

Fire as a Tool in Restoring and Maintaining Beetle Diversity in Boreal Forests: Preliminary Results from a Large-scale Field Experiment

E. Hyvärinen, H. Lappalainen, P. Martikainen and J. Kouki.

University of Joensuu, Finland

During the 1900s, the amount of dead and decaying wood has declined drastically in boreal forests in Finland because of intensive forest management. As a result, species requiring such resources have also declined or have even gone extinct. Recently it has been observed that in addition to old-growth forests, natural, early successional phases are also important for the biota of boreal forests. Because of the effective prevention of forest fires and clearing of forests after storms, the early successional stages that normally contain an abundance of dead wood, have become almost absent in forest dynamics. The development of more ecological approaches to manage production forests is needed to protect threatened species successfully and to enhance their recovery.

The natural-like, early successional phases can be created in several ways in managed forests. Based on previous descriptive studies, the two most important factors to be considered are the number of trees left in the regeneration areas, and the use of fire to promote more natural characteristics. The ecological and quantitative effects of these factors are, however, largely unknown.

Our large-scale field experiment is being conducted in mature pine-dominated forests with some mixture of spruce and birch. The size of each study plot is 3–4 hectares, corresponding roughly to the size of a typical regeneration cutting in southern Finland. There are three levels of green tree retention—0 m³/ha, 10 m³/ha, 50 m³/ha—and no cuttings as control. Each treatment combination is replicated three times. Prescribed burning was conducted on 12 of the 24 study plots. All the study areas are located in eastern Finland. In every study plot, 20 window flight traps and 20 pitfall traps are installed to catch beetles. The data have been collected before and after the experimental cuttings and burning; the trapping of beetles will be continued until the end of year 2003.

Since only part of the vast amount of material is identified completely, the results are preliminary. The data presented here represent only the one-month period immediately after the burnings conducted in 2001. According to the results, it seems clear that threatened species benefit from forest burning. It's likely that the treatments affect the beetle assemblages, but so far the data consist of only the first colonizers arriving at the areas. The effect of the level of green tree retention to the beetle assemblages will be examined further when all of the data are available. It also appears that many beetle species are very rapid to colonize new resources produced by fire, and also by cuttings. These preliminary results indicate that by using fire also in commercial forests, population levels of at least some threatened species can be enhanced significantly.