; deposited in the NS Museum.

2. Robert Forsyth is a research associate with the Royal BC Museum, Victoria and the New Brunswick Museum in Saint John, NB. He is also subject editor for the *Check List, Journal of Species List and Distribution.* In his collection are 102 air-breathing land slug and snail specimens from a number of taxonomical families of terrestrial pulmonate gastropod molluscs found in Prince Edward Island, collected from 2006-2010. Many of the species determinations are provisional. The specimens are in his private research collection in Kamloops, BC. Twenty-nine records of approximately 14 species are planned to be deposited in the New Brunswick Museum, within the next year or year-and-a-half (Appendix 34).
3. This inventory report contains native Prince Edward Island species, but it is possible to find non-native species that make the province their home. Increased global travel and trade has expanded the range of certain species. An example of this is the Copse snail *Arianta arbustoru.* It seems to expand its well-established presence in eastern Canada. The first occurrence of this non-native and alleged potential pest on Prince Edward Island was reported on 2 July 2013, when 2 specimens of Copse snail were collected

about 33 m apart along the grassy edge of the Confederation Trail in Summerside, PEI. It is important to document information about current or anticipated distributions of non-native species to set priorities for the control of any potential pest. More information can be found in an article published in the *Northeastern Naturalist* (McAlpine and Forsyth 2014).

Copse Snail, *Arianta arbustorum* (Helicidae), on Prince Edward Island. Photo, McAlpine and Forsyth (2014), with permission.

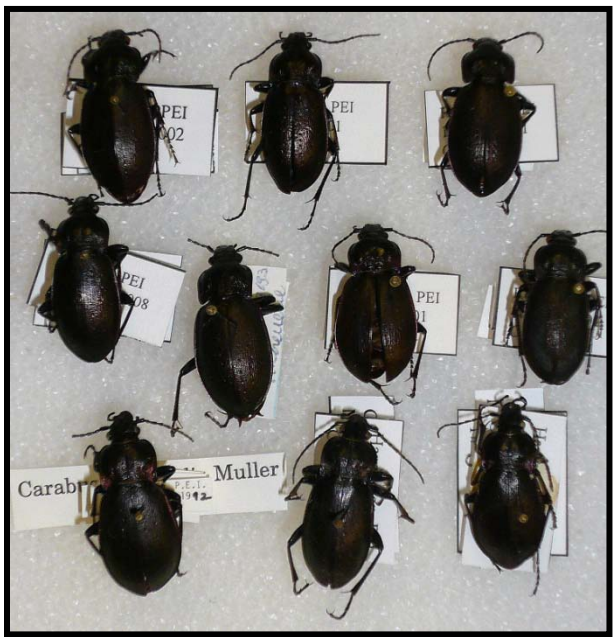
4. The Atlantic Reference Centre (ARC), based in St. Andrews, New Brunswick is a research museum for Canadian Atlantic marine life and a centre for biodiversity information and applied environmental research. The Huntsman Marine Science Centre and Fisheries and Ocean Canada (DFO) created the ARC to archive samples of Canadian Atlantic marine life collected by research surveys and as an archive of taxonomic and biodiversity information. ARC has one dataset with 125 PEI records, primarily lobsters in their larval stages collected by DFO and other vessels in Northumberland Strait. Specimens are catalogued, preserved in 50% isopropyl alcohol, and shelved taxonomically at the ARC facility in St. Andrews (Appendix 35). There are many more Northumberland Strait lobster larvae to be catalogued, including PEI specimens. There is another dataset with 9 invertebrate specimens including whelk, parasites and sea snails (Appendix 36).
5. The Museum of Comparative Zoology at Harvard University in Cambridge, MA has 114 malacology (snails, slugs and clams) records. Specimens were collected at various locations from Darnley, Cabot Park, and Bedeck to Miscouche in 1972-1973 by E. V. Thompson (Appendix 37).

6. The Manitoba Museum has 7 invertebrate, and one ornithological record (Appendix 29).
7. The Delaware Museum has 171 PEI mollusc records primarily collected by R.W. Coleman in 1975 (App 37B).
8. The Academy of Natural Sciences in Philadelphia has 170 malacology records. Specimen details can be found in their online database. The web address is provided in the "Database - Individual institutions" section of this report.

Entomology (Insects and allies)

Institutions with multiple Taxa in one data set

1. Agriculture and Agri-Food Canada in Charlottetown, has 1573 entomology records. In the collection are a number of educational displays for agriculture fairs and school tours. Research and collections expansion depends on funding from research proposals. One such specific project was the Carabidea (ground beetle) collection. Specimens found at other projects (not targeted towards a specific group) are also added to the collection after going through the identification process (Appendix 38).



European ground beetle, *Carabus hemoralis,* at Agriculture and Agri-Food Canada, Charlottetown, PE

2. Holland College Wildlife Conservation Technology Program has various large mixed trays with insects collected by students in the 2-year program. The insects are not all from PEI as students carry out this collecting project over the summer months and possibly in their home province.
3. Including backlogged material, the New Brunswick Museum is approaching 10,000 specimens from Prince Edward Island. There are 2776 recorded insect specimens. This is a modest estimation as insects are catalogued as "lots" (Appendix 39).

4. The Brigham Young University Arthropod Collection is housed in the Monte L. Bean Life Science Museum in Provo, Utah. It totals approximately 2,000,000 specimens, mostly insects. Although worldwide in coverage with an emphasis on western North America, 21 PEI specimens (mostly stoneflies) have been deposited at the museum (Appendix 40).
5. Fifty-seven PEI atrophod specimens are stored at McGill University. The records were found at the Southwest Collections of Arthropods Network (SCAN) online database. Specimens were collected by W.E. Smith and W.L. Seaman in the 1950s and T.A. Wheeler in 1996. The oldest specimen is Tachinidae (true Flies; no species name) collected in Charlottetown on July 1, 1948 and a Goldeneyed Lacewing, *Chrysopa oculata Say*, collected on July 1, 1949 in Charlottetown and determined by J.A. Garland in 1979.
6. The Museum of Comparative Zoology, Harvard University Cambridge, MA has 143 entomology records including two fire ants*, Myrmica rubra*, collected by James Wetterer in 2008 (Wetterer 2010). Records can be found online and in Appendix 37
7. The C.P. Gillette Museum of Arthropod Diversity, Department of Bioagricultural Sciences and Pest Management, Fort Collins, Colorado has a PEI Ground beetle, *Patrobus longicornis,* collected by R.S. Beal on August 13, 2000 in Stanhope. This record was found via the Southwest Collections of Arthropods Network (SCAN).
8. Parks Canada – PEI National Park has done multi-year Invertebrate Benthic studies, surveying for the Canadian Aquatic Biomonitoring Network (CABIN). Sampling data collected from 2008 – 2013 are stored at the Parks' Greenwich lab facility (Appendix 63).

Odonata (Dragon flies and Damsel flies)

Voucher with Four-spotted Skimmer at NBM, collected by Caleb and Robert W. Harding.

