Using fire for pine forest regeneration

The RSPB’s Abernethy nature reserve holds the largest surviving ancient native pinewood in the UK. We aim to double the size of this pinewood, allowing its expansion onto adjacent moorland out to the natural tree line. Our preference is for natural processes, which will more likely create new forest with natural characteristics. Deer culling has allowed some forest expansion, but the rate of new seedling establishment has slowed down in recent years. One natural process which is rare in Scotland, and which could enhance forest regeneration, is fire.

Sometimes, Scots pine has been shown to regenerate well after fire, but better seedling establishment on burnt heather moorland, compared to unburnt moorland, has not been demonstrated. Heather burning is a widely used management tool on heather moorland, but its efficacy for promoting Scots pine regeneration has not been tested. Therefore, we decided to test this technique as a means of promoting pine seedling establishment.

We set up an experiment on heather moorland on the reserve, away from the forested area. Twenty patches were burnt, and fire characteristics recorded. Small areas within burnt patches were burnt a second time: these fires removed more of the moss layer. Pine seeds, sourced locally, were sown into small exclosures on the burnt patches, and adjacent unburnt areas. The numbers of pine seedlings emerging were counted on three visits between three and 30 months after sowing.

Results showed that Scots pine seedling establishment was roughly quadrupled by burning. Patches that had slower-moving fires, such as those produced in calm, dry conditions, had even higher rates of seedling establishment. However, there was no advantage in burning the moss layer with a second fire.

We are now testing these results with a larger, replicated experiment at the forest edge, using natural seed rain from adjacent mature pines. Unlike the earlier experiment, seedlings are exposed to seed and seedling predators, and the fencing out of large herbivores is included as an experimental treatment. We have also started a long-term programme of targeted management burns, within large forest gaps that have little natural regeneration.

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See also: 2001: 33; 2002: 33; 2004: 36; 2005: 39

Numbers of Scots pine seedlings established in burnt areas were about four times greater than those of controls.

Below: RSPB staff carrying out an experimental burn on moorland at the RSPB’s Abermethy nature reserve.

Caledonian pine forest