Calcareous and Base-Rich Grassland F1

LORNE GILL/SNH

VALE OF ATHOLL

INTRODUCTION

Calcareous grasslands are found on shallow lime-rich soils, derived from lime-rich bedrocks. Although this Habitat Action Plan primarily covers calcareous grasslands on both in-bye and hill ground, it also covers grasslands overlying base-rich substrates. These grasslands are generally botanically diverse and can support many uncommon plants. Tayside, particularly Perthshire, contains significant areas of these types of grassland. The calcareous and base-rich grasslands are generally managed as grazing land.

In addition, there are a number of small exposures of Limestone Pavement and Granular Limestone. Limestone pavements were exposed by the scouring of ice sheets during the last ice age. Subsequent erosion has formed a complex pattern of crevices (grikes) between massive blocks of limestone (clints). Granular limestone occurs as small friable areas of limestone associated with pavement.

DEFINITION

The UK Biodiversity Steering Group defines calcareous grassland as National Vegetation Communities CG1-14 and divides calcareous grassland into Lowland Calcareous Grassland and Upland Calcareous Grassland. Of these community types, the Lowland grasslands (CG1-9) do not occur in Scotland. As such all the calcareous grassland in Tayside is considered to be Upland Calcareous Grassland at whatever altitude it occurs.

The grasslands over-lying the base-rich rocks and soils are a poor fit into the NVC Communities CG10 and CG11, but they do have similarities in the species they support. Although less species-rich than the official CG10 and CG11, many of the more common species are found. Such calcareous grasslands found in Tayside are defined as CG10: ***Festuca ovina - Agrostis capillaris - Thymus praecox***; CG11: ***Festuca ovina - Agrostis capillaris - Alchemilla alpina***; CG12: ***Festuca ovina - Alchemilla alpina - Silene aucaulis*** (montane grassland); and CG14: ***Dryas octopetala – Silene aucaulis*** (cliff ledges).

This habitat comprises a diversity of grassland characterised by the prominence of calcicolous (calcium-loving) grasses and herbs. Swards tend to be more species-rich than grasslands on more acidic soils and may contain over 60 species per $4m^2$. The montane forms of calcareous grassland are often enriched by a distinctive assemblage of Arctic-alpine plants such as Alpine lady's mantle ***Alchemilla alpina***, Alpine bistort ***Persicaria viviparum***, Moss campion ***Silene acaulis***, Yellow saxifrage ***Saxifraga aizoides***, Purple saxifrage ***Saxifraga oppositofolia*** and Lesser club moss ***Selagainella selaginoides***.

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KEY SITES

The main areas noted in the biodiversity audit for Tayside are:

Ben Lawers NNR, Beinn a'Ghlo SSSI, Ben Vrackie SSSI and Caenlochan NNR (Glen Doll and Glen Fee). Tulach Hill and Glenfender Meadow SSSIs are partly on Dalradian limestone and include calcareous grassland.

In addition to the SSSI's, there are numerous areas of calcareous grassland located within the Breadalbane area of Highland Perthshire.

SWT have identified Wildlife Sites containing calcareous / base-rich grasslands:

Tigh An Eilein, Glenshee	Edintian Bog, Glen Fincastle
Loch Kinardochy and Tomphubil Limekiln, Tummel Bridge	Creag Mhor, Loch Tummel
Kiltyrie Meadows, Loch Tayside	Gleann Taitneach
Grandtully Meadow, Strathtay	Auchleeks
Gleann Beag, Glenshee	Tonguey Faulds

SWT have also designated the following Wildlife Sites for their Limestone Pavement/Granular Limestone:

Allean Forest Limestone, Loch Tummel	Meall Ban
Trinafour	Lassintulloch

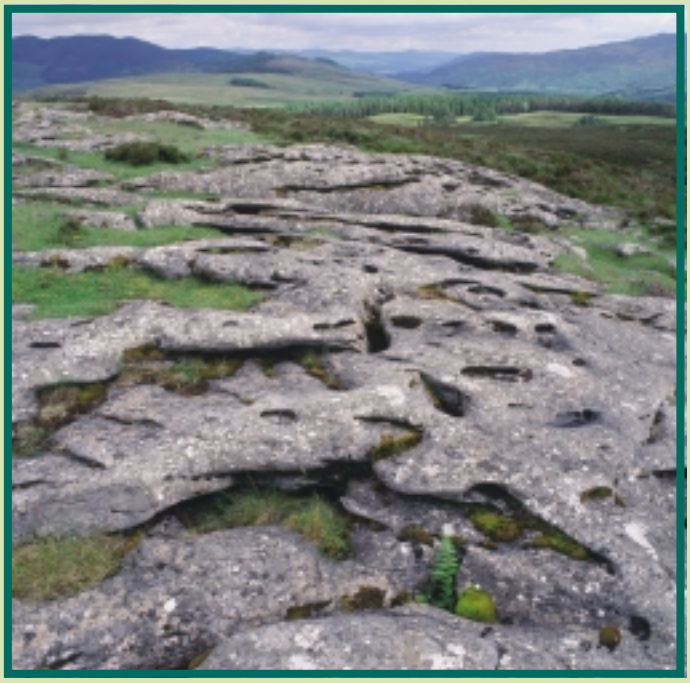
CURRENT STATUS AND EXTENT OF HABITAT

Only a small proportion of the region overlies limestone, but a broader band of mica-schist and calcareous grasslands (NVC CG10 and CG11) is quite widespread in the north and west of Tayside; base-rich igneous rocks occur in the Sidlaw and Ochil hills. At present there is no figure available for the total area of calcareous and base-rich grasslands in Tayside.

Limestone Pavement

Limestone pavement is one of Britain's most threatened habitats and is a scarce and non-renewable resource.

The total area in the UK is less than 3,000 ha. with only a small proportion occurring in Scotland. Such pavements are of both geological and biological importance. The vegetation, often containing unusual combinations, is rich in plants, bryophytes and lichens. It will vary according to geographical location, altitude, rock type and the presence or absence of grazing animals.



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Calcareous/base-rich grasslands are scattered throughout Tayside wherever there are outcrops of base-rich rocks. The majority of these appear to be in upland areas. Breadalbane has been identified in the UK BAP as one of the three most important areas in the UK for Upland Calcareous Grassland.

There has been no comprehensive survey of grasslands in Tayside and it is therefore not possible to determine their exact status. In addition to the Breadalbane area where these grasslands are relatively widespread there are substantial areas in Atholl and Glenshee, along with pockets in the Ochil and Sidlaw Hills and the Angus Glens, several sites in coastal Angus and in river shingle and well-drained alluvial soils and riverbanks along the rivers Tay and Tummel.

Limestone pavement is a rare habitat in the UK with only a total area of 3,000 ha. widely scattered in Wales, northern England, Northern Ireland and Scotland. The largest areas are found in North Yorkshire and Cumbria. Elsewhere in the UK pavements are found on Carboniferous limestone whereas in Scotland, including the limestone in Tayside, such pavements are found on much older Dalradian limestone.

KEY SPECIES

P = UK Priority Species **C** = UK species of conservation concern

Birds	Black grouse	*Tetrao tetrix*	**P**
Invertebrates	a mason bee	*Osmia inermis*	**P**
	Cuckoo wasp	*Chrysura hirsuta*	**P**
	Northern brown argus	*Aricia artaxerxes*	**P**
	Small blue butterfly	*Cupido minimus*	**C**
	Mountain ringlet	*Erebia epiphron*	**C**
	a micro-moth	*Ancylis tineana*	**C**
	a leaf beetle	*Cryptocephalus primarius*	**P**
	Bumble bees	*Bombus spp.*	
Molluscs	Round-mouth whorl snail	*Vertigo genesii*	**P**
	Geyer's whorl snail	*Vertigo geyeri*	**P**
Plants	Purple colt's foot	*Homogyne alpina*	**C**
	Purple oxytropis	*Oxytropis haller*	**C**
	Alpine fleabane	*Erigeron borealis*	**C**
	Common rockrose	*Helianthemum nummularium*	
	Wild thyme	*Thymus praecox*	
	Alpine lady's mantle	*Alchemilla alpina*	
	Quaking grass	*Briza media*	
	Autumn gentian	*Gentianella amarella*	
	Kidney vetch	*Anthyllis vulneraria*	
	Hair sedge	*Carex capillaris*	
Fungi	Date-coloured waxcap	*Hygrocybe spadicea*	**P**