1. Robert W. Harding and his family (Jacob, Jordan, Clayton and Caleb) from Summerville, PEI are major contributors to the dragonfly and damselfly collection at the New Brunswick Museum. Jacob also collected for the province while working for the PEI Environment Department, Fish and Wildlife Division. Robert W. Harding is the principle contemporary contributor who has drawn members of his family into this interest. He has 2,640 records starting from 1993 in NB, NS, CBI and PEI. Vouchered adults, exuviae and larvae of dragonflies and damselflies are deposited at the New Brunswick Museum. He added a further 13 provincial records to the knowledge of the NB Museum (McAlpine, Smith 2010). These data were published (Brunelle, 2010) and since the publication, many more odonata records have been added. One of the findings worth mentioning is a record of the Harlequin Darner *Gomphaeschna furcillata*, recorded on June 15, 2005. The Harlequin Darner is rare in Canada. It had only been known in our region in the southwest corner of New Brunswick and in a few sites in southern Nova Scotia. Then surprisingly, one specimen was found in Cape Breton in 1999, which extended the known limit of its regional range. This PEI record further extends the northern limit of the known range of this species in our region (Harding 2006). The Harding family has also collected specimens of several other insect orders and Mr. Harding's interests extend to other Taxa as well. Pickerel frogs, *Rana palustris, a* first record for PEI, were collected in 2003, and deposited at NBM (McAlpine et al, 2006; Harding, 2006), (Appendix 41).

Harlequin Darner, *Gomphaeschna furcillata*, collected on June 15, 2005 by R.W Harding. Photo by Mary Sollows, NB Museum.

2. The UPEI-biology department has records of dragonflies and damselflies collected in PEI. Vouchers for these specimens are housed at the New Brunswick Museum (NBM), since UPEI couldn't care for them properly. There is a backlog of uncatalogued PEI material that would include 3,000-6,000 Odonata, and approximately 150 miscellaneous insects (Appendix 42).

3. Odonata Exuviae are the cast nymphal or larval skins of the penultimate instar of Odonata. They provide important information about where species live and where they emerge. PEI National Park holds 3014 odonata exuviae records collected in 2008, 2009, 2010 and 2011. The specimens are stored at the Parks' Greenwich lab facility (Appendix 62).
4. Hagen's Bluet, *Enallagma hageni,* and Marsh Bluet, *Enallagma erbium,* were collected in PEI from 1966 to 2006 by multiple collectors. Main collectors were Robert W. Harding, Jacob Harding, Caleb F. Harding, Clayton A. Harding, R. Curley, Donald J.F. Hilton (Hilton, 1990), and Michelle Dobrin. The specimens are at Laval University (Appendix 42B)
5. The Royal British Columbia Museum has 43 PEI records extracted from the RBCM entomology database (Appendix 43).
6. The Smithsonian National Museum of Natural History has 80 PEI Odonata records. Except for one record, the odonata were all collected by C. M Flint and Oliver S. Flint Jr. The specimens were mainly collected in a pond and bog, 1.5 mi. E. of Douglas (Rt. 323), Glenfinnan Lake, Tarantum, and Mooney's Pond in Peakes in July 1996 (Appendix 44).

Coleoptera (Beetles)

1. Christopher G. Majka is a respected entomologist who edits several scientific journals and has contributed greatly to our knowledge of beetles in PEI. In 1991 (when the first checklist of beetles of Canada and Alaska was published) only 340 species had been recorded on PEI. Since then, largely as a result of the series of publications that Chris Majka has undertaken together with many collaborators. He has databased 8,243 coleoptera (beetles) from Prince Edward Island that are deposited in 19 Canadian and three US locations/institutions. Chris Majka has 962 records of beetle species from PEI; 899 species are known from Prince Edward Island and records of an additional 63 species have yet to be published. Specimen details and locations can be found in the various publications pertaining to Prince Edward Island specimens and cited in this report or on Mr. Majka's website.
2. The University of Prince Edward Island – Biology department has a collection of Robert Mutch specimens. It was loaned to UPEI by the late Lloyd Mutch of Mount Herbert, whose father, J. Robert Mutch, had built up the collection in the early 1920s when he was at the Agricultural College. The specimens were found in the family attic. The insect collection was badly chewed up by feasting members of another insect species called dermestid beetles which dine on dead organic material. There are approximately 400 beetle species in the collection and 94 beetles were in good enough shape for Chris Majka to identify. What was salvaged provided invaluable information as there were

some pest species there that had not been recorded in the Maritimes that early. Many other parts of the collection still need to be identified, including the butterflies and moths. Dr. Donna Giberson, biology professor at UPEI, also provided information on another set of boxes with beetles, called Schmidt Boxes, found in storage in the basement of the Science building at UPEI (Appendix 45).

3. The Canadian National Collection in Ottawa holds 405 Coleoptera that were recently databased. The majority of the specimens were collected by LeSage, L. at Dundee, Dingwells Mills and Red Point, Black Pond in 1985 (Appendix 46).

Diptera (True flies)

1. The Canadian National Collection in Ottawa has a list of 181 digitized holdings of Diptera from PEI. This data is a very small fraction of CNC's collection that has been databased. CNC holds around 17 million specimens. As there are a lot more data to be digitized, there could be a more extensive PEI collection (Appendix 47).
2. The Clemson University, Alabama, Arthropod Collection houses specimens that were collected from PEI. Specifically it contains several vials with black flies collected by D. Giberson at Launching in April 1994, a few vials of specimens collected by P. Adler and some vials of specimens collected by M. Minhas for a black fly study in 2005 (Minhas et al. 2005). There are also a few vials in the collection from A. Douglas's honour thesis on controlling black flies around Crowbush golf course. (Douglas 2007).

Hemiptera (True bugs)

1. Before Alexander Campbell's BSc Honours thesis, the aquatic habitat and biodiversity of aquatic true bugs (Insecta: Hemiptera) within the Deroche Pond (Natural Area) were not mapped. Twenty species of Hemiptera were recorded from this Natural Area, 5 of which had not been previously reported on PEI *Hesperocorixa michiganensis* iii (Hungerford), *H. minorella* (Hungerford), *Palmacorixa buenoi* (Abbot), *Sigara compressoidea* (Hungerford), and *Mesovelia mulsanti* White*)*. Furthermore, the *M.mulsanti* White record marks the first record of the family Mesoveliidae on Prince Edward Island. Specimens are stored at the Biology Department at the University of Prince Edward Island. A complete species list can be found in the thesis (Campbell 2008).

Lepidoptera (Moths and Butterflies)

1. The Maritime Butterfly Atlas project started in 2010 and is planned to extend to at least 2014. For the most part records are submitted by naturalists and anyone with an interest in butterflies. Data is compiled in the Atlantic Canada Conservation Data Centre

database, contributing to this important conservation effort. Results for over 1300 specimens up to January 2014 can be found in Appendix 48. Many of the Atlas specimen records to date are at the New Brunswick Museum for safe-keeping (frozen and then stored in a fumigated cabinet) and have not been sorted yet.

