

# Arthropods



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# Recent Research on Forest Beetles in the Maritime Provinces

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I first became conscious of the term “saproxyllic” while reading Speight’s seminal booklet, *Saproxyllic Invertebrates and their Conservation* (Speight 1989) more than a decade ago. It was a moment of awakening, when a panoply of ideas came together for me in a coherent pattern. *Deadwood – Living Forests*, the title of Dudley and Vallauri’s booklet written for the World Wildlife Fund, encapsulates an important paradox of forest biology: the processes of decomposition (of wood and other organic matter) are the *sine qua non* of forest ecosystems. Much of the forest biota is directly or indirectly reliant on such processes. As the Sammy Cahn song has it, “you can’t have one without the other.”

Another enlightening experience was reading the excellent survey by Langor et al. (2006) on maintaining saproxyllic insects in Canada’s managed boreal forests. As a biologist working on Coleoptera in the Maritime provinces, I was struck by what the authors called the “paucity of research” on this topic and their remark that, “The seemingly low interest of the Canadian research community to pursue work on saproxyllic faunas is enigmatic as the interest among forest managers in CWD [coarse woody debris] management for biodiversity conservation is very high.” Moreover, of the comparatively few Canadian studies that Langor et al. (2006) managed to marshal for their review, almost all came from Alberta or Quebec; none were from Atlantic Canada. Clearly, there were both challenges and opportunities in this region. In my previous research examining historical Coleoptera collections in the Maritime provinces, I had found relatively low representation of many forest (and particularly saproxyllic) species. This reflected early interests in the region, which focused on beetles of open habitats, particularly those of agricultural or horticultural significance.

With the assistance of many collaborators at various institutions in the Maritime provinces, including students working on thesis projects, private collectors, and taxonomists upon whose assistance I have relied in my climb up the steep learning curve of Coleoptera systematics and taxonomy, I have endeavored to fill in at least some of the gaps. The resulting research initiatives have been in three principal areas: taxon-specific biodiversity studies that have surveyed families, or groups of families, of saproxyllic beetles, reporting new species, mapping distribution, compiling bionomic information, and discussing these organisms in the context of the region’s forests and their management history; studies of forest beetle communities at particular localities; and specific

ecological investigations into forest beetle communities as they reflect forest stand types, ages, available coarse woody debris and forest management histories.

Biodiversity studies have resulted in a sizable number of papers surveying forest beetle families such as the Mycteridae, Boridae, Pythidae, Pyrochroidae, Salpingidae (Majka 2006b), Cleridae (Majka 2006a), Tetratomidae, Melandryidae, Synchronidae, Scaptiidae (Majka and Pollock 2006), Nitidulidae, Corylophidae (Majka and Cline 2006a, 2006b), Ciidae (Majka 2007a), Eucnemidae (Majka 2007d), Erotylidae, Endomychidae (Majka 2007c), Derodontidae, Bostrichidae, Anobiidae (Majka 2007b), Anthribidae, Curculionidae, Nemonychidae (Majka et al. 2007a, 2007b), Colydiidae (Majka et al. 2006), Cerambycidae (Majka et al. 2007c), Mordellidae (Majka and Jackman 2006), Ptiliidae (Majka and Sörensson 2007), and Elateridae (Majka and Johnson 2008) in the Maritime provinces (and survey results for the Latridiidae, Leiodidae, Tenebrionidae, and Phalacridae are in preparation). One important outcome of these surveys is that a large number of new provincial and regional records have been established (Figure 7). Overall, of the 647 species identified, 187 (29%) are newly recorded in the Maritimes, and 14 are new Canadian records. The records also include 489 new provincial records, a substantial increase in the known fauna of each province and in our knowledge of its distribution in the region.

Recent work in the Maritime provinces (e.g., several papers summarized in Majka 2007d) has revealed that a large proportion of the saproxyllic fauna appears to be “rare,” i.e., species represented by five or fewer specimens (or no more than 0.005% of saproxyllic specimens examined in total) (Figure 8). Fifty-nine (28%) of 208 species investigated thus far fall into this category. If bark beetles (Scolytinae), which are early colonizers of phloem, cambium, and sapwood, are excluded from the calculations, the proportion of “rare” species increases to 39%. The high proportion of rare species may be partly attributable to the long history of forest management in the region and should serve as an impetus for further research to assess the state of the saproxyllic fauna and the impacts of anthropogenic and natural disturbances.

