

ENVIRONMENT

Assessment of species diversity in the Atlantic Maritime Ecozone

Edited by Donald F. McAlpine and Ian M. Smith. 2010. National Research Council Press, 1200 Montreal Road, Ottawa, Ontario K1A 0R6 Canada. 785 pages. 94.00 USD. Cloth.

This book is a great achievement. It is the only hard copy assessment in a series that has been made available online (Smith 1998, Scudder and Smith 1998). It

is a major source for anyone interested in Canada's biodiversity as well as that of northeastern North America. The purpose is to "provide a comprehensive view by

experts on species diversity and biogeography of selected major taxa of fungi, plants, and animals inhabiting the Atlantic Maritime Ecozone (AME).” This region includes New Brunswick, Nova Scotia, Prince Edward Island, Îles-de-la-Madeleine, and that portion of Quebec extending from the Gaspé Peninsula to the United States border southwest of Sherbrooke. Managing biological resources is an often repeated reason for the work. It is a terrestrial ecozone so marine biodiversity is not considered in depth. In addition to an inventory list of species, many of the chapters include reference to biogeography and to how the postglacial colonization of the land by a particular group occurred. The content is generally of such high quality that there is little to correct and not much to add. However, as well as further discussing the content, it may be possible to provide some information and suggestions of interest to anyone who owns this book. This may also be useful to further biodiversity study in the AME.

The first five chapters are introductory and outside the species inventory purpose but all are valuable. The first chapter by the editors provides an overview and alludes to some of the impacts on biodiversity. Any written work can be made longer and/or more complete. Had time and space been available, an analysis of threats and a summary of the current status of species would also have been useful. The generic recommendations at the end of this chapter are good, but a specific recommendation that comes immediately to mind is the need to increase support for the Atlantic Conservation Data Centre and the maritime museums.

Another introductory chapter provides helpful information on protected areas. This important subject could also benefit from more extensive coverage. The kinds of protected areas, operational mandates such as representivity and ecological integrity, the special problems, and the outstanding work of conservation organizations such as the Island Nature Trust, assessment of what biodiversity is protected, what stewardship is available, and what is needed to fill in the gaps, are all relevant.

While on the subject of more work, what about more chapters? This is a tough task with 31 chapters and 785 pages already! However, I think it true that a chapter about habitat diversity and major themes in this introductory section would have been helpful. The range of habitats in this ecozone is remarkable. There is serpentine tundra on Mont Albert in Gaspé and plants of the southern Coastal Plain at their northern limits in southwestern Nova Scotia. Some of the available information on biodiversity in AME could be informatively organized by places such as Îles-de-la-Madeleine (e.g., not listed anywhere in the book are: Le Gallo 1952; Larochelle 1973; Pilon and Lagacé 1997) and habitats such as sand barrens (Carbyn et al. 2006). A theme that came to my attention only recently is that of the maritime cave faunas (Moseley 2007). An annotated list of information by habitat, theme and place would have been helpful because workers are often looking

for it in this format rather than as a broad regional list or as references for a taxon group.

Another short chapter that would have increased utility could have briefly featured the regular and special sources of information on species, including museums, collections, libraries, journals, newsletters, and clubs representing the region. For example, Nature New Brunswick produces the *New Brunswick Naturalist* (<http://www.naturenb.ca/nbnaturalistnewsletter.aspx>), an excellent magazine about species in the province. An exemplary copy of this available online contains an article about 2008 botanical field work on the St. John River and the proclamation of 31 new protected areas (on crown land) as well as the very first private-land protected area in the province. See also *Nature Nova Scotia* (www.naturens.ca) and the *Natural History Society of Prince Edward Island Ltd.* (<http://www.isn.net/~nhspei/>). See also “Bio link” – the official Newsletter of the Atlantic Society of Fish and Wildlife Biologists” (<http://www.chebucto.ns.ca/environment/ASFWB>) and a useful review of the present publication in vol. 47(1): 10-11. These are extremely valuable sources for anyone with an interest in AME biodiversity. A bibliography is available for the plants of the region that allows a large amount of information to be traced (Catling et al. 1986). There is more and an introductory chapter on societies and sources might have increased involvement.

