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COVER PHOTOGRAPH: Fire in north-west Scotland, see page 12.

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Burning bogs: management fires in north-west Scotland

Alistair Hamilton

Institute of Ecology and Resource Management, The University of Edinburgh

Fire has been used extensively as a management tool in the UK, particularly in the uplands. It is most commonly used as a means of regenerating heather (*Calluna vulgaris*), mainly to improve heathland habitat for red grouse (*Lagopus lagopus*) but also to improve the grazing for sheep. In the north-west of Scotland, fire is also commonly used as a management tool on land of poor agricultural quality, where the vegetation is dominated by a mosaic of wet heath and blanket bog. In such areas, fire is mainly used to encourage the 'early bite' for sheep and deer. This is the quick regrowth of sedge and grass species in the spring following a burn. Such fires therefore have different purposes to, and have different characteristics from, grouse moor fires. North-west fires tend to be much larger in area (often covering tens of hectares of wet heath and bog), are very heterogeneous in their effects, and are usually uncontrolled (due to the lack of available manpower, lack of suitable burning days and subsequent need to burn with little preparation, and partly from tradition). The use of fire in these areas, in particular on blanket-bog, is very controversial. Many conservation bodies recommend either no or minimal burning, whereas land managers see bogs as integral parts of the hill grazings and are managed as such. Of particular concern has been the effects of fire on the *Sphagnum*

Comment

layer - lose the *Sphagnum*, and severe degradation of the habitat may occur.

Although fire is one of the few management tools available over extensive areas, research carried out in the UK has been very one-sided. Studies have tended to focus on the effects of fire, with fire being treated very much as a homogeneous event - an area either has or has not been burnt. However, fire is not a homogeneous phenomenon, and if fire is to be used properly as a management tool, the links between fuel and fire characteristics, and the subsequent effects, must be understood. This is particularly important given the possible land use changes in the north-west (with the economic decline of sheep farming), increasing importance of conservation and tourism, and the large carbon stocks held in the peat and peaty soils in the north west. The tasks facing fire ecologists are concisely summarised by Johnson & Miyanishi (1995), who state that "*effective fire management and the development of proper fire prescriptions require an understanding of fire processes and heat transfer that explain fire behaviour characteristics, as well as an understanding of how fire behaviour is coupled to fire effects*".

The aim of my research (Hamilton 2000) was to characterise the fuels and management fires in north-west Scotland, relate those results to the effects on the vegetation, and to propose some guidelines for burning on blanket-bog. Using harvested plots, equations were developed to predict pre-fire biomass of the important fuel types. Forty small experimental fires were carried out in the spring of 1998 on Inverpolly Estate in the north-west Highlands. Temperatures were recorded continuously at ground level, and at mid, top and above the canopy. The highest temperatures tended to be found in the middle of the canopy (mean of 550 °C) - see Figure 1. However, temperatures above 'lethal' for plant cells (55 °C) were found to last longer on the surface of the bog, due to fuel smouldering after the fire-front had passed. This resulted in many cases in a greater total heat input at ground level, with obvious consequences for the *Sphagnum* layer.

The total heat released from each plot was calculated, based on the biomass of fuel consumed. The extreme variability of the results (from 713 to 8,524 kJ m^{-2}) was mainly due to the spatial patchiness of the vegetation across the bog habitat. Fire intensity was also estimated, from the biomass of fuel consumed and the rate of spread of the fire. The overall intensities were found to be very low, with a range of 11 - 120 kW m^{-1}, compared to the range of 43 - 1,112 kW m^{-1} estimated by Hobbs & Gimingham (1984) for dry heathland fires. However, fire intensity can also be calculated from observations of flame length, and from the maximum observed flame length of 2 m, an intensity of 1,173 kW m^{-1} was calculated. The low overall estimates are thought to

be due to the spatial variation of the fuel complex being on a scale smaller than could be resolved by the 1 m^2 sample plots. This results in under-estimates of the maximum intensities where these intensities are transient and confined to small patches of higher available fuel load. The health of the *Sphagnum* layer one year after burning was found to be significantly related to the total heat released, but not to the fire intensity. The health of *Sphagnum* also improved significantly up to three years after burning, with many experimental plots showing complete recovery after this time.

The overall results indicate that, for low-intensity management fires, the *Sphagnum* layer recovers relatively quickly following a fire. The *Sphagnum* appears to be protected in such fires by a layer of moist fuel (typically dead *Molinia* litter), and it is therefore recommended that burning on bogs only be carried out under such conditions. This means that after several consecutive dry days, with the ground fuels progressively drying out, burning should be stopped. Needless to say, out of season (especially summer and drought-condition) fires must be avoided. It was also observed that burned sites can attract a large number of sheep and deer, and that trampling damage to the *Sphagnum* and peat can be severe, especially on areas recovering from a burn. It may therefore be advisable to maintain the large size of burns in these areas, partly because it is not possible to conduct many small burns as currently recommended, but also to spread the impact (grazing and poaching) of herbivores.

The present study also highlighted the need not only for more fire research in this country, but also for research to be conducted in a more focused manner. The development of fire prescriptions requires an understanding of the linkages between fuel, fire behaviour, and fire effects, which we are currently lacking. This requires the development of standard methodologies, for example to describe and quantify fuels, and an appreciation of what different fire characteristics actually mean and what they should be used for. For example, the maximum temperature reached may be vital in determining individual meristem survival, but the total energy released may relate better to overall community recovery, and fire intensity may be vital for fire control planning. We have a lot to learn about fire ecology in the UK, but the tools required are available.

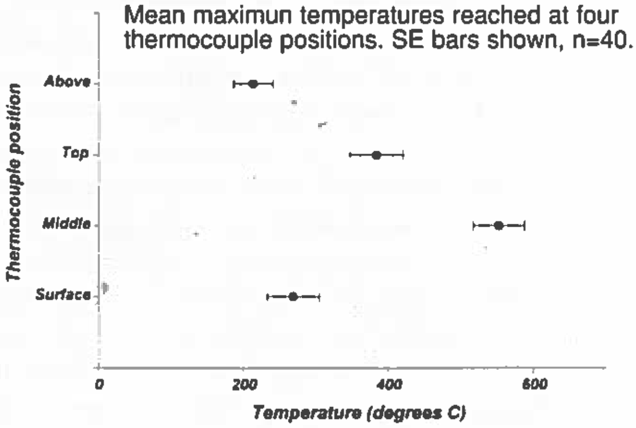

Figure 1.

REFERENCES

Hamilton, A. (2000).	*The characteristics and effects of management fire on blanket-bog vegetation in north-west Scotland.* PhD Thesis, The University of Edinburgh.
Hobbs, R.J. & Gimingham, C.H. (1984).	Studies on fire in Scottish heathland communities 1. Fire characteristics. *Journal of Ecology*, 72: 223-240.
Johnson, E.A. & Miyanishi, K. (1995).	The need for consideration of fire behaviour and effects in prescribed burning. *Restoration Ecology*, 3: 271-278.