

Species Rich Grassland

Best Management Practice

Lessons Learned from the Highland Perthshire Calcareous Grassland Project 2007-2010

Introduction

The Highland Perthshire Calcareous Grassland Project (HPCGP) was set up in 2007 with the aim of increasing awareness of the conservation value of calcareous and other species-rich grasslands and to encourage restoration and enhancement of these valuable grasslands. The HPCGP received funding from the SITA Tayside Biodiversity Action Fund, Scottish Natural Heritage and the Cairngorms LBAP Biodiversity Grant Scheme.

Four Demonstration Sites were established under the project, with each site focussing on a range of grassland management issues. This Best Management Practice booklet is a summary of the lessons learnt from each of these sites, and is intended to help other grassland managers.

The Demonstration Sites

Glenfincastle

Set up as a Demonstration Site in 2007, the site consists of as 3.2ha field on an organic farm. The field is a mosaic of improved reverting grassland and calcareous and species-rich bankings. Since the field was re-seeded in the 1950's, there has been only limited inputs and various wildflowers have re-established in the sward.

The owner was keen to “restore” a more species-rich grassland on the site, so various enhancement treatments were trialled. These included:-

- Creating scattered bare ground patches and broadcasting locally collected seed, including yellow rattle.

- Creating scattered bare ground patches and broadcasting purchased local provenance wildflower seed with 40% by weight of yellow rattle.
- Turning over an area with pigs and then sowing with purchased yellow rattle, yarrow and chewings fescue.

Grazing regimes for cattle and sheep were also designed to encourage conditions suitable for encouraging species-richness (e.g. short sward in winter and spring, followed by lower grazing levels to encourage flowering and seed set).



Yellow Rattle © Bob Dawson BBCT

Tomnaguie

Set up as a Demonstration Site in 2007, the site was selected because it supports patches of botanically rich calcareous grassland and is/was used as a nesting site by *Omsia inermis*, an extremely rare Mason Bee. The site is located on an organic farm.

The site extends to 0.3ha, and was unfenced and therefore no longer grazed. Scrub had regenerated in patches and perennial weeds were taking hold. Prior to becoming a Demonstration Site it was used for temporary storage and occasional parking.



General view across site

Under the HPCGP the site was fenced and a grazing regime was re-introduced to try to tackle the rank vegetation and scrub.

The blaeberry bumblebee feeds on the flower-rich habitats in the locality.



Blaeberry Bumblebee © Bob Dawson BBCT

Strathgarry

Set up as a Demonstration Site in 2007, this site was selected because it included a mosaic of habitats, including calcareous grassland and improved grassland. The farmer was keen to try to find a suitable grazing regime that would suit all of the unimproved grasslands and flushes, whilst encouraging greater species diversity within the reverting semi-improved grassland. The site contains part of the Tulach Hill SAC/SSSI.



General view across site

The site is large (34 ha) but prior to joining the project, was grazed in conjunction with a section of hillground, and there was therefore little control over the grazing levels.

Under the project the farmer has erected fencing to allow closer control over grazing regimes, and has increased the number of cattle on the farm, so that the predominant sheep grazing could be replaced by a more balanced cattle and sheep grazing regime. The grazing levels were reduced between mid-June and the end of August to encourage flowering and seed set.

Many butterflies utilise the site, including the Northern Brown Argus whose food plant is the rock rose.



Northern Brown Argus © Butterfly Conservation Scotland

Cesthill

Set up as Demonstration Site in 2008, this site was selected as it clearly illustrates the problems associated with grazing management on habitat mosaics. It also is a useful site for examining scrub control techniques, barriers to grazing and the impacts of supplementary

feeding and winter grazing.

The site extends to 11.5ha and is a mosaic of calcareous grassland, neutral species-rich grassland, semi-improved/improved grassland and woodland and scrub. Anthills (yellow meadow ants and black ants) are also a significant conservation feature of the site.

