

# Impacts of active management on biodiversity in forest set-asides

*Should protected forests be left completely untouched, or is some kind of active management required if their biodiversity is to be preserved? That question is hotly debated among conservationists today. MISTRA EviEM has now assessed what evidence exists on the topic.*

The biodiversity of forests set aside from forestry is often considered best preserved by non-intervention. In many protected forests, however, remaining biodiversity values are legacies of past disturbances, such as recurring fires, grazing or small-scale felling. These forests may need active management to keep the characteristics that were the reason for setting them aside. Such management could be particularly relevant where lost ecological values need to be restored.

## Mapping the evidence

Interest in active management of forest set-asides has grown in recent years, but opinions differ among conservationists on how it should be balanced against non-intervention. Therefore, EviEM has initiated a review of what science has to say on the matter. As a first step towards a more complete synthesis, we have compiled a **systematic map**. Such a map gives an overview of the evidence base by providing a database with descriptions of relevant studies, but it does not synthesise reported results.

We have identified studies on a variety of interventions that could be useful for conserving or restoring any aspect of forest biodiversity. We have searched not only for studies of interventions in actual forest set-asides, but also for appropriate evidence from commercially managed forests, since some practices applied there may be useful for conservation or restoration purposes too.

Since the review is based on Swedish initiatives, we have focused on the boreal and temperate forest types that are represented in Sweden, but these forests are parts of vegetation zones that extend over many parts of the world. We have looked for relevant studies performed throughout these zones, which means that the evidence covered by our review should be relevant for managers of forest set-asides not only in Sweden but in many other regions as well.



Protected forests are sometimes partly burned for the benefit of their biodiversity. Photo: Trons/TT bild.

## 812 studies catalogued and described

Initially, our searches for literature identified almost 17,000 articles as possibly relevant to the subject of the review. Through several stages of screening, most of these articles were subsequently excluded, but after close reading, 812 studies have been assessed as useful. Almost two thirds of the included studies were conducted in North America, whereas most of the rest were performed in Europe. Of the European studies, more than half were conducted in Sweden or Finland (69 and 68 studies, respectively). The interventions most commonly studied were partial harvesting, burning, thinning, and grazing or exclusion from grazing/browsing. The outcomes most frequently reported were effects of interventions on trees, other vascular plants, dead wood, vertical stand structure and birds.

Descriptions of the included studies are available in an Excel file, and also in an interactive Geographical Information System (GIS) application that displays data on the studies in detail. Both can be accessed at the EviEM website.

Our systematic map identifies a wealth of evidence on the impact of active management practices that could be utilised to conserve or restore biodiversity in forest set-asides. As such it should be of value to conservation managers, researchers and policymakers. Moreover, since the map also highlights important knowledge gaps – such as a scarcity of studies on hydrological restoration and on certain groups of inverte-

brates – it could inspire new primary research. Finally, it provides a foundation for more complete synthesis of specific subtopics. Based on our map of the evidence, we identified the following four subtopics as sufficiently covered by existing studies to allow full systematic reviewing:

1. Effects of thinning, partial harvesting and understorey removal on the diversity of ground vegetation.
2. Impacts of various interventions on dead wood and deadwood-dependent species.
3. Effects of prescribed burning on the diversity of species other than those dependent on fire and dead wood.
4. Impacts of grazing and browsing by livestock, deer etc. on the diversity of forest plants and invertebrates.

So far, we have initiated full review of subtopics 2 and 4.

## Free access to full report

The GIS application and a more detailed description of the project are available at the EviEM website (<http://www.eviem.se/en/projects/Managing-protected-forests-original/>). The full report on the systematic map can be downloaded there. The report has also been published in *Environmental Evidence* (<http://link.springer.com/article/10.1186/s13750-015-0050-7>).

## What is a systematic map?

In this review we used a systematic approach to collate and catalogue studies of how biodiversity is affected by various kinds of forest management. The result is a systematic map of the evidence.

