

**Community Structure of Canopy Arthropods Associated with  
*Abies amabilis* Branches in a Variable Retention Forest Stand  
on Vancouver Island, British Columbia, Canada**

by

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## ABSTRACT

Clearcut harvesting can create conditions unfavourable to forest regeneration. In response, variable retention harvest methods are being investigated in montane forests on Vancouver Island, Canada. The effect of this overstory removal is unknown for canopy microarthropods, especially oribatid mites. As mites contribute significantly to nutrient cycling and decomposition processes in the canopy, changes in community structure and abundance may have dramatic effects on forest productivity. I studied the effects of two variable retention treatments, patch-cut and shelterwood systems, on arthropod communities associated with *Abies amabilis* (amabilis fir) branches and lichens. Changes in community structure were evident among the treatments and an old-growth control site. I also investigated the use of lichen abundance as a surrogate for oribatid mite abundance because it is time consuming and laborious to collect, count and identify microarthropods. Lichen abundance was a good predictor of mites in the old-growth and shelterwood, but not in the patch-cuts. Lichen abundance estimates should not replace biotic inventories, but can be used as an indicator when rapid biodiversity assessments are required.

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*Dedicated to*  
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## CHAPTER 1

### General Introduction

#### *Habitat loss and biodiversity*

Decades of research have shown that many genetically distinct populations, species, and ecosystem types have been lost due to human activity (Ehrlich and Wilson 1991, Wilson 1992, Ehrlich and Daily 1993, Vitousek 1994). The significant and accelerating global loss of species is largely due to habitat alteration and fragmentation (Soulé 1991). Not only are we facing an extinction crisis, but also a biome crisis as the rate of habitat conversion greatly exceeds habitat protection (Hoekstra et al. 2005). While we do not fully realize the consequences of a massive biodiversity loss, many ecosystem goods and services have already been altered irreversibly (Hooper et al. 2005). In order to understand human impact on ecosystems, we must first measure the effects of habitat alteration and loss on biodiversity.

Habitat fragmentation occurs when large tracts of land are subdivided resulting in smaller, isolated patches. Habitat fragments are generally smaller, more isolated, and have more edge relative to interior habitat (Saunders et al. 1991, Robinson et al. 1992, Debinski and Holt 2000, Fahrig 2003). Habitat fragmentation typically reduces species richness (Wettstein and Schmid 1999, Bascompte and Rodriguez 2001, Steffan-Dewenter 2003), reduces genetic diversity (Lande 1998, Gibbs 2001, Francisco et al. 2004, Vandewoestijne and Baguette 2004) and changes population distributions and abundances (Lande 1987, Hanski et al. 1995, Hanski et al. 1996, Lande 1998). Fragmentation also affects ecological structure in habitats. Trophic chain lengths are reduced (Komonen et al. 2000), species interactions, such as predation rates, are changed