

Science for Environment Policy

Boreal forests may benefit from controlled fires, depending on forest management

Controlled fires could help the regeneration capacity of some insects in regions of intensively managed forests, according to a recent study of Finnish forests that are part of an EU LIFE restoration project. Results indicated that fire can be an effective conservation measure but its impact depends on the region's history and context.

Natural forests and the species that inhabit them are disappearing at high rates in many parts of the world. Often forests that are intensively managed for timber production have little variation in the age or type of trees and there is little in the way of fallen trees and debris to provide habitat. However, management also suppresses natural disturbances in forests such as fire, which influence the availability of habitat for some species. The controlled re-introduction of fire in [forests](#) can have profound effects on the pattern of species, encouraging those that are rare and prefer recently burned areas to re-colonise in places where they had been dwindling or non-existent.

The study was carried out in nine coniferous forests sites in southern Finland that were part of the EU Life project Restoration of Boreal Forests and Forest-covered Mires¹. The forests consisted mainly of the tree *Pinus sylvestris* and were located in two distinct regions: the western region where intensive forestry has prevailed for several centuries and the eastern region, which had a shorter management history (about 60 years).

At each site a single stand (group of similar trees) was burned and the number and range of forest insects (beetles and flatbugs) were sampled. The study focused on insect species that were pyrophilous (i.e. grow or thrive in recently burned areas) and red-listed species (i.e. those identified as rare). Sites were not sampled before burning because previous research by the authors in 2006 has shown that intensively managed Finnish boreal forests that lack deadwood and fire-scarred trees contain no rare or pyrophilous species.

Altogether 956 individual insects were sampled that belonged to 29 pyrophilous or red-listed species. A total of 17 species were pyrophilous and 21 species were red-listed, meaning 9 were both pyrophilous and red-listed. A total of 12 species were red-listed - but not pyrophilous - and these were species that prefer habitats with dead wood that is often provided by burning. All species colonised the burned sites quickly but there was a clear difference in the species richness (or range of species) between the east and west regions. The eastern forests harboured a greater number of species with an average of 13.7 species per site, whereas the western forests harboured only 5 species per site. This was also reflected in the different species groups, where eastern sites harboured on average 9.7 pyrophilous species and 8.7 red-listed species whilst western sites harboured on average 3.8 pyrophilous species and 2.3 red-listed species.

This indicates that restoration using controlled fire is less effective in forests with a longer history of intensive management. This may be due to the far-reaching changes to the ecosystems caused by a lengthy duration of intensive management. The effect of controlled fire on non pyrophilous species is likely to be due to the presence of dead wood left after burning. However, if the forest management strategy leaves a substantial amount of dead wood, then the benefit of controlled fire to these species may not be so great. There was some debate as to the origin of the colonisers. It is almost impossible to show exactly where they came from, but the study suggests a major source area is likely to be the eastern part of Finland or Russia. This could be a reason why the eastern sites harboured more species. The difference between the two regions has implications for successful restoration, which must take into account the ecological history of the landscape and possibly the proximity of areas harbouring the species. The researchers point out that more work needs to be done, focusing on a broader range of species and covering longer time spans.



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1. <http://www.metsa.fi/SIVUSTOT/METSA/EN/PROJECTS/LIFENATU/REPROJECTS/FORESTLIFE/Sivut/RestorationofBorealForestsandForestcoveredMiresForestLife112200231122007.aspx>