



Field Gentian in the Yorkshire Dales

Results of Survey of 12 sites – 2016

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Introduction

Field Gentian (*Gentianella campestris*) is a biennial (and sometimes annual) member of the Gentian family. It occurs on short turf grasslands, typically calcareous in the uplands and more acidic in the lowlands, but always nutrient poor. It is a poor competitor and tends to only be found in relatively open swards, which are usually cattle grazed.

It is classified on the IUCN Red List as 'Vulnerable' and is therefore considered to be facing a very high risk of extinction in the wild

Field Gentian is one of the most rapidly declining species in the British flora. The New Atlas of the British Flora records this species as having a change index of -1.28, although its continued wide distribution in Scotland has disguised its catastrophic decline in England and Wales and its disappearance from many sites within its Scottish range. It is now known from only twelve sites in southern England (three of which are on The Lizard in Cornwall, and six in Hampshire's New Forest), and has been recorded recently from only 12 10km squares in Wales. It is listed in the Vascular Plant Red Data List for Great Britain as 'vulnerable'. It is also thought to have undergone a rapid decline throughout the whole of its European range.

The taxonomy of *Gentianella* in Britain has been the subject of much speculation and research in recent years and the status of some species is still unresolved. *Gentianella campestris* has however been shown to be genetically distinct from other members of the genus.

Little is known about the ecology of Field Gentian in Britain, although some work has been carried out in mainland Europe. It is mainly a species of dry, well-grazed, species-rich acidic grasslands and heathland, habitats that are marginal to modern, intensive agricultural systems. In common with most other members of the genus it is thought to be an annual or short-lived monocarpic perennial, requiring open conditions for seedling establishment, but its germination periodicity and longevity of seed in the soil are unknown for British populations. It is likely to be poorly competitive and it is frequently confined to shorter vegetation within its sites. Recent unpublished work on other *Gentianella* species suggests that there are complex relationships with mycorrhizal fungi, and this may make the species particularly susceptible to environmental changes.

12 historic locations for Field Gentian were surveyed in the Yorkshire Dales. A population count was made and the vegetation samples for associated species. Field Gentians were found at 10 of the 12 locations, with a mixture of increased and decreased population sizes since previous surveys.

Community data and associate species were recorded at 8 of the sites to help build a picture of the type of communities in which Field Gentian occurs and thrives.

We are indebted to Fran Graham at the Yorkshire Dales National Park Authority for her assistance, and to the M Way Charitable Trust for generously funding the work.

Survey Results

At many of the sites where the habitat conditions are optimal (short well grazed sward with some bare ground) large population were surveyed. The plants have a strong affinity with CG2b and CG10a grassland with a typical sward height of 3cm.

CG2b *Festuca ovina*-*Avenula pratensis* grassland, (*Succisa pratensis*-*Leucanthemum vulgare* sub-community) is a species rich type of calcareous grassland marked by high diversity and short swards. It is generally found in the south of England. CG10a *Festuca ovina*-*Agrostis capillaris*-*Thymus praecox* grassland, (*Trifolium repens*-*Luzula campestris* sub-community) is a calcareous grassland of northern England, characterised by high levels of Common Bent, and lesser amounts of Fescue and large amounts of Thyme. The affinity with CG2b may be in part due to the more open swards the Gentian favours within the broader CG10 grassland type.

		Sites /8
<i>Carex flacca</i>	Glaucous Sedge	8
<i>Festuca ovina</i>	Sheep's-fescue	8
<i>Agrostis capillaris</i>	Common Bent	7
<i>Euphrasia</i> sp.	Eyebright	7
<i>Potentilla erecta</i>	Tormentil	7
<i>Briza media</i>	Quaking-grass	6
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	5
<i>Sesleria caerulea</i>	Blue Moor-grass	5
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss	5
<i>Campanula rotundifolia</i>	Harebell	5
<i>Linum catharticum</i>	Fairy Flax	5
<i>Plantago lanceolata</i>	Ribwort Plantain	5
<i>Thymus vulgaris</i>	Thyme	5
<i>Trifolium repens</i>	White Clover	5