2. Mr. Bill Oehlke from Montague, PEI captures nectaring, gravid, day-flying female Sphingidae (moths) in his blackberry patch or takes night-flying females at lights. He has been able to obtain eggs and rear fourteen Sphingidae species native to Prince Edward Island. Saturniids are among the largest of the moths. There are six Saturniidae species native to PEI, and Mr. Oehlke has seen all six regularly in the Montague area, and has also reared them. He suspects all six species range across all of Prince Edward Island. Two species, *Hyalophora cecropia* and *Hyalophora columbia* frequently hybridize in nature, and Mr. Oehlke has taken wild specimens of hybrids at lights.
   The Catocala of Prince Edward Island collection contains: *Catacala sordida, connubialis, blandula, crataegi , badia coelebs, ultronia, unijuga, concumbens,* and *relicta*. Detailed information on Saturniidae, Sphingidae and Catocala can be found at Mr. Oehlke's moth and butterfly websites, listed in the Database/Web address section of this report.
3. The New Brunswick Museum has a rare butterfly in its collection. Early Hairstreak *Erora laeta*, is ranked SRank S1, indicating that it is extremely rare in Prince Edward Island and it is vulnerable to extirpation (typically 5 or fewer occurrences or very few remaining individuals). This Early Hairstreak is the only record for the Island. The Early Hairstreak that was collected in PEI (on the right) is not in particularly good condition; it lacks a head.

Early Hairstreak in Quebec. Photo by Peter Hall

PEI Early Hairstreak. Photo by John Klymko

4. The Manitoba Museum has seven invertebrate specimen records; Northern Blue, *Lycaeides idas,* collected July 23 and 24, 1940 at East Point (Appendix 29).
5. The Royal British Columbia Museum. Extraction from the RBCM entomology data base show 102 PEI records of Lepidoptera (Appendix 43).

Orthoptera (Grasshoppers, Locusts, Katydids and Crickets)

1. A Gladiator meadow katydid, *Orchelimum gladiator,* is a new Maritime Canadian grasshopper specimen record collected at Cape Egmont, Prince County on August 12, 2011. Specimen vouchers for this study have been deposited in the collection of the New Brunswick Museum, Nova Scotia Department of Natural Resources and the private collection of J.B. Ogden (McAlpine and Ogden 2012).

Hymenoptera (Bees, Wasps and Ants)

1. Bumblebees (234) were collected at various PEI locations. The earliest collection was from 1971. Most specimens were collected in the summer of 2009 mainly by H. Carmichael and J. Gallant, identified by Donna Giberson and verified by David McCorquodale (Appendix 49).
2. Fire ants, *M. rubra* were collected in 8 localities on Prince Edward Island by Jim Wetterer in 2008: Dalvay, by hotel; Charlottetown, Victoria Park; Brookvale Provincial Park; Brudenell Provincial Park; Sally's Beach Provincial Park, near beach; Seal Cove, campground; Portage, bike trail; Darnley, forest (Wetterer and Radchenko 2010). The voucher specimens are at the Museum of Comparative Zoology at Harvard University, Cambridge MA (Appendix 37).
3. Parks Canada – PEI National Park has 366 records of ants collected at various locations in the National Park in 2010 and 2011. The specimens were identified by P. Mallam (Appendix 64).

Ichthyology (Fish)

1. The University of Prince Edward Island has a large teaching collection of eight cabinets of fish preserved in 5% formaldehyde solutions. A large number of fish were collected in the 1970's and 80's. There is a written inventory available at the biology department with an estimated 200+ specimens. It is expected that the collection records will be digitized over the next year.
2. PEI Provincial Department of Agriculture and Forestry, Forests, Fish and Wildlife Division have five mounted fish specimens: three Brook trout, one Rainbow trout and one Atlantic salmon.
3. The Hillsborough River Eco-Centre in Mt. Stewart has 3 large mounted fish: two Atlantic salmon and one Striped bass.
4. Parks Canada, PEI National Park has 7 tanned Eel skins that can be found at the Dalvay administration office.

5. Otoliths (earbones) of fish are collected by DFO on PEI and are stored in Moncton for aging; some might also be stored in DFO labs in Dartmouth or St. Andrews, NB. These collections include eels, and most of the major ground fish and pelagic species such as cod, hake, and herring. There are tens of thousands of otoliths, but it is hard to determine which of the otoliths are from PEI. Collections of the major commercial species are often made from sea-going vessels that operate at any distance from shore. Many of the otoliths would be collected between PEI and New Brunswick, or between PEI and the Magdalen Islands. Source: the Charlottetown Department of Fisheries and Oceans -David Cairns.
6. The New Brunswick Museum has a large collection of fish scales, donated by the Department of Fisheries and Oceans. There are 406 Brook trout, *Salvelinus fontinalis*, fish scale collections from Blackett's Creek, Annandale; Browns Creek, Montague; Annandale Pond; Trout Brook, Mill River and Montague River between 1937 – 1947. There are also 26 collections of scales of White perch, *Morone Americana,* collected from Dalvay Lake. The collector of the White perch is M.W. Smith; the collector of the Brook trout is unknown (Appendix 50). Source is W.B Scott (DFO), co-writer of Freshwater Fishes of Canada (Scott 1973).
7. St. Andrews Biological Station has a collection of Bluefin tuna otoliths collected in 1983, 1984, 1985, 2004 to 2008 and 2011 to 2013. Also in the biological specimen collection are Bluefin tuna spine and tissue samples collected in 2012 and 2013.
8. Ninespine stickleback, *Pungitius pungitius*, were caught at O'Keefe's Lake and Glenfinnan River, and studied by D. Max Blouw in the early 90s (Blouw 1992). The specimens are stored at the Nova Scotia Museum in bags with 70% alcohol.

Ninespine stickleback, *Pungitius pungitius,* at the Nova Scotia Museum in Halifax.

9. Cornell University Museum of Vertebrates in Ithaca, NY has 95 PEI fish records. There are a total of 16 Ninespine sticklebacks, *Pungitius pungitius*. Four Ninespine sticklebacks were collected by M. Newson at Kelly's Brook in Southport (1952-08-11). Twelve more ninespine sticklebacks were collected at the same location and at the same date, identified by Edward Raney. There are 39 Golden shiners, *Notemigonus crysoleucas crysoleucas* collected at Afton Lake (1952-08-11) by M. Newson and identified by E. Raney and one three-spined stickleback, *Gasterosteus aculeatus*, caught at the same location. Thirty-five Banded killifish *Fundulus diaphanus* were collected at McPhail's Pond in Southport (1952-08-10). According to the source, the collector is unknown, but there is another record stating that three *Fundulus diaphanus* were collected at the same pond and date by M. Newson, identified by R. J. Miller. There is one older record of Winter flounder, *Pseudopleuronectes americanus*, collected off Tignish (1860-01-01) by M/V Grampus. All specimens are preserved in isopropanol as whole organisms. Source: Arctos, Multi Institution, Multi Collection Museum Database.

10. A Brook trout, *Salvelinus fontinalis,* was collected from the Wilmot River Estuary in 1958. The whole animal is preserved in alcohol at the Museum of Comparative Zoology, Harvard University Cambridge, MA.

Herpetology (Reptiles and Amphibians)

1. The PEI Museum and Heritage Foundation has several Red-spotted Newts, *Notophthalmus viridescens* collected by John Gilhen in Murray Harbour, Route 18A on August 15, 2008 (Yotsy-Yamashita et al, 2012). The Red-spotted newts were donated to the Museum and Heritage Foundation in February, 2014.