The calcareous grasslands of the area are important for several rare plant species and Ben Lawers and Caenlochan Glen are among the top sites for alpine plants in the UK. These include Purple colt's foot ***Homogyne alpina*** at Caenlochan NNR, Alpine fleabane ***Erigeron borealis*** on Ben Lawers and Caenlochan and Purple oxytropis ***Oxytropis halleri*** on Ben Vrackie.

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In addition to these rare alpine plants, other plants associated with calcareous/ base-rich grasslands include Rock rose ***Helianthemum nummularium***, Wild thyme ***Thymus praecox***, Alpine lady's mantle ***Alchemilla alpina***, Quaking grass ***Briza media*** and Autumn gentian ***Gentianella amarella***. Another UK priority species is the fungus Date-coloured waxcap ***Hygrocybe spadicea***.

On the limestone pavement Hair sedge ***Carex capillaris*** (a BSBI national scarcity) and Kidney vetch ***Anthyllis vulneraria*** are found.

The flower-rich grassland supports a wide range of insects. Several of these are listed as priority species within the UK BAP - the Mason bee ***Osmia inermis***, for instance, is found only on base-rich upland grasslands and limestone pavement - including a south-facing limestone escarpment near Blair Atholl. A parasite of the mason bee, a Ruby-tailed wasp ***Chrysura hirsuta*** and the Northern brown argus butterfly ***Aricia artaxerxes*** are also found in Tayside.

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COMMON ROCKROSE

Wild thyme grows, often in mats, in short limestone turf or even directly on the rock on dry south-facing slopes. Seen here with the low-growing Eyebright *Euphrasia spp.*, Wild Thyme is much appreciated by butterflies and bumblebees. In the Highlands thyme tea used to be popular as an everyday beverage.

The Northern brown argus is a UK BAP Priority Species. Found in scattered colonies across Scotland and Northern England strong populations have been recorded in Highland Perthshire and the Sidlaw Hills where the sulphur-yellow Common rockrose grows. Although the butterfly uses other plants such as Common Storksbill *Erodium cicutarium* and Knapweed *Centaurea spp.* it is dependent upon Common Rockrose as it is the main foodplant for its caterpillars. Single eggs are laid on the upperside of the plant's leaves.

The butterfly's overall decline is due not just to the loss and fragmentation of habitats but also to a change in grassland management practices. It benefits from its habitat undergoing light grazing either by livestock or rabbits to ensure open sward conditions. The species has, however, been recorded as absent from many heavily grazed sites even when there is an abundance of its foodplant.

DAVID WHITAKER

NORTHERN BROWN ARGUS

Other species associated with calcareous grasslands include the Small blue butterfly ***Cupido minimus*** in coastal areas and the Mountain ringlet ***Erebia epiphron*** on upland mica schist. Various Vertigo species of snail are found on calcareous habitats: two UK BAP species are known in Tayside - the Round mouth whorl snail ***Vertigo genesii*** and Geyer's whorl snail ***Vertigo geyeri***.

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NATURE CONSERVATION IMPORTANCE

Calcareous grasslands contain an exceptional diversity of plants, many of which are uncommon or rare.

Base-rich grasslands, although not as diverse as calcareous grasslands, still support a diverse range of plants, which in turn provide feeding and breeding areas for a wide range of insects (including numerous butterfly species), birds such as Black grouse *Tetrao tetrix* and small mammals.

