

Importance of Forest Act habitats for epiphytic lichens in Finnish managed forests

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Abstract

Habitats of particular importance, as defined in the recent Forest Act of Finland, provide a new means to conserve forest biodiversity in managed forest landscapes. These “Forest Act habitats” should by definition contain populations of rare and red-listed species, but their species composition has not been studied. In this work, indicator and red-listed lichens were studied in private forests of southern Finland in three Forest Act habitat types (brookside forests, herb-rich forests, cliff-forests). Threatened species were found only in 9%, red-listed species in 29% and indicator species in 50% of the study sites. Populations of the target species were mainly very small, half of them on no more than one tree, and thus prone to extinction. *Picea abies*, *Populus tremula* and *Sorbus aucuparia* were the most important host tree species for indicator lichens. The Forest Act habitats appear to make only a limited contribution to the conservation of indicator and red-listed lichens. This is because delimited Forest Act habitats are small-sized sites and rarely harbour old forest stands. Moreover, even selective logging and felling of individual trees, which are generally permitted in Forest Act habitats, can decrease the persistence of epiphytic lichens. Thus, the biodiversity goals integrated in the Forest Act appear to be incompletely realized in current forestry practices.

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1. Introduction

The distribution of protected forests is notably biased in northern Europe. They are situated mainly in the northern parts of Fennoscandia on mountains or in the northern boreal vegetation zone (Nilsson and Götmark, 1992; Stokland, 1995; Virkkala and Toivonen, 1999; Fridman, 2000), where the number of forest species is lower than in central and southern parts of Fennoscandia. For example, in southern Finland only 1–2% of the forests have been protected (Ruuhijärvi et al., 2000), and almost all forest land outside the protected areas is subject to silvicultural practices (Virkkala and Toivonen, 1999). As a result of the intensive forest management many species have become threatened (Hanski, 2000). Consequently, the key issue for maintaining forest biodiversity in these regions is how

threatened and declining species can survive in landscapes dominated by managed forests.

As a response to biodiversity decline, new forestry practices have been developed and implemented in managed forest landscapes of northern Europe. The concept “Woodland key habitats” has a key role among the new means to preserve biodiversity in managed forests. These habitats are defined as habitats in which red-listed species are likely to occur and thus they are considered as particularly important sites for forest biodiversity (Hansson, 2001; Andersson et al., 2003). Nationwide surveys have been conducted to examine the occurrences of woodland key habitats. In practice, woodland key habitats have mainly been identified using indirect criteria indicating naturalness of a site (e.g. uneven age structure of a forest stand and occurrence/abundance of old and dead trees), although indicator species have also been used for their identification (Nitare, 2000; Berg et al., 2002; Andersson et al., 2003). In most countries, key habitats are not automatically protected. Instead, their preservation is taken into account through various methods. For example, authorities are expected to pay attention

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to key habitats in forest management planning, and they are empowered to delineate restrictions on their use or make contracts with landowners concerning their management. Landowners may also voluntarily preserve key habitats through forest certification (FSC) (Hansson, 2001; Johansson and Gustafsson, 2001).

In Finland, the woodland key habitat concept consists of two elements. The “core” of this concept includes several key habitats that have been incorporated into the forest legislation. These habitats are called “habitats of particular significance” and their biodiversity values are conserved by the means defined in the Forest Act (1093/1996), which came into force at the beginning of 1997. However, the key habitat concept also covers several other important habitats, which are not included in the Forest Act, but are preserved voluntarily by good management practices (Meriluoto and Soininen, 1998). In this study, we focus only on the habitats of particular significance (hereafter referred to as “Forest Act habitats”).

Forest Act habitats are considered to be near-natural sites in forests that encompass occurrences of many rare or demanding species (Forestry Development Centre Tapio, 1996; Meriluoto and Soininen, 1998; Tenhola and Yrjönen, 2000). According to the Forest Act, silvicultural measures must be carried out in such a way that the site’s special characteristics are preserved. Regional Forestry Centres in Finland have completed a nationwide inventory of Forest Act habitats in private forests. As a result of the inventory, 95,922 Forest Act habitats (mean size 0.62 ha) were identified in private-owned forests (Yrjönen, 2004).