2. The New Brunswick Museum has 41 amphibian records. A few juvenile Pickerel frogs, Rana palustris, were collected by R.W. Harding between Martinvale and Corraville on August 19 and September 2, 2003. They are preserved in 70% ethanol. This is the first record of this species for Prince Edward Island. The SRank for this species is S1, indicating that this species is extremely rare in PEI, and it may be especially vulnerable to extirpation according to the ranking by the Atlantic Canada Conservation Data Centre (McAlpine et al. 2006; Harding, 2006).

Pickerel frog, *Rana palustris,* collected September 20, 2005. Photo by collector R.W. Harding

Ornithology (Birds)

1. The UPEI-Biology Museum has approximately 200 mounted birds, of which not all are native to Prince Edward Island. The date of the accession for the majority of species is 1983. In the 1983 inventory report, Kathy Martin mentioned that most of the mounted birds were in poor to fair condition. Since the publication of this report a large number of birds have been restored by taxidermist Danny Clark. In addition to the mounted birds, there is a collection of undocumented study skins and eggs.
2. Taxidermist Danny Clark has been mounting wildlife specimens for almost 50 years. Ninety percent of the specimens he processes are birds. He mounts birds that died accidentally, from natural causes or from hunting. Around 400 specimens are processed per year at the taxidermy shop; 60% of the total specimens are from PEI. Annually about 20 specimens are mounted for institutions such as the Atlantic Veterinary College, MacPhail Woods Nature Centre, Mt. Stewart Interpretive Centre, Parks Canada and high school biology labs. Records are kept for the birds that are registered under the Federal Migratory Bird Convention Act (1994). Taxidermy species depend on the season (e.g. waterfowl hunting season).
3. The PEI Museum and Heritage Foundation has a display of 16 mounted song birds in a glass fronted case. J.O. Hyndman, owner of a farm and amateur taxidermist in Fort Amherst had given the display to his farm manager Joseph Doiron. The display was possibly made between the 1930 and 50s. Although hard to identify due to the faded plumage, it showcases various warblers, vireos and a thrush. The display was donated to the Museum and Heritage Foundation by Doiron's granddaughter in 1998.

4. The Provincial Department of Agriculture and Forestry, Fish, Forest, and Wildlife Division has a collection of 65 mounted specimens, representing 39 avian species (Appendix 51). Included in the department's collection is a rare Great Grey owl. This specimen was found dead on the roadside on Oct. 29, 1991 and reported by Norna Gard to Lorne MacDougall. It was found near Bloomfield on the Mill River East road - Rt. 145. Ross Bernard, Conservation Officer in the area confirmed that the owl was indeed a Great Gray Owl, which is considered an accidental or rare find in the province and there have only been a few unconfirmed sightings (Curley 1992).

A mounted Great Grey owl at the PEI Department of Agriculture and Forestry.

5. At a pre-deportation Acadian farm site known as Pointe-aux-Vieux, along Malpeque Bay, (occupied between 1728 and 1758) archaeological excavations were conducted by provincial archaeologist, Dr. Helen Kristmanson and her field crew between 2008 and 2011. Excavations revealed a pattern of field stones that formed part of a house foundation and an associated fireplace and oven which contained charcoal, animal bones, old shell and other artifacts. Bones found in the structure were confirmed to be faunal and directly associated with the Acadian occupation. In 3 years, a large diverse faunal assemblage has been collected at the site, including bones of the extinct "passenger pigeon." Work at this archaeological site is still in progress and details on the findings will be published in the future.
6. The Holland College, Wildlife Conservation Technology Program has a variety of study skins, mounts and wings of 47 bird species. The mounted birds are divided in two separate classrooms (Appendix 52).

7. The Canadian Wildlife Health Cooperative (CWHC) at the Atlantic Veterinary College Pathology Department has a number of mounted birds in their collection. Most of the birds were necropsied after being submitted to the pathology department and mounted by Danny Clark (Appendix 53).
8. Parks Canada, PEI National Park, has close to 30 mounted birds. The specimens are at Greenwich and at the Dalvay Activity Centre. Details can be found in Appendix 65.
9. Island Nature Trust has 21 mounted birds that were donated by various donors and are used for educational specimens. A Great-horned Owl, *Bubo virginianus,* in a glass fronted case was donated to the Trust in 2013. The owl was shot in the barn in 1901 by the donor's great-grandfather Mr. McDermaid in West St. Peter's as it was "after the chickens" (Appendix 54).
10. MacPhail Woods Ecological Forestry Project – Nature Centre has 25 mounted birds from various donors and the majority was mounted by taxidermist Danny Clark after being submitted to the Atlantic Veterinary College (Appendix 55).
11. A mounted Great-horned Owl is found at Farm Centre, PEI ADAPT Council office. It was donated to the office by the Wildlife Federation. The origin of the specimen in unknown.
12. Hillsborough River Eco-Centre in Mt. Stewart has a collection of mounted birds. There is a Snowy owl in a glass case donated in 2007 by Mr. Peter Doyle. The owl was shot by his uncle in Cumberland around 1923 (Appendix 56).
13. The New Brunswick Museum has 24 avian records. In the collection is *Anser brachyrhynchus*; this Pink-footed Goose has the status of being an accidental, and non-breeding species on the Island. It was collected by Louis Daley and Bruce Pigot in Mayfield, north of New Glasgow on December 2, 2010 (Appendix 57).

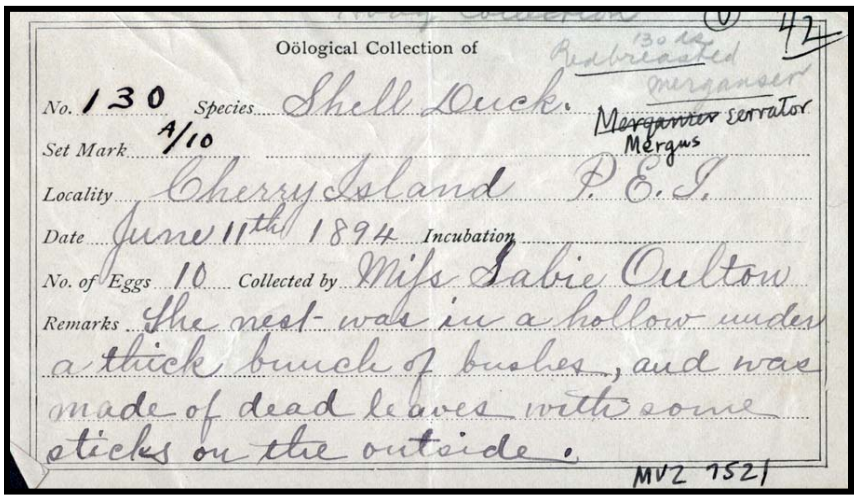
Pink-footed Goose, *Anser brachyrhynchus,* wing at the New Brunswick Museum.

14. The Acadia Biology Wildlife Museum has a Japanese Pheasant, *Phasianus versicolor robustipes*, (male) study skin. It was collected by Arthur Smith on March 13, 1974; no specific location was indicated. The introduction of the Japanese Pheasants to PEI was

the subject of a Master's thesis by Mr. Smith at Acadia University, but the species did not establish.