It is estimated there is approximately 55,000 - 66,000 ha. calcareous grassland in the UK (including 31,000 - 41,000 ha. of lowland calcareous grassland which does not occur in Scotland). Approximately 10,000 - 13,000 ha. occurs in Scotland, the most important area being Breadalbane and Atholl in Highland Perthshire. It is not known, however, the true extent of the habitat in Tayside.

NATIONAL BIODIVERSITY CONTEXT

Calcareous Grassland - there is a Broad Habitat Statement in the UK Biodiversity Action Plan for Calcareous Grassland which has the following objective:

> *"Maintain calcareous grasslands in all parts of the UK where it occurs, and to restore degraded grasslands buffering and linking small, vulnerable and discontinuous sites."*

Measures to be considered further include:

- Protect from inappropriate changes in land use and management;
- Encourage appropriate grazing in lowland areas and reduce the grazing in upland areas without encouraging scrub encroachment;
- Consider how existing measures (ESA's, RSS) might establish links between fragmented sites;
- Provide management advice and encourage appropriate technological and other innovation.

Although written specifically for Calcareous Grassland, the above Objective and Measures are also appropriate to base-rich grasslands.

Limestone Pavement is also a Key Habitat in the UK Biodiversity Action Plan. The objectives of the UK Habitat Action Plan for Limestone Pavement are:

- Ensure that there is no further loss to the extent of limestone pavement areas;
- Ensure that there is no further deterioration in the quality of existing limestone pavement areas;
- Maintain features of geological importance;
- Restore and maintain a characteristic assemblage of native plant species.

CURRENT FACTORS CAUSING LOSS OR DECLINE

A number of factors are adversely affecting the upland calcareous grassland, reducing the extent of the habitat as well as diminishing the quality of the vegetation:

- Agricultural intensification in the form of fertiliser applications, herbicide applications, ploughing and re-seeding are likely to still be damaging and destroying some of the calcareous grasslands. The majority of the calcareous grassland located within the Breadalbane ESA should be protected from such damage by the General Protection Measures;

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- Heavy grazing by sheep, cattle and horses can adversely affect species-richness and structural diversity, with the loss of tall herbs in particular. Invertebrates such as the Northern brown argus are also at risk from heavy grazing. Deer can be a problem in some areas through grazing, trampling and nutrient enrichment. Some rare plants are now confined to inaccessible ledges;
- Supplementary feeding may result in poaching and enrichment of the grasslands, encouraging ruderals such as Creeping thistle *Cirsium arvense*, Dock species *Rumex spp*. and Nettle *Urtica dioica*;
- Very light or absent grazing results in scrub encroachment and the loss of species diversity;
- The spread of Bracken *Pteridium aquilinum* onto calcareous grassland adversely affects species richness and can totally eliminate grasses and herbs;
- Quarrying of limestone at Blair Atholl has resulted in the loss of calcareous grassland, although this is a very localised issue;
- Little information is available about the effects on the habitat by tree planting and woodland regeneration, but it is known that shading by trees, particularly conifers, can adversely affect species richness on both calcareous grassland and limestone pavement;
- Acidification and nitrogen enrichment caused by atmospheric deposition and climate change may have a detrimental effect on calcareous grasslands, but potential impacts have not yet been fully assessed;
- Sites may be vulnerable to damage because of our lack of knowledge regarding current distribution.