Table 1 – Occurrence of associate species in 8 sites surveyed

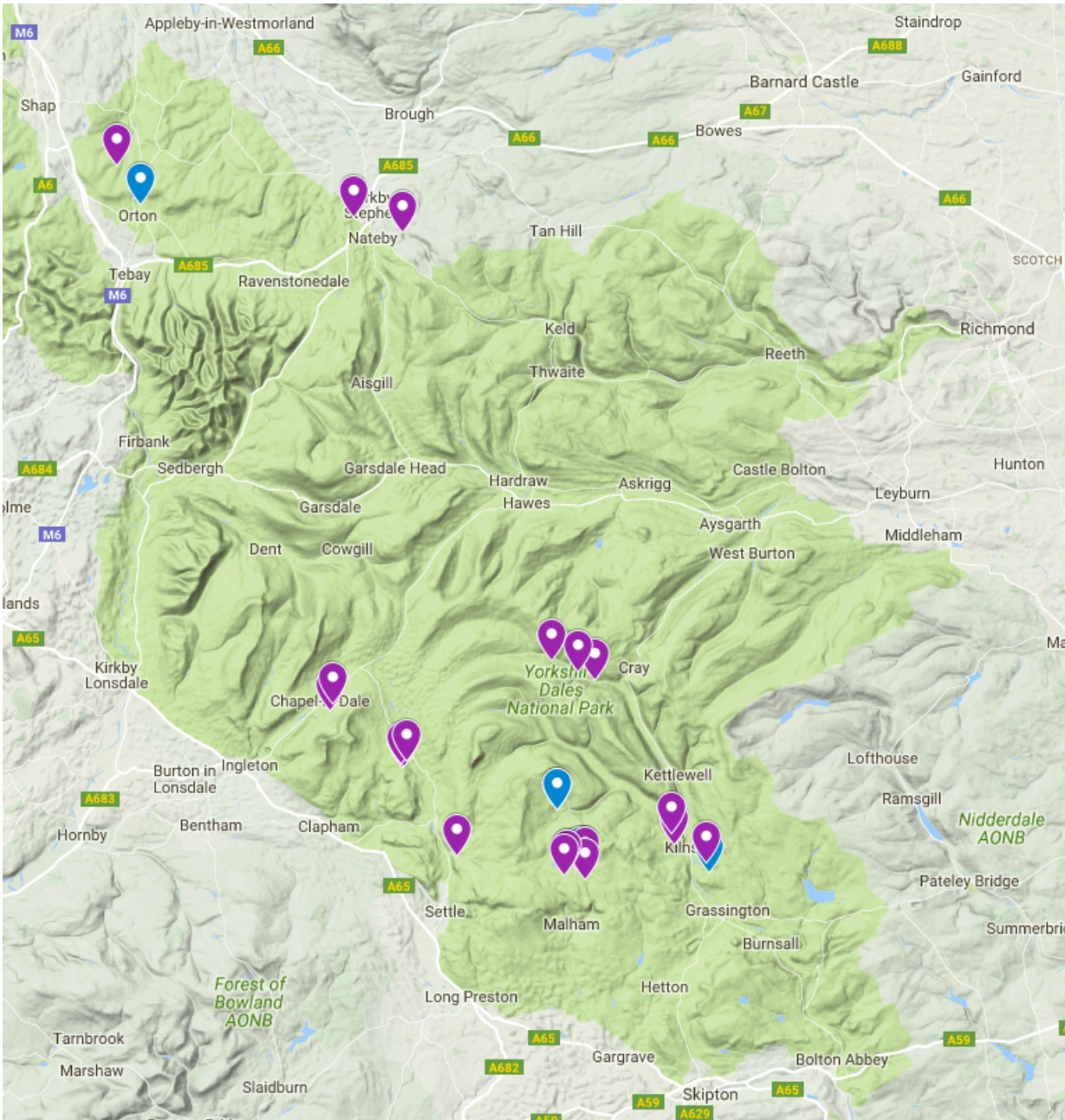
Species associates most commonly included Eyebright, Tormentil, Thyme, Common Bent, Glaucous Sedge, and Sheep's-fescue. On drier sites mouse-ear Hawkweed could reach higher levels, and Thyme showed the largest amount of variation in cover levels from site to site(occurring more abundantly on skeletal soils with more open swards).

