Stonesfield

Brook Lane Limestone Grassland

Joe Grainger-Hull

Site Context

The grassland at Brook Lane (hereafter 'the site') is located on the southern edge of the village of Stonesfield, centered on OS Grid Reference SP 39335 16791. It lies over the White Limestone Formation (BGS, accessed 2024), and soils at the site are freely draining, lime-rich, and loamy (Cranfield university, accessed 2024). The site slopes gently to the south, where it is open to the adjacent field, and is bordered to the east and north by hedgerows, and by woodland on its southwestern edge. Historic maps of the site suggest that it was previously quarried for limestone (National Library of Scotland, accessed 2024)

The site, and the village of Stonesfield, are situated within the Cotswolds National Landscape, and are set amongst a local network of Sites of Special Scientific Interest (SSSIs) designated primarily for the occurrence of unimproved limestone grassland.

Methods

Data collection:

A botanical survey of the site was undertaken by Joe Grainger-Hull, who was assisted by Genny Early and Alfie Stone, on 09 August 2024. General observations on the habitat present at the site were made, and five 1 m x 1 m quadrats were situated within representative locations throughout the site, within which of each all plants present were recorded, along with a DOMIN score for percentage cover (See table 1, below).

Table 1: DOMIN scores for percentage cover.

DOMIN value	Percentage cover (%)
10	91-100%
9	76-90%
8	51-75%
7	34-50%
6	26-33%
5	11-25%
4	4-10%
3	<4% (many individuals)
2	<4% (several individuals)
1	<4% (few individuals)

A list of additional species present throughout the site but not recorded within the quadrats, along with their abundance according to the DAFOR scale was made.

Data analysis:

The quadrat data from the site were compared against data tables for calcareous and mesotrophic (neutral) grassland communities within the National Vegetation Classification (NVC; Rodwell et al., 1996), to identify the vegetation community present at the site, and assess whether it corresponds to the descriptions of Priority Habitats in England as per Section 41 of the NERC Act, or European priority habitats according to Annex 1 of the Habitats Directive. Additional, the keys to grasslands within Rodwell (1996) were used, and *RMAVIS* software was used to assist in the assignment of the botanical quadrat data to one or more of the NVC communities (Marshall et al., 2024).

Results

General observations:

Overall, the site is relatively herb-rich, with wild marjoram *Origanum vulgare* locally dominant throughout, but contains a significant cover of rank neutral grasses such as false oat-grass *Arrhenatherum elatius* and Yorkshire fog *Holcus lanatus*; the northeastern corner of the site in particular is dominated by tall neutral grasses. The sward throughout the majority of the field is open, with bare ground between 5 and 10%, likely as a result of disturbance from recent scrub clearance. At the west of the field, just inside the entrance and several metres along the footpath, the sward is much more closed and is dominated by red

fescue *Festuca rubra,* perhaps indicative of having been more continually kept clear of scrub through consistent trampling. Sward height is well varied throughout the field.

Botanical data:

The quadrat data for the site are provided in Table 2, below.

Table 2: Quadrat data

Species	Common name	Presence in quadrat (values are cover as per DOMIN scale)				
		Q1	Q2	Q3	Q4	Q5
Achillea millefolium	Yarrow			2		4
Agrimonia eupatoria	Agrimony	1	4	1		2
Agrostis capillaris	Common bent		2			4
Agrostis stolonifera	Creeping bent				4	
Anacamptis pyramidalis	Pyramidal orchid			1		
Arrhenatherum elatius	False oat-grass			4	4	
Centaurea nigra	Black knapweed	2		3		
Cerastium fontanum	Common mouse-ear				1	2
Cirsium eriophorum	Woolly thistle		2			
Clematis vitalba	Traveller's-joy	7			2	
Clinopodium vulgare	Wild basil	4	4	4	4	4
Crataegus monogyna (seedling)	Hawthorn				3	
Crepis capillaris	Smooth hawk's-beard				1	1
Dactylis glomerata	Cock's-foot				3	
Festuca rubra	Red fescue	4	4			8
Galium album	Hedge bedstraw	1	5	1		5
Galium verum	Lady's bedstraw			5		
Holcus lanatus	Yorkshire fog			1	3	4
Hypericum perforatum	perforate St. John's-wort	2			2	2
Jacobaea vulgaris	Common ragwort		1	1		1
Kindbergia praelonga	Common feather-moss	4		4		4
Knautia arvensis	Field scabious		3	4	4	
Lactuca serriola	Prickly lettuce	2				
Leontodon hispidus	Rough hawkbit		3		3	
Leucanthemum vulgare	Oxeye daisy		4	4	5	
Lotus corniculatus	Bird's-foot trefoil	2		3	1	
Medicago lupulina	Black medick	3	4	3		4
Myosotis arvensis	Field forget-me-not					1
Odontites vernus	Red bartsia		1	3	3	1
Origanum vulgare	Wild marjoram	6	5	4	5	4
Pastinaca sativa	Wild parsnip			2		