15. The Royal Alberta Museum in Edmonton has eggs from two Piping plovers, *Charadrius melodus*, two Common terns, *Sterna hirundo* and one Arctic tern, *Sterna paradisaea*. They were all collected on June 15, 1971. Clutch size was 4 for the plovers and 3 for the terns. The eggs were donated and the collector is unknown (Appendix 23).
16. The Manitoba Museum has one PEI record, the wing of a Lesser Golden Plover, *Pluvialis dominica*, found as road kill in 1978 by Wayne Neilly in Hamilton, PEI, (Appendix 29).
17. The Delaware Museum of Natural History has 4 bird study skins, which are the only PEI specimens in the study skin and skeleton collections. These four specimens (Nelson's Sparrows, *Ammodramus nelsoni*) came to the museum in the collection of George M. Sutton, who was a well-known American collector, author, and artist.
    Jean Woods, Curator of birds at the museum suspects that George M. Sutton traded (or purchased perhaps) these specimens from Mr. C. Addy, along with a number of others specimens now in the collection. There are other specimens in the collection from Mr. Addy from New Brunswick from the same time period the specimens from PEI were collected. The specimens were collected at the "Passenger's Ferry" in 1949. The assumed passenger ferry is located in Borden and GPS coordinates were provided to the curator (Appendix 58).
18. The Museum of Vertebrate Zoology, University of California, Berkeley has 10 Red-breasted Merganser, *Mergus serrator* eggs collected on June 11, 1894 on Cherry Island by S. Oulton. Cherry Island is also known as Oulton Island**.** This record was found via Arctos online museum database: MVZ: Egg: 7521.

Source: Collections Database Museum of Vertebrate Zoology via VertNet beta


Oölogical Collection of

No. 130 Species Shell Duck. Merganser serrator Mergus

Set Mark A/10

Locality Cherry Island P. E. I.

Date June 11th 1894 Incubation

No. of Eggs 10 Collected by Miss Sabie Oulton

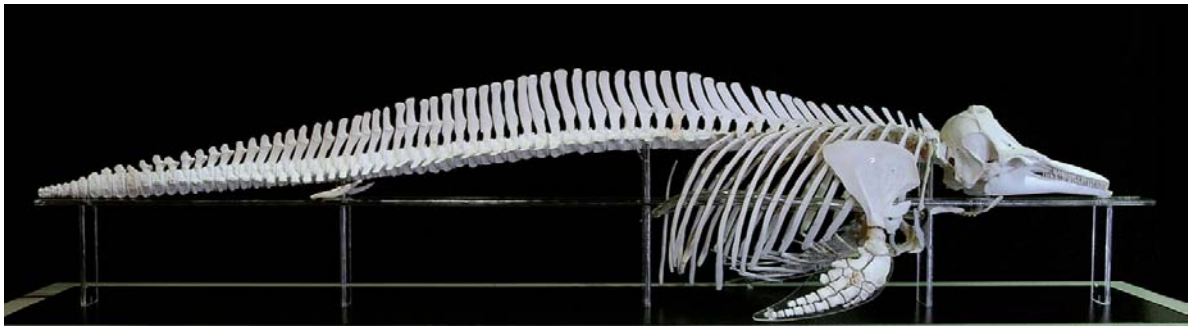
Remarks The nest was in a hollow under a thick bunch of bushes, and was made of dead leaves with some sticks on the outside.

MVZ 1521

Source: Collections Database Museum of Vertebrate Zoology via VertNet beta

19. The Museum of Comparative Zoology, Harvard University has 30 ornithology records, including a specimen collected in 1881: Pied-billed Grebe, *Podilymbus podiceps*, collected at Tignish. A Caspian Tern, *Sterna caspia* and Northern Harrier, *Circus cyaneus hudsonius* were collected in Malpeque in 1897 (Appendix 37).
20. The Buffalo Museum of Science has 50 bird skins in its collection from the early 1900s "F.E. Johnson collection". The skins are currently kept in a climate controlled storage facility (Appendix 59).
21. The Smithsonian National Museum of Natural History, Washington, DC has one record found in the online database. A Leach's Storm Petrel, *Oceanodroma leucorhoa* was collected by D. Burkhalter on March 19, 1967.
22. In the early 1900s Robert T. Moore traveled across North and South America to study and observe birds, amassing and establishing one of largest collections of birds in the world. Moore decided to give his collection to Occidental College in Los Angeles and in 1952, the Moore Lab of Zoology was dedicated. Moore passed away six years later knowing that his love of birds would carry on to the next generation. From PEI, there is a White-winged Crossbill, *Loxia leucoptera* study skin at the Moore Lab of Zoology. The bird was wild caught and identified by Robert T. Moore in 1911. This record was found via Arctos, Multi Institution and Collection database.
23. The University of Alaska Museum has three records of two hatch year and one after hatch year female Northern Pintails, Anas acuta, (frozen tissue and wing) collected in Summerside. One record has 'event date' November 24, 2006. These records were found via Arctos online museum database.

Mammalogy (Mammals)



White-sided Dolphin display at the Atlantic Veterinary College, Charlottetown, PE

Institutions with multiple Taxa in one data set

1. The PEI Provincial Department of Agriculture and Forestry, Forests, Fish and Wildlife division have 10 mounted PEI mammalian specimens, representing 9 species, including two albino muskrats (Appendix 51).
2. The PEI Museum and Heritage Foundation collection at the Artifactory has a Long-finned Pilot Whale *Globicephala melas* skull, three vertebrae and two ribs, found at St. Peter's lake and donated by G. Hancock. In the same collection are the skin of a Garter Snake *Thamnophis sirtalis,* and a wasp nest. Also in the PEI Museum and Heritage Foundation collection is a walrus tusk used for educational purposes and a mounted raccoon and squirrel in a glass fronted case. A number of fox skins, originally from "Island Furriers Ltd." are stored frozen.
3. The Canadian Wildlife Health Cooperative at the Atlantic Veterinary College, University of Prince Edward Island has a variety of whale bones and a complete skeleton of a Minke Whale. For some specimens it is unknown if they originate from Prince Edward Island. Also in the collection are spermaciti and several teeth from Sperm Whales. The Atlantic Veterinary College has two mounted marine mammal specimens in the corridor of the Student Learning Commons: a White-sided Dolphin and Harp Seal, mounted by Grant Curtis (Appendix 53). Various marine mammals that stranded on the Island were processed by the CWHC, and are stored and displayed at the New Brunswick Museum. A White-beaked Dolphin, *Lagenorhynchus albirostris,* was found at Darnley on May 24, 2013 and a Sowerby's beaked Whale, *Mesoplodon bidens* was found at McNeil Brook, NE of Cavendish on June 5, 2013. The Sowerby's beaked whale is a whale that is rarely sighted. No population estimates have been made and as of 1991, there are only about 90 records of this species. The majority of the records are from around the British Isles.