MAIN THREATS TO KEY SPECIES

Mason Bee	Loss of herb-rich upland grasslands or moorland with short swards. Inappropriate grazing regimes, including cessation of grazing or grouse-moor management. Direct loss of habitat owing to afforestation. Climate change.	
	UK Importance of Tayside population:	**high** – restricted to one site in Tayside (only one other site known in the UK)
Mountain Ringlet	No obvious threats – population fluctuates widely from natural causes.	
	UK Importance of Tayside population:	**high**
Alpine Fleabane	Grazing pressure from deer and sheep.	
	UK Importance of Tayside population:	**high** – all UK populations are in Tayside
Alpine Gentian	Whilst some grazing is essential, too much, together with trampling by deer and sheep, can be deleterious.	
	UK Importance of Tayside population:	**high** – all UK populations are in Tayside
Purple Coltsfoot	Vigorous competitive vegetation can have serious detrimental effects.	
	UK Importance of Tayside population:	**high**
Purple Oxytropis	Susceptible to over-grazing and trampling.	
	UK Importance of Tayside population:	**high**
Date-coloured Waxcap	Improvement of grassland habitat through ploughing and/or fertiliser application. Reduction of grazing/mowing regimes leading to growth of rank vegetation.	
	UK Importance of Tayside population:	**high**

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OPPORTUNITIES AND CURRENT ACTION

Legal Status

Approximately 4,000 ha. of calcareous grassland in Scotland are protected by SSSI status. Several sites are also found within National Nature Reserves such as Ben Lawers and Caenlochan.

A number of sites in Tayside have also been designated or proposed as Special Areas of Conservation (SACs) under the EC Habitats and Species Directive. These include Tulach Hill and Glenfender Meadows, Ben Lawers, Ben Heasgarnich and Caenlochan.

Breadalbane ESA

A large proportion of the calcareous/base-rich grasslands occurring within the Breadalbane ESA boundary will be protected by the General Protection Measures. In addition individual areas within the in-bye ground will be positively managed with sensitive grazing regimes under the Tier 2 payments.

It is estimated that 2,315 ha. of in-bye herb-rich grassland is protected under the Tier 1 General Protection Measures within the Breadalbane ESA and that 1,470 ha. of in-bye herb-rich grassland receives annual payments for positive management. Although there is no detailed breakdown of grassland communities falling within the "herb-rich grassland" option, it is expected that the majority of these grasslands will be calcareous or base-rich.

Rural Stewardship Scheme/ Countryside Premium Scheme

Areas of calcareous/base rich grassland occurring in Tayside outwith the Breadalbane ESA boundary may be protected and possibly even actively managed under the previous Countryside Premium Scheme (CPS). Figures held by SEERAD cannot be separated into different grassland communities so it is not possible to confirm areas of calcareous/ base-rich grassland protected or managed under CPS.

Incentives are now available through the RSS for the protection and management of calcareous / base-rich grasslands.

Advisory Services

Conservation advisors from SAC and FWAG help farmers identify important habitats on their farm, including calcareous grasslands, and suggest appropriate management.

OBJECTIVES AND TARGETS

	Objectives	Targets
1	To ensure that areas of calcareous, base-rich grassland and limestone pavement are protected from damage, and that where possible areas of this habitat are enhanced, restored and/or extended.	A target of the UK HAP is to achieve favourable condition for at least 75% of (Upland) Calcareous Grassland (i.e. 7,000 - 9,750 ha. in Scotland) through sympathetic management by 2005 or as soon as biologically practical thereafter. A target for Tayside should be between 1,000 ha. and 1,500 ha.
2	Ensure that SAC consultations and designations are concluded.	

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3	Ensure that SSSIs are managed to enhance/extend this habitat.	Ensure that SSSIs containing calcareous grassland are managed sympathetically and where necessary management agreements entered into. A target of the UK HAP is "By 2004, prepare and implement management plans for all SSSI and Natura 2000 sites".
4	Establish the extent and condition of this habitat in Tayside.	Undertake a detailed survey to determine the extent and quality of calcareous grasslands and limestone pavement throughout Tayside.
5	Ensure no losses of this habitat to tree planting or natural regeneration.	Ensure that this rare habitat type is not lost to tree planting or natural regeneration of woodlands.
6	Achieve a target of 75% of calcareous grassland in favourable management by 2006 (1,000 to 1,500 ha. – best estimate).	Maintain calcareous grasslands where they occur in Tayside and attempt to restore or enhance selected areas to buffer and link small, vulnerable and discontinuous sites.
7	Encourage landowners into agri-environment schemes to positively manage calcareous and base-rich grasslands.	Encourage landowners with calcareous grassland to apply for the RSS.
8	Reduce fragmentation of areas of the habitat.	
9	Establish the condition of calcareous grasslands within SSSIs, SACs and agri-environment schemes.	
10	Identify successful techniques to restore degraded sites.	Encourage the restoration of degraded calcareous grasslands and limestone pavements where they buffer or link small or discontinuous sites.
11	Raise awareness of best practice through demonstration sites, farm walks and training days for land managers and advisers.	Encourage the establishment of a demonstration site, with special linkage to agri-environment schemes, to develop and exhibit best practice management techniques.