Phleum bertolonii	Smaller cat's-tail				2	
Plantago lanceolata	Ribwort plantain	4			4	4
Poa pratensis	Smooth-stalked meadow-grass					5
Poa trivialis	Rough-stalked meadow-grass			4		4
Prunella vulgaris	Selfheal				4	5
Ranunculus repens	Creeping buttercup			1		
Rhinanthus minor	Yellow-rattle	4				
Rhytidiadelphus squarrosus	Springy turf-moss		6			
Rosa canina agg.	Dog rose	1				
Salvia pratensis	Meadow clary			4		
Sanguisorba minor	Salad burnet				2	
Stachys sylvatica	Hedge woundwort	1				
Taraxacum officinale agg.	Dandelion	1	2			
Trifolium repens	White clover	1	3	1	5	4
Trisetum flavescens	Yellow oat-grass			4	3	4
Vicia hirsuta	Hairy tare		1			

Additional species present throughout the site but not recorded in any quadrat are provided in Table 3, below.

Table 3: Additional species present.

Species	**Common name**	**DAFOR**
Cirsium arvense	Creeping thistle	O
Cirsium vulgare	Spear thistle	R
Daucus carota	Wild carrot	F
lathyrus pratensis	Meadow vetchling	O
Malva moschata	Musk mallow	R
Picris hieracoides	Hawkweed oxtongue	O

Results of vegetation analysis:

Using the keys to mesotrophic grasslands, the vegetation keys out readily as neutral grassland community MG1, *Arrhenatherum elatius* (false oat-grass) grassland. The presence of common knapweed *Centaurea nigra,* bird's-foot trefoil *Lotus corniculatus,* oxeye daisy *Leucanthemum vulgare* and yellow oat-grass *Trisetum flavescens* suggests the grassland has some affinity with the species rich *Centaurea nigra* subcommunity, MG1e. This is corroborated by the results from *RMA VIS,* which give the site a similarity co-efficient of 46% with community MG1e.

Using the key to calcareous grasslands within Rodwell et al. (1992), the community does not easily key out, though the presence of the typically lime-loving species wild marjoram, wild basil *Clinopodium*

vulgare, woolly thistle *Cirsium eriophorum*, salad burnet *Sanguisorba minor,* pyramidal orchid *Anacamptis pyramidalis* and meadow clary *Salvia pratensis clearly* indicate the lime-rich nature of the site. Results from *RMAVIS* give the grassland a similarity co-efficient of 45% with calcareous grassland community CG4c, *Brachypodium pinnatum* (tor grass) grassland, *Holcus lanatus* (Yorkshire fog) sub-community. Aside from the conspicuous absence of tor grass itself, this similarity is corroborated by comparison of the quadrat data to the table for CG4, in which yellow oat-grass and Yorkshire fog are expected to be the most dominant grasses after tor grass. Possible reasons for the absence of tor grass, and the general makeup of the community present are discussed below.

Discussion and Recommendations for Management

The rank, false oat-grass and Yorkshire fog dominated neutral component of the grassland indicates an historic lack of regular cutting or grazing, and the nutrient enrichment of the underlying soils either through the decomposition of organic matter following mowing of the site, or the application of fertiliser. The calcareous component of the community shows similarity to the Yorkshire fog sub-community of the tor grass grassland CG4, which is typical of ungrazed, more mesotrophic swards of this grassland type. The two communities, MG1 and CG4, share the characteristic of being ungrazed, and many species tolerant of neutral to calcareous conditions are present within both. Tor grass is recorded as having poor seed-set, spreading vegetatively via rhizomes, and thus may never have re-colonized the site following its possible previous use as a limestone quarry.

Priority Habitat correspondence

The affinity of the grassland at the site to community CG4, though limited, identifies it as corresponding to the description of the 'lowland calcareous grassland' Habitat of Principal Importance (HPI; Maddock, 2011) under the NERC act 2007 (as amended). Additionally, lowland calcareous grassland is identified in Annex 1 of the EC Habitats Directive as of Community interest. With enhancement and an improved management regime, the site could become a diverse example of this habitat.

Management

To reduce the extent of the rank grasses present and help remove nutrients from the soil - leading to increased botanical diversity at the site – a regular cutting regime should be established within the first few years of management. An early cut should take place in late February or early march, before the onset of the main growing season, and a late summer cut should take place from late June to late August, once all desirable species have set seed. It is important that the arisings from these cuts are removed from the site, to reduce the nutrient input back into the soil. Repeat cuttings can be taken throughout the autumn/ winter period, depending on growth rates, with the aim of removing as much biomass and nutrient content as possible from the soil.

Enhancement of the grassland at the site by the spreading of green hay should be considered – hay could be obtained from a diverse local site, such as Stonesfield Common, during seed set and spread at the site. If doing so, care should be taken to ensure the populations of meadow clary present at the common, which is protected against under the Wildlife and Countryside Act 1981 (as amended), are not damaged.

References

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