Sowerby's beaked Whale skull on display at the New Brunswick Museum

4. A Minke whale was found dead at Cavendish campground beach on July 27, 2010. It was arranged for the carcass to be transported to a field where a necropsy was performed by the Canadian Wildlife Health Cooperative. The whale carcass is buried in compost by Glen Kelly for possible future mounting of the skeleton.
5. Holland College Wildlife Conservation Technology Program has many prepared mammal specimens of 19 PEI mammal species in mounts, study pelts and skulls. Most of the pelts and skulls are prepared by students in the program. Specimens were supplied by local and hunters and trappers from off Island. Some of the prepared specimens, such as skulls, have a location and date of collection tag attached; other specimens are undocumented.
6. Island Nature Trust has two mounted Red Foxes, one Silver Fox and two Mink, of which one is an albino.
7. Danny Clark and Duncan Crawford, taxidermists, process mammal pelts. Ninety percent of the mammals are mounted and ten percent are processed as skins. A number of mounted specimens are used for educational displays by the provincial Fish and Wildlife Branch, the Atlantic Veterinary College and Parks Canada.
8. Places such as Sea Cow Pond near Tignish and Sea Cow Head in Summerside remind us of the Walrus or "Sea Cow" (local name). The walrus was hunted for food and other products by the local aboriginal populations. When the Europeans arrived the walrus population declined as they were hunted for their ivory tusk ("white gold"), oil, and walrus leather to make harnesses and traces. By the end of the 18th Century the walrus was locally extinct (Hogan 1986). The University of PEI has a walrus skull on display in the Duffy Science Centre. The skull was hauled up by a fisherman off Covehead in 1985 and donated to the UPEI Natural History Museum. The skull was borrowed by the National Museum of Civilization and used in a travelling exhibition called "500 generations of Aboriginal Hunting and Fishing". The museum carbon-

dated the skull and found that it is 2500 years old. It is mounted in a wired sculpture together with a replica of an aboriginal spear.

Walrus display at the Duffy Science Centre at UPEI.

9. The Keir Museum in Malpeque has a walrus tusk that was found in the fishing gear of Mr. Champion and donated to the museum. It was mentioned that there was a resting spot, favoured by walruses in the Darnley area, called “Black Sow”. There is a possible fossilized whale bone at the Keir Museum that requires further investigation.
10. A walrus skull can be found at the Canadian Potato Museum in O’Leary. It was donated by a local fisherman.
11. Another walrus skull, found on a North Shore beach is in the collection of Scott McBurney, wildlife pathologist at the Canadian Wildlife Health Cooperative.
12. Hillsborough River Eco-Centre in Mt. Stewart has a small collection of mounted common mammals (Appendix 56).
13. The NB Museum has 198 records of PEI mammals. Included in their collection are members of the Cetacea (whale), Chiroptera (bats), Rodentia (rodent) and Carnivora (carnivore) families. There is a backlog of uncatalogued PEI material that would include approximately 30 mammals (Appendix 60).
14. Parks Canada, PEI National Park has 20+ undocumented mounted mammal specimens, plus one Snowshoe hare pelt. The specimens are on display at various locations in the park. Details can be found in (Appendix 65).
15. Four, Little Brown Bats *Myotic lucifugus* were collected in Cavendish by J. Sherman Bleakney on June 19, 1958. The specimens are stored at the Wildlife Museum at

Acadia University, Wolfville, Nova Scotia. In the 1983 inventory report on natural science specimens it was indicated that there were 29 little brown bats collected in Cavendish. It is unknown where the other 25 bats went. They may have been consumed by Dermestid beetles.

Little Brown Bat, *Myotic lucifugus,* at Acadia University, Wildlife Museum.

16. The Museum of Southwestern Biology at the University of New Mexico, Albuquerque, NM has specimens collected by James A. Lackey for a small mammal study conducted at Cedar Dunes Provincial Park, Prince County in 2005. The following specimens are fixed in 70% ethanol: two Woodland jumping mice, *Napaeozapus insignis,* a species found throughout North America. It can hop surprisingly long distances, given its small size. The mouse is an extraordinary part of the rodent family. Also in the collection are 3 Meadow jumping mice, *Zapus hudsonius* and 2 Deer Mice, *Peromyscus maniculatus*.
17. Dr. Howard Thomas, studied small mammals in PEI in 1977 and 1978 and collected several hundred PEI specimens (Thomas, 1982). The specimens were stored at the Northeastern University in Boston and were recently relocated with the complete vertebrate collection to the University of Georgia. A few skulls and or skeletons may have been lost from the 1970s collection. (Appendix 61). As part of the collection, Dr. Thomas acquired 11 Little Brown Bats, *Myotis lucifugus,* from Queens County that were donated by the "Fish and Wildlife Service" (i.e. Fish and Wildlife Division).

18. Fitchburg State University has 60 small mammal skulls collected in the PEI National Park in 1978 and 1979. They were collected by the Canadian Wildlife Service and donated to Dr. Howard Thomas (Appendix 61B).
19. The Museum of Comparative Zoology at Harvard University, Cambridge, MA has 4 mammal records from which one is a walrus skull found at Tracadie in July, 1937 (Appendix 37).
20. The Beaty Biodiversity Museum at the University of British Columbia, Vancouver, BC has a PEI Blue Whale skeleton that was excavated twenty years after it stranded at Phee Shore near Tignish on November 12, 1987. When the whale stranded, an agreement was made with the Museum of Nature in Ottawa, who gave the rights to the Royal Ontario Museum in 2008. The Province hoped to receive a replica "cast" from the ROM for local display. Meanwhile, the University of British Columbia was moving forward with the newly established Beaty Biodiversity Museum and was looking for a centre piece. Negotiations between the Province, the Canadian Museum of Nature, the Royal Ontario Museum and the University of British Columbia resulted in a unique joint effort of UBC staff, the University of PEI Canadian Wildlife Health Cooperative and many volunteers to exhume the whale, which is now on display at the Beaty Biodiversity Museum in Vancouver.

Excavation of the Blue Whale at Phee Shore May 2008. Photos by Andrew Trites.

Blue Whale on display, May 2010.

21. The Field Museum of Natural History, Chicago, Illinois has 29 small mammals collected in Alberton, Kensington, Georgetown and Mt. Stewart, between October 26 and November 18, 1897 by Mr. R.T. Young. The same specimens were documented in the 1983 PEI inventory report. All specimens are preserved as skins and skulls. The collection contains the following specimens: 17 Meadow voles, *Microtus pennsylvanicus acadicus*; 4 Red-backed Voles, *Myodes gapperi gapperi* (Clethrionomys gapperi gapperi in 1983 inventory report); 2 Red Squirrels, *Tamiasciurus hudsonicus gymnicus*; 2 North American Deer Mice, *Peromyscus maniculatus abietorum*; 2 Masked Shrews, *Sorex cinereus cinereu*s, and 2 Northeastern Pygmy Shrews, *Sorex hoyi thompsoni*.

NOTE: Not all of the information from search engines was exportable into datasets/spreadsheets. The sources mentioned in the report are searchable via links provided in “Search Engines/Web Portals” and “Databases-Individual Institutions” sections of this report.

Entering “Prince Edward Island” in the location field will usually yield results in finding PEI records. For more targeted searching, such as species, collector or collecting date; the Advanced Search option may provide results.