Stakeholders

- Land owners, managers and advisors, statutory bodies, general public.

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ACTION FOR BIODIVERSITY

		Action - Calcareous and Base-Rich Grassland (inc. Limestone Pavement)	Deliverers		To take place by	Meets Objective No.
			Lead Partners	Partners	02 03 04 05 06 07 11 16	
LBAP Ref.	**A**	**Policy and legislation**				
F1	1	Complete SAC consultation and designation (consultation to be completed by 2004 - designation depends on EU).	SNH		#	i
	B	**Site safeguard and management**				
F1	1	Ensure that SSSIs are managed sympathetically and where necessary Management Agreements entered into - UK HAP target. Natural Care target of 75% under 'assured management' by 2004, and 85% by 2007.	SNH		# #	ii
F1	2	Maintain grassland survey (to determine the extent and quality of calcareous grasslands throughout Tayside) in the desired survey programme for P&K.	SNH		# #	iii
F1	3	Liaise with FC when requested to do so to ensure this rare habitat type is not lost to tree planting or natural regeneration of woodlands by ensuring that WGS/FWPS applications are checked against species-rich grasslands identified on the Breadalbane ESA audits (by 2009).	FC	SNH SAC FWAG SWT NTS SNW SEERAD	#	iv
F1	4	Help achieve UK HAP target of favourable condition for at least 75% of calcareous grassland by approving proposals for favourable management under agri-environment schemes.	SNH	SAC FWAG SWT SEERAD	#	v
F1	5	Help encourage the restoration of degraded calcareous grasslands where they buffer or link small or discontinuous sites (by 2009).	SAC FWAG	SEERAD	#	
F1	6	Consider any bid to set up a project to restore a number of degraded sites and monitor restoration projects to identify successful techniques (by 2009).	SNH	SEERAD	#	
	C	**Species management and protection**				
	D	**Advisory**				
F1	1	Encourage landowners with calcareous grassland to apply for RSS and manage the grasslands sympathetically.	SAC FWAG		# # # # # # #	vi
F1	2	Help provide information on the RSS to landowners with calcareous grassland (by 2009).	SAC FWAG	SEERAD	#	
	E	**Research and monitoring**				
F1	1	Provide information on SSSIs and SACs managed under agri-environment schemes (by 2009).	SNH (SSSIs and SACs)	SAC FWAG SEERAD (agri-env schemes)	#	vii
F1	2	Investigate the feasibility of setting up a project to restore a number of degraded sites and monitor restoration projects to identify successful techniques.	SNH	SEERAD SAC FWAG	# # # # # #	ix
F1	3	Monitor and review this plan – ensure this plan is being delivered annually and in detail after 5 years.	TBP		# # # # # # # #	x

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	F	Promotion and Awareness-raising				
F1	1	Work with other organisations to identify and establish a demonstration site, with special linkage to agri-environment schemes, to develop and illustrate best management practice.	SAC	SNH SEERAD FWAG	#	xi
F1	2	Help with the organisation of a series of farm walks/training days for farmers, advisers etc.	SAC FWAG	SEERAD	#	

Calcareous and Base-Rich Grassland

This illustrative map shows a few key examples of the habitat. Please note that many sites of interest are privately owned and owners' permission should be sought for any access.