

VEGETATION DYNAMICS IN  
SEASONALLY GRAZED UPLAND SYSTEMS

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## DECLARATION

I declare that this thesis is my own composition, except where otherwise stated. Specific contributions of others are acknowledged. The work has not been submitted for any other degree or professional qualification.

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## ABSTRACT

This thesis addresses the effects of seasonality of grazing on vegetation dynamics. Background to the thesis is provided by the Hill Sheep and Native Woodland (HSNW) project, a system-scale experiment with the long-term aim of integrating upland sheep husbandry within native woodlands. Sheep husbandry in the HSNW project has involved a change from year-round grazing to off-wintering (grazing on upland areas from April to October only). The potential impact of this change on individual plants, plant communities and the landscape is evaluated.

A cutting experiment was run to simulate herbivory in different seasons at the level of the individual plant. In grassland communities, where most species are wintergreen graminoids, interaction between species and seasons in response to cutting was minimal. In mire communities, where species with a range of life-forms and phenologies are present, there was considerable interaction between species and life-form in response to cutting in different seasons. Non-wintergreen graminoid species recovered more rapidly than wintergreen graminoid species following cutting in spring, but the reverse occurred following cutting in autumn. Dwarf shrubs and forbs were slow to recover from cutting in all seasons in both mires and grasslands.

The impacts of three grazing treatments in the HSNW project (unchanged year-round grazing, change to off-wintering, and change to zero grazing) on sward structure and

species abundance were monitored. Sward height increased in the ungrazed treatment, but changes in species relative abundance were minimal in the short time-scale of the study.

Literature suggests that change in plant species abundance in grazed systems is driven by herbivore selection preference for (or avoidance of) plant species and plant responses to grazing. Experts were interviewed to generate a set of seasonal data on herbivore selection preferences and plant responses, and levels of agreement between experts were assessed. Information was also collated on plant response to herbivory from the cutting experiment (above) and plant trait information from the literature. A qualitative model was developed to predict change in species abundance. It was used to: i) explore patterns of interaction between herbivore preferences and plant responses to grazing; ii) compare short-term predictions of change in abundance made using each of the information sources available; iii) make longer-term predictions using plant trait information. The short-term predictions were tested against the small changes in species abundance that had occurred in the HSNW project. Predictions made with the plant trait information were more accurate than those made with other information.

A study of levels of browsing on regeneration was carried out in mature sheep-grazed birch woodlands. It was rare to find regeneration at sites grazed only by sheep, but

tree regeneration did occur in the presence of sheep. Seasonal variation in browsing was found to be more related to the presence of cattle than to the presence of sheep.

Finally, the findings are collated to make management recommendations for the HSNW project and other systems where seasonal grazing regimes could be beneficial.

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