One of the main threats to the site is scrub. The following treatments were trialed:

- Scrub control through increased grazing
- Scrub control through cutting and stump treatments
- Scrub control through foliar spraying

Wild thyme is abundant on the site and grows well on the anthills.



Wild Thyme © Lorne Gill SNH

Management to Enhance Species-rich Grassland

1. Sward Enrichment by Seeding into Improved and Semi-Improved Grassland (Glenfincastle)

Seed Source

- Collection of seed locally is very time consuming, and care needs to be taken to ensure weed seeds are not included.
- The collection method can partly determine the range of seed collected. The reversed Stihl handheld blower only collects 'loose' seed. Hand

collection is much more selective/controlled, but is very time consuming. It can take days to collect 1kg of seed.



Volunteer collecting seed

- Seed collected focussed on commonly occurring perennials plus yellow rattle.
- There is a lack of commercial sources of regional provenance wildflower seed.
- Grassland research has shown yellow rattle to be a valuable addition as it is semi-parasitic and reduces the vigour of grasses in the sward creating a more open structure, encouraging the spread of wildflowers. However, it proved to be difficult to establish yellow rattle on the small bare patches at Glenfincastle, but on the large scale seeding it established easily.

Options for Seeding

- Slot planting is an option, but was not trialed in this project.
- Tight grazing to create niches followed by broadcasting of seed was another option considered but not trialed in this project.
- It was decided to use a turbo tiller to create bare patches of ground for seeding. This decision was partly taken as the mole hills on the site had proven to be excellent seeding sites for a range of wildflowers. The bare patches measured approximately 30cm by 20cm, and were sown in the autumn by hand, using a mix of wildflower seed and sand. The sites

were firmed in with feet. The bare patches were kept quite small as the farmer was concerned about the spread of thistles, which on an organic farm are very difficult to control.



Turbo-tiller

- The seeded patches germinated well in the first summer following sowing, but by the second summer the grasses within the surrounding sward had grown across the seeded patches and smothered out most of the wildflower seedlings.
- It was hoped that the yellow rattle would have helped to reduce the vigour of the grasses in the locality, but this did not happen and the yellow rattle did not persist beyond the first growing season, even though grazing levels allowed for flowering and seed set.
- In retrospect, it was decided that the seeding patches should have been much larger – e.g. 2m x 2m to prevent smothering of the seedlings.
- Mole hills provide an ideal seed bed for many species including lady's bedstraw, harebell and violet.



Wildflowers seeding onto molehill

2. *Natural Regeneration from Existing Seed Sources (Strathgarry, Tomnaguie and Glenfincastle)*

Agricultural Inputs

- Both Strathgarry and Glenfincastle show that if agricultural inputs (lime, inorganic fertiliser, pesticides and FYM) are excluded or significantly limited, improved or semi-improved grasslands can gradually revert to become more flower-rich. However, without specific intervention to speed up the process, this can take a number of decades.
- The species of grass in the sward are crucial. Fine-leaved grasses, such as crested dogstail, bents and fescues are more conducive to recolonisation by wildflowers, whereas tussocky grasses or very productive grasses, such as cocksfoot or ryegrass are less conducive.
- The wildflowers that had gradually recolonised include self heal, ribwort plantain, common sorrel, germander speedwell, pignut and yarrow.

Grazing Management

- Continued grazing over many years can result in loss of botanical diversity, particularly if the grazing prevents flowering/seed set and consequently there is no natural regeneration of wildflowers.
- The type of stock can make a significant difference to the proportion of flowering stems in the sward. On the Strathgarry site sheep selectively grazed wildflowers, even when grazed at a low stocking rate (less than 0.7 lu/ha).
- Cattle appeared less selective, but still exhibited grazing preferences at Strathgarry, where the more species-rich grasslands were subject to heavier grazing levels than improved/semi-improved or rank grassland areas.

- Advice should be taken on the type of stock best suited to the grassland and the timing of the grazing and stocking rates. Organisations such as Butterfly Conservation and the Bumblebee Conservation Trust can provide advice on management of grasslands to encourage bees and butterflies – refer to last page for contact details.