In recent years, several studies have examined the composition of forest beetle communities in the Maritime provinces. Although some of these studies are still unpublished, together they provide important insights into

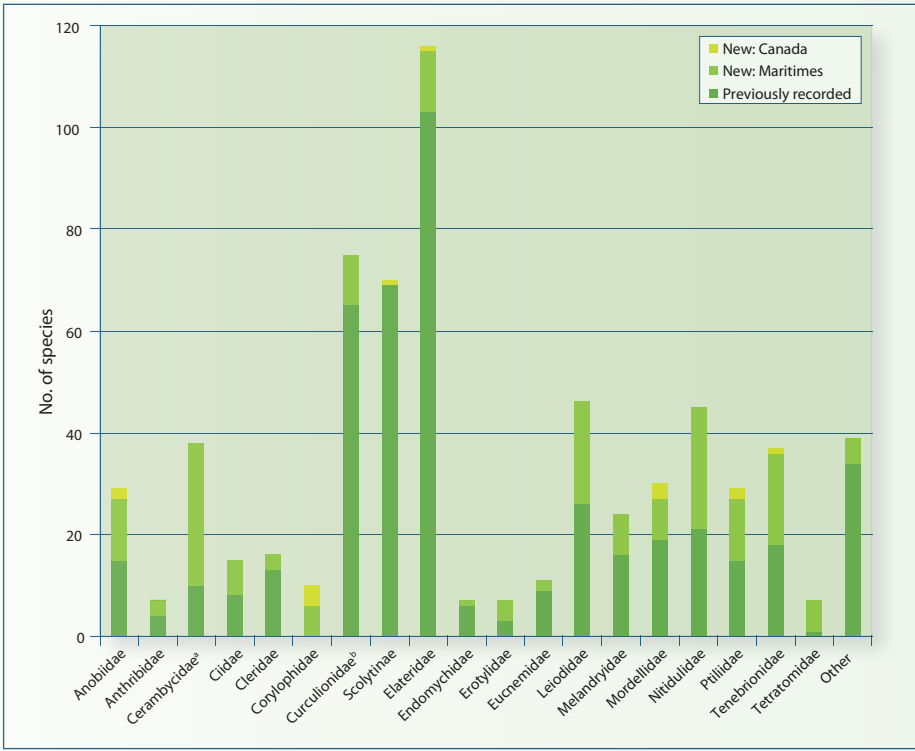


Figure 7. Records for selected families of forest Coleoptera in the Maritime provinces, including new records. For families that include nonforest species, only forest species are included in these counts. <sup>a</sup>Prince Edward Island only; <sup>b</sup>excluding the Scolytinae.

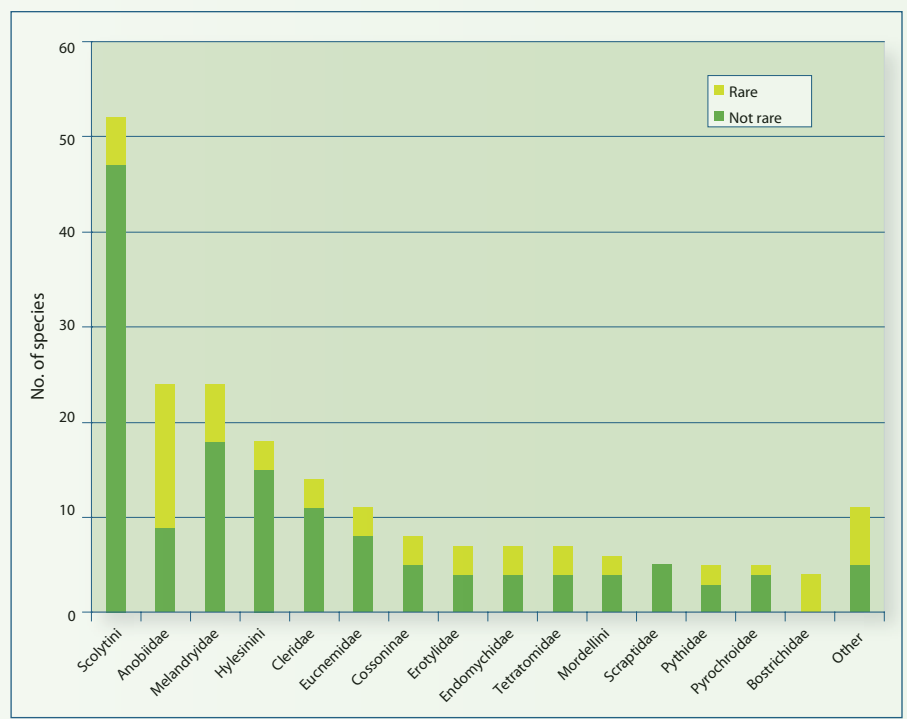


Figure 8. Rare species of native saproxylic Coleoptera in the Maritime provinces.