The main part of the book, beginning with chapter 6 on page 71 and continuing to chapter 31 on page 693, a total of 27 chapters, includes assessments of mammals, birds, reptiles and amphibians (and turtles), freshwater fishes, freshwater mussels, 12 chapters on various groups of insects, water mites, oribatid mites, earthworms, zooplankton, exotic vascular plants, native vascular plants, mosses, lichens, fleshy fungi and hyphomycetes. The insect groups covered include dragonflies, grasshoppers, true bugs, short-horned bugs, featherwing beetles, ladybird beetles, false darkling beetles, longhorn beetles, water beetles, moths and butterflies, and mosquitoes. Obviously many groups of insects are left out, presumably due to lack of information or lack of an available expert. However, a number of groups of insects have been assessed or are being assessed for part of the region (e.g., Lewis and Bennett 1979, Majka et al. 2007), and some mention of those would have made the biodiversity information more available. The reader should simply bear in mind that, despite the amazing coverage, information available for some groups is not included. For example, although spiders are not included, many groups have been monographed for all of Canada by Charlie (C. D.) Dondale and information relevant to AME is also available in Pickavance and Dondale (2005) and Paquin and Dupéré (2006), as well as from a Canada list indicating provincial distributions (Paquin et al. 2010). Information on this group in Atlantic Canada is also available from the General Status of species in Canada pro-

gram (<http://www.wildspecies.ca/reports.cfm?lang=e>). Although some groups are missing, all of the 27 taxon chapters are helpful and interesting, and a large amount of regional biodiversity, including many key indicator groups, is well covered.

Chapter 11 on exotic and invasive vascular plants provides a good review with an analysis of the extent of invasion and potential invasion in natural communities. Granite and sand barrens might have been considered under the native habitats subject to invasion by Scotch Broom (Catling and Mitrow 2011a). Four species, *Alliaria petiolata*, *Frangula alnus*, *Pinus sylvestris*, and *Phalaris arundinacea* are listed as current pests, each with a paragraph. A more recent source for the potential pest, *Phragmites australis* subspecies *australis* is Catling and Mitrow (2011b). One of the editor's recommendations on page. 9 is to "assess the impact of invasive and alien species within the AME on native biodiversity and ecosystem integrity." There are relatively few examples of impact assessment that could have been referenced. One is the work assessing the impact of *Pinus sylvestris* on the whole *Corema* sand barren ecosystem (Catling & Carbyn 2005). Problems with *Pinus sylvestris*, and another introduced pine, *Pinus nigra*, are not confined to Nova Scotia. On Îles-de-la-Madeleine these species, escaped from plantings, are transforming open dune vegetation with rare native species into a thick forest of introduced pine and little else. The introduced pines now threaten some of the most important dune ecosystems in the AME. As well as the four current pests, 11 potential pests are listed. One of these, *Rosa rugosa*, of seashores, is already a major problem in parts of Nova Scotia on dunes (Hill et al. 2010) and on Brier Island (Garberry personal communication), but these studies and observations were evidently not in time to be included in this chapter.

Chapter 13 on earthworms by John Reynolds is a chapter that stands out with 17 pages of diagnostic illustrations and distribution maps. There are 17 species in the region and because the ecozone covers an extensive area, and these same species occur in adjacent ecozones, the information has broad application. Although 136 new species were described worldwide in the last decade, it is doubtful that any new species occur in the AME. All earthworms in the region are introduced except *Sparganophilus eiseni* which occurs underwater or in mud in saturated soils. Distribution within the AME is given by county and by ecoregion.

Chapter 15 by Valerie Behan-Pelletier, "All you ever wanted to know about Oribatid Mites in the Maritimes," may not jump out at the average field biologist. It should. This group of soil organisms is of major importance with respect to decomposition of organic matter and nutrient cycling and their influence extends up the food chain throughout natural and agricultural ecosystems. There are 196 species known in the AME and another 200 are suspected of being there but are as yet unknown. This is a reminder of the fact that we

may have 100,000 unknown and nameless arthropods in Canada, yet we have far fewer taxonomists than we had 30 years ago. This chapter assesses a group and reports that we know less than half of it. Thinking about this raises some interesting questions. Have we assessed the needs for taxonomists and ecologists to deal with the biodiversity crisis in the AME? Hopefully we will deal with it, as we promised in the International Convention on Biological Diversity. Like many of the chapters, this one provides an important foundation for future research (and part of a basis for keeping promises).

Chapter 16 by Paul-Michael Brunelle features the 142 damselfly and dragonfly species that are known from AME. This chapter includes such complete information on biology, habitat and systematics, all very well illustrated, that with a basic knowledge of its content, and using it as a reference, the reader is well on the way to being an expert on the group in the region. Brunelle has coordinated the Atlantic Dragonfly Inventory Program (ADIP) and has contributed about ten thousand records himself. The value of that program is immediately apparent in the extensive information available for the assessment. The section on recommendations for improvements on monitoring is especially useful. There is a little more to say on the subject of biogeography. Distributions are changing in this region as southern and western species (*Ischnura hastata*, *Enallagma civile*, *Tramea lacerata*), move north as they have further to the west (Catling 2008, Catling et al. 2009, and references therein). There are some notable patterns that correspond to those of other groups and could be obtained from Appendix Table 1. Distributions in saltmarsh have been discussed and more information on occurrence in this habitat is recently available (Catling 2009). There are a few websites that are useful for dragonflies in the region and one is devoted to a portion of the AME (<http://www.odonatanb.com>).