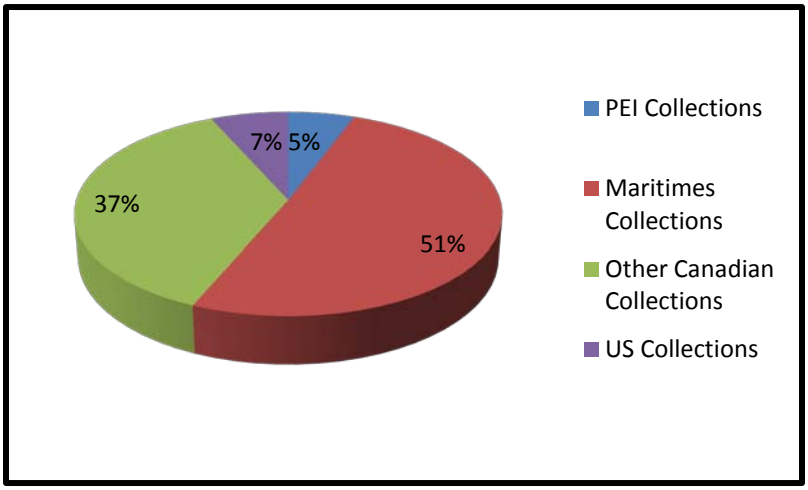
Evaluation of Prince Edward Island collections

The current compilation consists of 50 datasets amalgamated into one (See Appendix 67). Some datasets were received after the compilation was completed and these are available in individual appendices. The final compilation dataset holds 38,715 records. Together with written inventory lists and the datasets not included in the compilation set, more than 40,000 PEI science specimen records were gathered in 4 months.

Most collections have basic information of genus and species and dates and locations collected, but not all data was presented in all cases. Geographic coordinates are missing from 14% of the specimens, and a standardized taxonomy is confirmed for only 80% of them. Though the data presentation is raggedy and far from standardized, it might be improved with further work.

There are many museum records from PEI which are not in a digital format and thus could not be made available for this project. Of particular note are the largely un-digitized insect collections in the Canadian National Collection in Ottawa, numbering in the thousands. Many insects in this collection are only shown as being present, and in a particular drawer. Some specimens stored locally in Prince Edward Island such as at the University of Prince Edward Island are not digitized. It is very likely that there are more institutional collections that have not yet been found. Private collections, where they exist, are unavailable for public use.

Only 5% of collections are stored in Prince Edward Island while 7% are stored in the United States of America, some at famous institutions such as the Smithsonian Museum or Harvard University's Gray Herbarium. The other Maritime Provinces house 51% of all collections, with the remainder stored across Canada, mainly in the Canadian Museum of Nature.



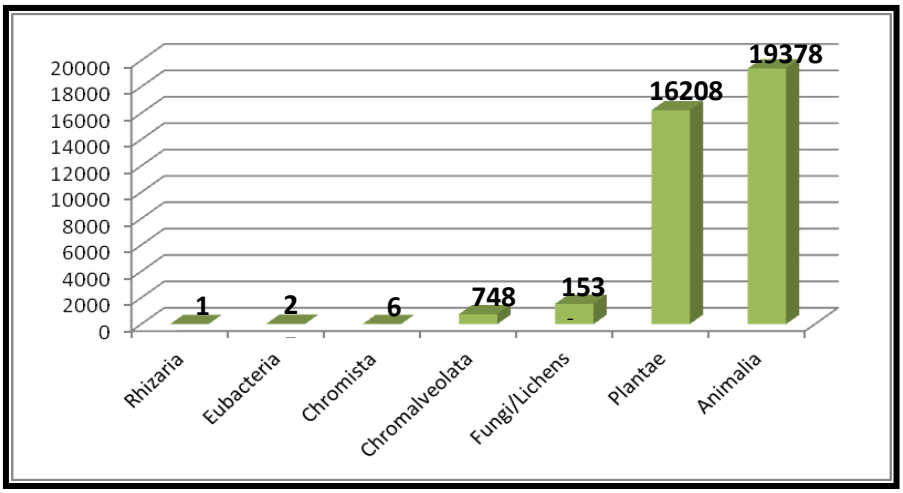
Approximate percentage of specimens housed in PEI collections, in other Maritimes Provinces, in Canadian collections outside of the Maritimes and in United States collections.

Roughly 40,000 specimens seems like a lot of material, but this number is small in comparison with the 200,000 plant specimens in the E.C. Smith Herbarium at Acadia University or the 800,000 fish specimens in the Beaty Biodiversity Museum in Vancouver. Existing PEI collections are biased to certain taxonomic groups and may reflect personal interest rather than systematic coverage of life forms. The difficulty in identifying the invertebrates has probably influenced collectors, and shortages of taxonomy experts who can identify the various groups also limit collections. Many collections are static in size and expansion is done on an opportunistic basis. A recent analysis of what is known about species in our Ecozone can be found in the comprehensive "Assessment of Species Diversity in the Atlantic Maritime Ecozone" (McAlpine, and Smith, 2010). Corroborating our conclusions, gaps in knowledge about PEI biodiversity are identified from chapter to chapter, time and time again.

Most of the specimens represented in Appendix 67 are from the well known plant and animal kingdoms while the more primitive life forms are barely represented (see also Appendix 68). Of the 19,000+ Animalia, 13,000 are Insects. Based on the data, we are led to believe that there are only 22 spider species on the Island when hundreds exist in neighbouring provinces. Only 220 PEI bird species have been collected and information for the mammals is non-existent for species that are no longer extant in the province. There is no skull of the last bear that was shot in 1927 or of most of the species that did not survive into the 20th century such as Canada lynx, American martin or the River otter. The exception is the walrus where body parts may still be dredged from the deep in fishermens' nets. There are no specimens of the Smoky shrew (*Sorex fumeus*) to verify its presence in the Province and also none of a truly common but nocturnal species, the Northern flying squirrel (*Glaucomys sabrinus*).

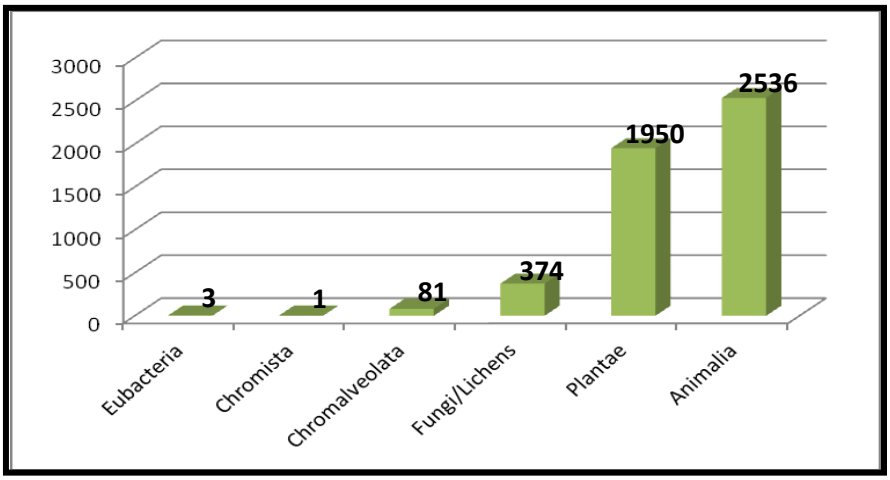
Terrestrial species are prevalent in collections but it is also good to see that there are considerable numbers of marine animal specimens scattered in institutions in Atlantic Canada and beyond. They include fish, jellyfish, numerous marine molluscs, whales and dolphins and even a leatherback turtle. Marine algae are also well recorded in several collections.