forest beetle communities of the region. Since 2000, I have been conducting research on forest beetles at a site in St. Patricks, Prince Edward Island. Between 2000 and 2004, I also surveyed the beetle fauna of Point Pleasant Park, a forested municipal park located at the southern tip of peninsular Halifax, Nova Scotia. During 2004–2005, Tatiana Rossolimo and her students at Dalhousie University, Halifax, conducted a study of the forest-floor Coleoptera at several sites in Kejimikujik National Park, Nova Scotia. They found 152 species of beetles as part of their investigation of the potential utility of forest-floor Coleoptera as indicators of environmental change. Figure 9 summarizes the findings of several studies of forest beetle communities in Nova Scotia. Kehler et al. (1996) and Bishop et al. (2008) used flight-intercept traps to survey several forest stands, whereas Dollin (2004) and Majka (unpublished data) used several trapping methods. Although the sampling methods, sampling effort, and number of sampled sites varied between studies, the number of forest beetle species found (ranging from 292 to 405) and the proportion of saproxylic fauna (ranging from 63% to 79% of species) give an indication of the scale and relative importance of this fauna in the province.

Three studies of saproxylic beetle communities in Nova Scotia deserve particular attention. In 1994–1995, Daniel Kehler and Christine Corkum (working with Søren

Bondrup-Nielsen at Acadia University, Wolfville, Nova Scotia) conducted an extensive study of forest beetle communities in 20 coniferous and deciduous forests. Some of the results of this research have been published (Kehler et al. 2004; Majka and Bondrup-Nielsen 2006), and additional analysis is in progress. In 1997, DeLancey Bishop (working with Stewart Peck of Carleton University, Ottawa, Ontario) studied saproxylic beetles in naturally and artificially disturbed forests in Nova Scotia (Bishop et al. 2008). Most recently, in 2003, Philana Dollin (working at Dalhousie University with Peter Duinker and C.G. Majka) examined forest beetle communities at 11 sites of various ages in southwestern Nova Scotia (Dollin 2004). Each of these studies has provided detailed information on saproxylic and forest beetle communities in relation to both forest age and disturbance history, as well as in relation to the characteristics of coarse woody debris. These are all important steps in addressing the “paucity” of information noted by Langor et al. (2006).

Although we have learned a considerable amount about the forest beetle faunas of the region, it is nonetheless clear that much remains to be done. Given the apparent rarity of many species, it is worth echoing the conclusion of Grove (2002), who wrote, with respect to European saproxylic fauna, “Many saproxylic species now survive ... only as relictual populations, ‘hanging on by the tips of their tarsi’ ... In the absence of positive management, the ultimate extinction of some such species (truly the ‘living dead’) is almost inevitable through stochastic events.”

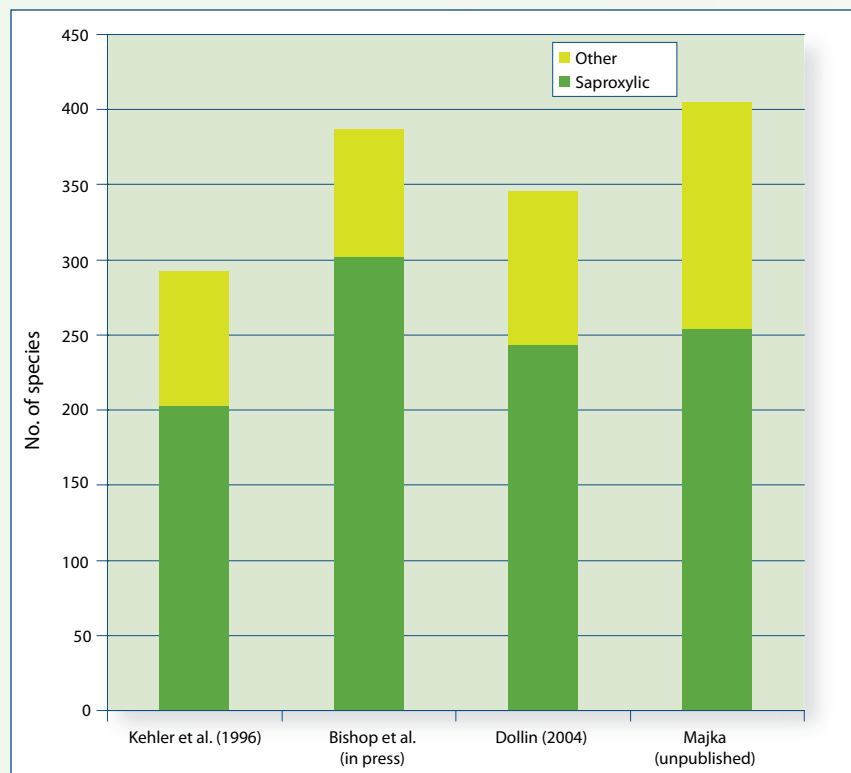


Figure 9. Diversity of forest Coleoptera assemblages in the Maritime provinces based on four independent studies.

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