Chapter 17 Grasshoppers (Orthoptera) and allied insects of the Atlantic Maritime Ecozone, benefitted from the earlier work of Vernon Vickery and colleagues. Chandler's (1992) record of the Dusky Cockroach, *Ectobius lapponicus*, on Prince Edward Island, was overlooked. *Neoconocephalus retusus* reported from Sable Island, Nova Scotia, may not be established, but it is nevertheless an interesting record. New information in this chapter includes: the Brown Cockroach, *Periplaneta brunnea*, established in Nova Scotia; the Brown-Banded Cockroach, *Supella longipalpa*, also established in Nova Scotia; the Tree Cricket, *Oecanthus nigricornis*, from New Brunswick; *Conocephalis brevipedennis* from the maritime provinces generally and *Allonemobius maculata*. The latter is likely the species included on the basis of a female from Queens County, Nova Scotia (see page. 373) since *A. fasciculatus* was previously reported to have an extensive distribution in the ecozone. A number of other species of cockroaches have been collected in the AME, but may not have

become established. Also deserving of mention is the study of the two endemic grasshoppers by Chapco and Litzenger (2002). Among other things their study suggested the *Melanoplus madeleineae*, endemic to Îles-de-la-Madeleine, diverged from an *M. borealis*-like ancestor 0.68 million years ago. The authors suggested that more work was needed to precisely define the distribution and status of Orthoptera species. Recently some of this work was reported by McAlpine et al. (2012).

Chapter 25 on Butterflies and Moths begins with an extensive and extremely valuable summary of sources of information on the Lepidoptera of AME. The only omission here (and elsewhere in the assessment) was that of information for the U.S. portion of the AME. For butterflies for example, the work of Webster and deMaynadier (2005) is available for Maine (which is surrounded on two sides by the AME). A recent report relevant to the section on threatened species is Doucet's (2009) census of the butterflies of Gulf of St. Lawrence salt marshes. The details of the interesting story of the maritime ringlet on page 497 can be found in status reports and recovery documents on the Species at Risk (SARA) website: http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=304, http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=1809. The Maritimes Butterfly Atlas was launched in 2010 <http://accdc.com/butterflyatlas/About.html> and Maine has an ongoing butterfly survey <http://mbs.umf.maine.edu>.

Chapter 30 on birds is an outstanding contribution and will always serve as a basic reference document for the region. It is cautious and complete. I was slowed down by the suggestion that "the tundra habitats prevalent in the AME ca. 12 ka, ..., probably had a breeding bird fauna similar to that present in the High Arctic region of Canada today." They may just as well have included western prairie species and have no modern analogue. Sabine's complete discussion of occasional nestings of Horned Grebe in the east, outside the Magdalen Islands, makes the Magdalen population seem potentially a little less important, yet it has been suggested that the latter should be recognized as a separate unit on genetic grounds (Boulet et al. 2005). It would have been of interest to know something of the history of the Gannet colonies – a digression as much as a suggestion. The Bird Rocks, off the Magdalen Islands, were visited by early explorers and were famous in the early days and attracted a lot of attention of well-known ornithologists. Jacques Cartier described the Gannets as "infinite" in 1556 and he named the place the "Gannet Islands." Audubon was there in 1833 for two days, but because of a storm he could not land, but the storm is clear in his plate (and the adult Gannet is clearly looking upward). William Brewster says that in 1860 there were 100,000 Gannets (Brewster 1884 quoting Bryant 1861), making it perhaps the largest Gannet colony recorded in North America. It is believed to have been

larger at the time than the well-known gannet colony on Bonaventure Island off Gaspé. This was prior to the construction of a lighthouse on the cliff-top plateau of the largest of the Bird Rocks. The number declined to 5,000 in 1872, after the lighthouse and continuous habitation (and the elevator on a rusty chain that took 27 minutes to be cranked to the top – see illustration in Charles Cory's classic – "A naturalist in the Magdalen Islands (1878). In 1881 there were only 50 nests at the north end that had been robbed a few days before and about which a few birds lingered. The decline may have been largely due to both the use of Gannet flesh to bait hooks for catching cod and to consumption of eggs. Up to 600 birds were clubbed to death by a group of several fishermen within an hour. Somehow the Gannets survived. The Bird Rocks have been protected since 1919 and they now host 15,000 nesting Gannets, currently the second largest colony in North America. Older references regarding the birds of the Magdalen Islands may be found in Gaboriault (1961). The Maritime Breeding Bird Atlas (Bird Studies Canada 2011) became available after the assessment was published.

With a wealth of biodiversity information, this book is a marvellous value. Although it will certainly be useful in the area of management of biological resources, it will also provide a basis for research and teaching and a vast source of general information. Its greatest impact though may be as an example of what can be done in a book to assess Canada's biodiversity since it is the first of its kind. Naturally we hope that its example and standard can be followed.

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