Plants including marine algae and mosses make up over 16,000 specimens but represent only 1950 species; there appear to be no vouchers for some PEI plants anywhere. The fact that (on a regular basis) some plant species continue to be found for the first time in the province speaks to the need for more survey work and a place to safely store these finds. There has been little funding allocated to build or maintain local collections and several plant collections on the Island are not databased or available for study.



Total number of specimen records compiled by Kingdom, (excluding records for which class could not be identified).

Recent work on lichens and fungi has boosted these collections to 374 species, yet large fungi remain mainly unsampled and unknown in PEI. More collections and documentation for spiders, ants, nocturnal moths, amphibians, reptiles, and mammals would be useful. Land snails and slugs and many insect genra are unassessed. The picture might be improved by databasing/ digitizing the Canadian National Collection of invertebrates.



Total number of Taxa identified to Species, by Kingdom.

It is good to learn of the many wild specimens that were collected in Prince Edward Island and to know that they are stored somewhere and looked after by concerned and caring curators. Nevertheless, our dependence on other institutions to reveal, study, and store Prince Edward Island's natural heritage specimens is only partly satisfactory. This heritage cannot be shared properly with the citizens of the Province, nor can it be properly studied to answer questions about life important to Prince Edward Islanders.

Conclusion

It is quite likely that there are more Prince Edward Island specimens in many collections, but they are not easily found at this point in time or not easily transferable into a data file. As more museums eventually digitize their collections, more information on specimens will become published and available.

Generally, we have a good impression of what was collected and we can continue the process of identifying what is scarce or absent. New groups can be investigating and research encouraged. May a provincial museum materialize, a collection can be established, allowing us to better document the variation that occurs within species occurring on Prince Edward Island. Strong emphasis should be placed on preservation of specimens for study and educational purposes to be shared with the general public, including tourists visiting the Island having an interest in the Island's natural history. Setting up temporary or semi-permanent (travelling) exhibits at schools, branch museums or the Confederation Centre should be explored.

In trying to keep a collection for the province, it needs to always grow to capture change and stability over the years. The only records for the province are sometimes based on old records. It would be good to have a recent record to demonstrate that the species is still on PEI as in many cases there's a gap of forty years or more between the first specimens recorded and the next most-recent of the same species. Collecting specimens throughout the year and over time give insight into annual cycles, (such as reproduction, migration, and molting) and into long-term changes in distribution, abundance and possible genetic research.

A general direction of a provincial museum is to record occurrence and relative abundance of a species; to study relationships to other species and relationships to humans. A provincial museum will tell the complete Island Story, its life and culture, unlocking mysteries of our past and answering vital questions of today.

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Search Engines/Web Portals

These search engines are comprised of a set of integrated databases from various institutions.

http://www.canadensys.net/about/collections/herbaria Canadensis

http://eol.org Encyclopedia of Life

http://www.gbif.org/

http://www.ornisnet.org/

http://portal.vertnet.org/

www.boldsystems.org

http://www.ornisnet.org/ Bird collections and Observations

http://arctos.database.museum/home.cfm and http://arctos.database.museum/ Multi Institution, Multi Collection Museum Database

http://arctos.database.museum/saved/PEI_cryptogams

http://symbiota1.acis.ufl.edu/scan/portal/ SCAN: South west Collections of Arthropods Network

http://www.pnwherbaria.org/ Consortium of Pacific Northwest Herbaria

http://swbiodiversity.org/seinet/collections/index.php South West Environmental Information Network database

Databases - Institutions and Individuals

Beaty Biodiversity Museum, University of British Columbia, Vancouver, Department of Botany
http://www.biodiversity.ubc.ca/museum/herbarium/database.html

Canadian Museum of Nature, Ottawa
http://nature.ca/en/research-collections/our-collections/online-collection-data and
http://www.nature-cana.ca/databases/specimen_search.php

Connell Memorial Herbarium, Department of Biology, University of New Brunswick.
http://unbherbarium.ca/quicksearch

E.C. Smith Herbarium Acadia University, Wolfville, NS
http://procyon.acadiau.ca/ecsmith/cgi-bin/home.cgi

Field Museum of Natural History, Chicago, Illinois.
http://emuweb.fieldmuseum.org/botany/detailed.php

Harvard University Herbaria (Gray Harbarium and Farlow Herbarium)
http://kiki.huh.harvard.edu/databases/specimen_index.html

Kew Royal Botanic Gardens, Herbarium Catalogue
http://apps.kew.org/herbcat/navigator.do

Majka, C, Coleoptera Publications & Research
http://www.chebucto.ns.ca/Environment/NHR/PDF/index.html

Marie-Victorin Herbarium at the Université de Montréal

http://data.canadensys.net/explorer/search?view=map&1_f=9&1_o=EQ&1_v_1=Prince+Edward+Island&2_f=8&2_o=EQ&2_v_1=Marie-Victorin+Herbarium+%28MT%29

Museum of Comparative Zoology, Harvard University
http://mczbase.mcz.harvard.edu/

New York Botanical Garden Online Database
http://sciweb.nybg.org/science2/hcol/allvasc/index.asp.html

Oehlke B. moths and butterflies
http://www3.islandtelecom.com/~oehlkew/ (Saturniidae)
http://www.silkmoths.bizland.com/indexsp.htm (Sphingidae)
http://www.silkmoths.bizland.com/catPEI.htm (Catocala)

Smithsonian National Museum of Natural History
http://collections.nmnh.si.edu/search/

Smithsonian National Museum of Natural History – Botany Collection
http://collections.mnh.si.edu/search/botany/?ti=3

Rocky Mountain Herbarium, University of Wyoming
www.rmh.uwyo.edu

The Academy of Natural Sciences, Malacology Collection
http://clade.ansp.org/malacology/collections/index.html

University of Alberta Herbarium
http://vascularplant.museums.ualberta.ca/

University of Michigan Herbarium
http://quod.lib.umich.edu/cgi/i/image/image-idx?xc=1;page=searchgroup;g=herb-ic

University of Prince Edward Island Herbarium
http://vre2.upei.ca/herbarium/

Taxonomy Information

ITIS - Integrated Taxonomy Information System
http://www.itis.gov/

Canadian Biodiversity Information Facility (CBIF)
http://www.cbif.gc.ca/pls/itisca/taxaget?p_ifx=cbif

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Note: Due to the number and length of the 72 appendices, they have not been included in copies of the printed report. Copies of the complete report can be consulted at the PEI Museum and Heritage Foundation.

Title Page

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Harlequin Darner, *Gomphaeschna furcillata*, a first record for Prince Edward Island, collected on June 15, 2005 by R.W Harding. Photo by Mary Sollows, New Brunswick Museum.

Blue whale, *Balaenoptera musculus*, excavated from Phee Shore, Prince Edward Island in 2008; on display in the Beaty Biodiversity Museum in Vancouver. Photo by Andrew Trites, University of British Columbia.

Stemless Lady's slipper, *Cypripedium acaule*, Brookvale, PEI. Photo by Fiep de Bie

PEI MUSEUM AND HERITAGE FOUNDATION

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