Cutting and Baling

- This was not trialled on the four Demonstration Sites, but the donor site for seed for Glenfincastle, Foss Meadow, was an improved, reverting grassland site. Wildflowers were gradually regenerating, but when the management was switched to cutting for hay and aftermath grazing, the proportion of wildflowers increased significantly. Yellow rattle was an important element in reducing the density of the grasses. The late cutting appears to have created ideal seeding niches, so seed drops onto this and regeneration is very successful. The aftermath grazing then keeps the sward relatively open, which appears to encourage regeneration.
- At Tomnaguie and Strathgarry, areas that have become rank proved unattractive to stock and difficult to graze down-even when grazing the rest of the site quite hard. At Strathgarry a section of calcareous grassland was fenced to allow a targeted grazing regime to be implemented and this has proved quite successful. At Tomnaguie the site is too small to justify internal fencing, so a heavier grazing regime across the whole site has been undertaken.



Rank calcareous grassland at Strathgarry



Rock rose in the rank grassland

- It may be necessary to cut the rank areas (and ideally remove the cuttings) to make them more attractive to grazing animals.
- Light grazing throughout the spring, summer and autumn tends to provide better results than a grazing exclusion followed by reintroduction of grazing. At Tomnaguie there were two years when an exclusion was unavoidable, and the more productive vegetation became rank. This resulted in the smaller stature wildflowers becoming smothered, and when grazing was reintroduced the vegetation was trampled down, and grazing did not produce a well-grazed sward, due to the mat of rank vegetation.
- If scrub is present grazing exclusions should be avoided – refer to section 4.
- Barriers to grazing should be investigated and removed if possible. At Chesthill an old scare fence across a section of the middle of the site resulted in reduced grazing levels on sections of site, and appears to have encouraged the development of scrub. The removal of the fence has resulted

in a better dispersal of stock and therefore a more even distribution of grazing.

3. *Seeding to Create Species-rich Grassland (Glenfincastle)*

- Removal of the existing sward and sowing to create species-rich grassland was trialled at Glenfincastle, in order to introduce a persistent source of yellow rattle to gradually spread across the site.
- Pigs were used to turn over the soil and to create a seed bed. It was hoped that the pigs would control the creeping and spear thistle by uprooting the plants.
- The site was sown with a mix of yellow rattle, yarrow and chewings fescue.
- The seed was broadcast onto an uneven seedbed left by the pigs. Germination was very successful.
- Unfortunately regeneration of creeping and spear thistle were equally successful, and as the farm is organic and herbicide use is not an option to control the thistles, the area has had to be cultivated to control the thistles.
- The germination was excellent, and if there had not been a problem with thistles, this area would have provided a seed source for yellow rattle and yarrow to spread across the site.



Yellow rattle on seeded site

4. *Scrub (Chesthill, Tomnaguie and Strathgarry)*

Grazing

- It is best to try to manage grazing to prevent the onset of scrub regeneration, as once it has started, it is very difficult to control using grazing alone.
- Grazing exclusions during the growing season can encourage the onset of scrub regeneration. Ideally, light grazing should be continuous throughout the growing season.
- At Tomnaguie small areas of birch and dog rose seeded in when the site was not grazed. Re-introduction of sheep and cattle grazing has resulted in browsing of the foliage and some damage to the woody growth, but as the scrub is 80cm-120cm tall, grazing will not eradicate it. Grazing is however, preventing further spread of the scrub.



Scrub grazed by cattle and sheep

- At Strathgarry birch and willow are attempting to regenerate on the flushes. Grazing keeps the regeneration at < 30cm in height and relatively sparse, as the flushes are preferentially grazed. At a different part of the site alder is regenerating and threatening a colony of marsh helliborine. Stock do not appear to graze much on this area, and although there is some browsing of the alder, once they get to 20cm tall, they get away from the browsing and quickly develop. It has been decided that the

alder will be cut and the stumps treated.