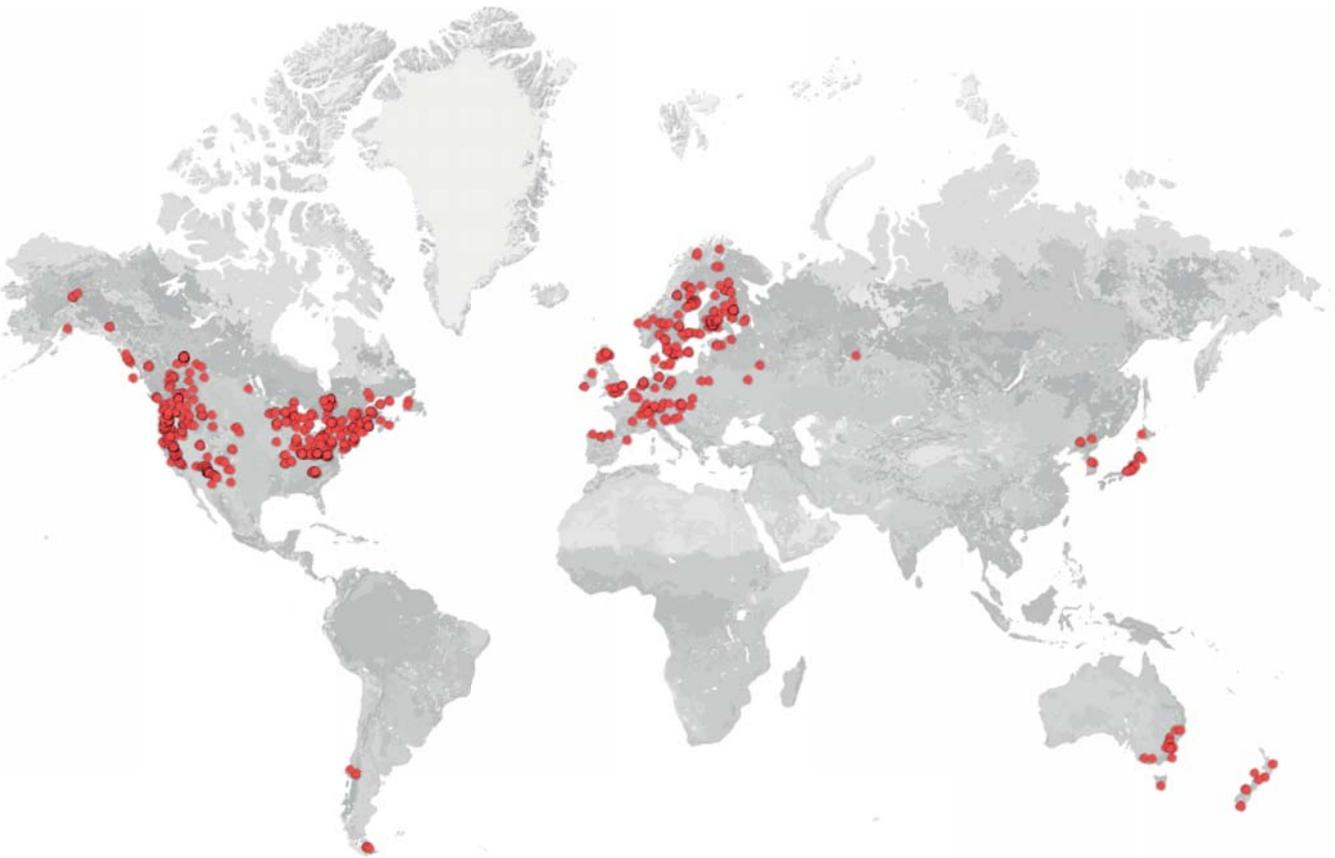
Like other kinds of systematic reviews, systematic maps are characterised by meticulous planning, methodical procedures and a transparent documentation of all assessments carried out in the course of the work. This approach is designed to avoid bias and increase reliability and repeatability.

## How this review was conducted

This review was initiated and financed by the Mistra Council for Evidence-Based Environmental Management (EviEM). It was conducted as part of a project by a specially appointed team of researchers chaired by Bengt Gunnar Jonsson, a Professor at Mid-Sweden University in Sundsvall. The project is managed by Claes Bernes, EviEM.

## EviEM

The Mistra Council for Evidence-Based Environmental Management (EviEM) strives to ensure that environmental management in Sweden is informed by the best possible scientific evidence. Through systematic reviews of relevant research, we aim to improve the basis for decisions in environmental policy. EviEM is funded by the Swedish Foundation for Strategic Environmental Research (Mistra). It is financially and politically independent.



The red dots show the locations of the 812 studies included in the systematic map.