In Sweden, key habitats have been shown to host a large number of occurrences of indicator and red-listed species (Gustafsson et al., 1999; Gustafsson, 2002). Red-listed species may be more frequent in key habitats than elsewhere in the forest land, but this is not necessarily the case (Gustafsson, 2000; Johansson and Gustafsson, 2001; Sverdrup-Thygeson, 2002; Gustafsson et al., 2004). These results suggest that the success of the identification of key habitats varies among regions. In Finland, corresponding studies are lacking. Moreover, as regards the whole of northern Europe, very little is known about the population size of threatened and indicator species in the woodland key habitats, or about the potential differences in the number of species occurrences among the different key habitat types (but see Pykälä, 2004).

The main target in protecting forest biodiversity by woodland key habitats is that the delimited sites will maintain the populations of red-listed and declined species, which they harbour. Unfortunately, very little is known about the persistence of species in key habitats. The results of the only study available (Pykälä, 2004) suggest that the recent decline of rare epiphytic macrolichens has also been strong in the key habitats. In sites where there is no earlier occurrence data available for the observed species, the current population size may nevertheless provide approximate predictions for the persistence of the populations. This approach was adopted in this study to evaluate the potential of the Forest Act habitats to maintain their indicator and red-listed lichen species.

In this study, the importance of three different Forest Act habitat types for epiphytic lichens was examined. We focus on brookside forests (immediate surroundings of brooks and rivulets), herb-rich forests and “cliff-forests” (cliffs and the underlying forest stands), because they are the three most frequent Forest Act habitats in southern Finland on productive forest land in private forests. Furthermore, based on earlier studies these habitats are thought to be among the most important Forest Act habitats for lichens (Rassi et al., 2001; Pykälä, 2004).

The following questions were addressed: (1) How frequently do indicator and red-listed lichen species occur in Forest Act habitats? (2) What is their population size? (3) Do various Forest Act habitats differ in their importance for epiphytic lichens? and (4) What are the prospects for the observed red-listed and declining lichen species populations to persist in the Forest Act sites?

2. Material and methods

2.1. Study area

The Forest Act habitats included in the study are located in southern Finland, in the area of the three Regional Forestry Centres, i.e. Häme-Uusimaa, Pirkanmaa and the southern sub-region of Rannikko Forestry Centre (Fig. 1). The study sites are partly situated in the hemiboreal and partly in the southern

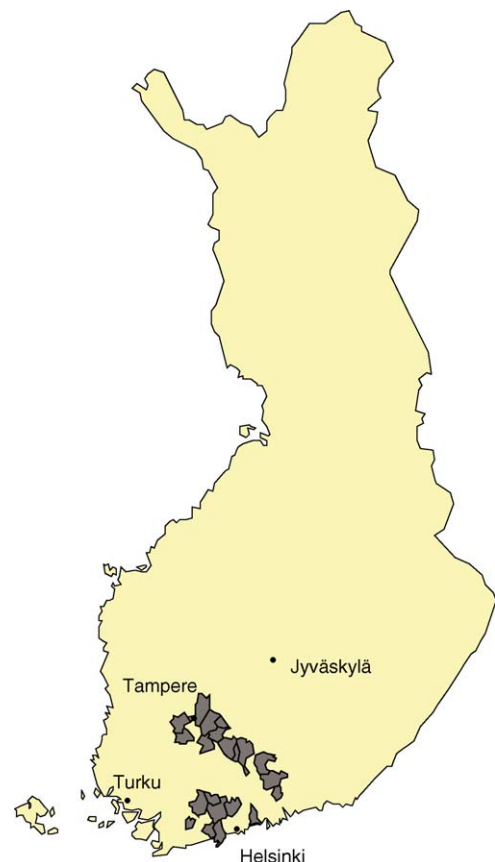


Fig. 1. The locations of municipalities (in dark grey) in which the studied Forest Act habitats ($n = 140$) are situated in southern Finland.

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