

Gus Routledge gsrtldg@hotmail.co.uk

Scotland's Rural College, Aberdeen

An investigation into techniques for understanding the potential for expansion of montane scrub woodland at established sites in Scotland

Six months BC (that is, Before Covid), I spent a few days being tormented by midges, ticks and thorns with my head below a one metre canopy, notebook and tape measure in hand. It was great, one of the highlights of my summer, and the data it provided me for the winter desk-based work was great fun to look through and understand. But what was I doing?

In Scotland, montane scrub woodland (herein referred to as MSW) is a rare habitat, typified by low-growing shrubs such as juniper and willow, growing above the altitude at which trees thrive, somewhere between the treeline and the open montane heaths and grasslands. Centuries of various land uses have taken their toll on this stunted woodland and resulted in its almost complete retreat to inaccessible crags and slopes in Scotland's uplands. Much of this is due to overbrowsing by herbivores. The likes of the montane willows are a particularly nutritious treat compared to much of the vegetation in the hills so when herbivory reaches too high a level, they stop reproducing and the low canopy that provides habitat for various plants and animals gradually disappears.

In recent years, there has been a greater focus on the restoration of this "Cinderella habitat" with schemes such as those at Carrifran Wildwood in the Borders and Cairngorms Connect seeking to reinstate the natural transition from forest to scrub to open hilltop. With so little MSW left in Scotland, we perhaps lack some understanding of it. We can look to the likes of Norway for inspiration but within Scotland we are limited to often unrepresentative stands that are growing where they are due to significant pressures.

My dissertation project sought to answer one question: where would new MSW be best sited? To understand this it was necessary to study existing sites. Two sites were chosen, one being Craigdilly SSSI in the southern uplands with its eared willow scrub, and the other being the well-known Creag Fhiaclach treeline site, with its stands of juniper scrub. Both sites are on acidic ground at between 450m and 570m a.s.l.

I used three methodologies. One utilised the existing National Vegetation Classification (NVC) to try to identify currently open communities that may be best-suited to montane scrub establishment by looking at the vegetation found beneath the canopy of the MSW and drawing comparisons with open heaths and grasslands.

The second used Ellenberg values. These are indicators of various environmental factors: light, moisture, pH and soil fertility were most relevant for this study. By gathering species data for the sites, it was possible to average out all the Ellenberg values for the species found there, taking into account abundance of individual species, to ascertain the Ellenberg values for the MSW. This was then compared to a list of British plants to identify potential indicator species.

The third approach used a detrended correspondence analysis, but this did not show anything particularly clear, so I won't bother explaining it.

The NVC approach interestingly identified the likes of heather-blaeberry heath and blaeberry-wavy hair-grass heath, and great wood-rush-blaeberry tall-herbage being identified as most similar to the community found beneath the scrub. These are quite extensive habitats in Scotland's uplands which

may point towards our landscapes being capable of supporting far more MSW than they do at present. Blaeberry-wavy hair-grass is also a minor snowbed community which is interesting.

The Ellenberg approach identified some generic species such as blaeberry (perhaps again suggesting MSW should be far more widespread) but also some more specific species such as interrupted clubmoss and alpine lady-fern. The former is a minor snowbed indicator, the latter being more associated with snowbeds. Perhaps this is a reflection of these species being happy with some protection which could come in the form of a canopy, as well as snow.

The take-home message I got from my project; the research, the field experience and the data analysis; was that Scotland has the potential to support a more MSW in the long run. There may be places where, initially, the scrub will take hold a little better such as where herbivory is low, snow cover is moderate, mycorrhizal connections can be established and the wind isn't too harsh. But our montane dry heaths, wet heaths and grasslands could all be mixed into a rich tapestry of scrub and open ground, providing a habitat that has virtually been completely lost from Scotland as well as contributing towards carbon sequestration, water purification, sustainable field sports and farming, and recreation.



*Plate 1: Juniper *Juniperus communis* & Scots pine *Pinus sylvestris* scrub at Creag Fhiaclach, the most natural treeline in Scotland*