Alder regeneration threatening marsh helliborine

- At Chesthill the scrub (birch, hazel, hawthorn) has developed over many years, thought to be encouraged by the exclusion of red deer from the site and a summer cattle grazing exclusion. Year round cattle grazing was introduced under the project to control the scrub. Scrub less than 50cm in height has been significantly browsed, but any taller it tends to escape from cattle browsing and quickly grow away, with an annual growth increment of 1m plus.
- Scrub control at Chesthill involved changing the grazing regime, cutting and stump treatment, and foliar spraying.

Cutting and Stump Treatment

- With cutting and stump treatment the scrub was cut back in November 2008 and treated with Timbrel (200ml to 20 l water). Results have shown that by August 2010 approximately 30% of the cut stumps showed signs of re-growth, therefore 70% had been killed by the Timbrel. The project budget did not allow for removal of cut material, and although it is breaking down relatively quickly, it is excluding grazing from patches, and potentially could encourage more scrub regeneration under the brash.

Foliar Spray

- Timbrel was used for the foliar spraying. It was applied in August/September 2008 using a knapsack sprayer. Results have shown that by June 2009 95% of the sprayed shrubs appeared dead (i.e. there were no signs of living canopy). Timbrel does not impact on non-woody species, so the majority of the sward was unaffected, however, spray drift did kill a small number of *Calluna vulgaris* plants.



Prior to scrub treatment



After scrub treatment

Scrub control has removed the shading of wildflowers such as rock rose.



Rock Rose © Lorne Gill SNH

5. Perennial Weeds

- Tomnaguie and Glenfincastle sites both had problems with perennial weeds such as creeping thistle and docks. Both farms are organic, so spot treatment with herbicide could not be undertaken.
- Grazing controlled some of the perennial weeds at Tomnaguie, but stock did not graze the thistles and nettles. These have been cut each year to control their spread.
- At Glenfincastle, the main perennial weed is thistles (creeping and spear). A Lazy Dog device has been used to uproot thistles quite successfully, but is very time consuming. The use of pigs to dig up the roots of thistles resulted in a rapid increase in thistles, rather than control. Topping has been used to prevent seeding and further spread.
- On non-organic farms weed wiping and/or spot treatment have proved to be very successful.

CONCLUSIONS

The farmers involved in the project have been enthusiastic about their grasslands and have been happy to help with management to enhance them.

There were many aspects of grassland management included in the project – the following is a summary of the main points.

- If using sward enrichment by seeding, the seeded areas must be large enough to avoid smothering of seedlings from adjacent vegetation.
- Grazing management to encourage natural regeneration of wildflowers within the sward results in extremely slow changes to the sward. Although the sites are gradually becoming more diverse they need to be

managed/monitored for many more years to determine results.

- The quickest results for enrichment of the sward have been seen at Foss Meadow, where a combination of yellow rattle and the introduction of cutting and baling at the end of the summer has resulted in the rapid spread of wildflowers throughout the sward.
- Once the scrub has established and reached a height of 50cm+, it is likely to be necessary to use either mechanical or chemical control, as grazing alone is unlikely to prevent further development of the scrub.

6. Funding for Grassland Management

At the time of writing (2011) the only funding available for species-rich grassland management, restoration or creation is the Scottish Rural Development Programme (SRDP) Rural Priorities Scheme. www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities

7. References

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Scottish Agricultural College Technical Note TN629 (2010) *Management of Species-rich Grasslands* (SAC)

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8. Useful Contacts

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RSPB Scotland 2 Lochside View, Edinburgh Park, Edinburgh, EH12 9DH
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All photographs provided by Christine Hall of SAC unless otherwise acknowledged

This project was funded by the SITA Tayside Biodiversity Action Fund, the Cairngorms Local Biodiversity Action Plan's Biodiversity Grant Scheme and Scottish Natural Heritage.