Larger populations were typically found close to exposed rock (and therefore often on thinner soils). The small size of the Gentians makes the plants a poor competitor when surrounded by dense taller swards, and in most cases this tends to hem the populations into specific areas and prevent them colonising outwards to new areas.

Overall the populations have shown a decline since previous surveys, but with not all sites covered it is hard to make an accurate overall assessment of the Dales populations in its entirety. Only one site (Conistone) appeared to be a poor condition for supporting Gentians, with declines at the other sites harder to explain.

Sites

Field Gentian in the Yorkshire Dales National Park (In purple. Dwarf Milkwort in Blue)



Summary

Site Reference Number	Site Name	Date last recorded on Site	Grid Reference	Surveyed in 2016	Population
GC31a	Chapel-le-Dale: Great Douk Cave	2016	SD74667704	y	0
GC31b	Chapel-le-Dale: Great Douk Pasture	2012	SD74497659	y	8
GC32	Ingleborough: High Brae	2011	SD79427328	y	0
GC32a,b,c	Ingleborough: south of wall	2012	SD79067309, SD79137286	y	3
GC33	Conistone	2016	SD98686671	y	2
GC34	Wharfedale: East Deepdale Farm	2012	SD88667975	n	~
GC35a	Wharfedale: Yockenthwaite	2012	SD90447899	n	~
GC35b	Wharfedale: Strans Wood	2012	SD91657842	n	~
GC36a	Malham Tarn: Hummock	2016	SD89736617	y	12
GC36b	Malham Tarn: Low Trenhouse	2011	SD8952865915	n	~
GC36c	Malham: Great Close Plantation	2011	SD90336630	y	0
GC36d	Malham: Great Close Mire E	2011	SD9086766402	n	~
GC36e	Malham: Street Gate	2006	SD909657	n	~
GC37	Lower Winskill	2012	SD825672	y	167
GC38	Kilnsey Moor: High Ox Pasture	2012	SD96656790	y	120
GC39	Kilnsey: High Sleets	2012	SD96486863	y	65

Table 2 – Known Field Gentian sites in the Yorkshire Dales

Site – GC31a Chapel-le-Dale: Great Douk Cave

Description

12 plants – 8 plants 4&6m up from path, growing in very short Thyme dominated sward surrounding rocks. A further 4 plants 4m away.

Location



Other Species

<i>Danthonia decumbens</i>	Heath-grass	5
<i>Festuca ovina</i>	Sheep's-fescue	5
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil	5
<i>Luzula campestris</i>	Field Wood-rush	5
<i>Sesleria caerulea</i>	Blue Moor-grass	5
<i>Prunella vulgaris</i>	Selfheal	5
<i>Sanguisorba minor</i>	Salad Burnet	5
<i>Carex caryophylla</i>	Spring Sedge	10
<i>Potentilla erecta</i>	Tormentil	10
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss	10
<i>Carex flacca</i>	Glaucous Sedge	15
<i>Euphrasia sp.</i>	Eyebright	20
<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	30
<i>Plantago lanceolata</i>	Ribwort Plantain	30
<i>Thymus vulgaris</i>	Thyme	30

Management required

Continue with existing grazing regime, which is maintaining a good short sward around rocks.

Images



Site – GC31b Chapel-le-Dale: Douk Cave Pasture

Description

2011 1 plant on grassy bank amongst rocks

2016 Not re-found. Relatively thick grass dominated sward, little open ground. Some negative indicator species such as Creeping Thistle in field.

Location



Other Species

<i>Agrostis capillaris</i>	Common Bent	20
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	20
<i>Carex caryophylla</i>	Spring Sedge	2
<i>Carex flacca</i>	Glaucous Sedge	2
<i>Cynosurus cristatus</i>	Crested Dog's-tail	15
<i>Festuca ovina</i>	Sheep's-fescue	2
<i>Sesleria caerulea</i>	Blue Moor-grass	5
<i>Achillea millefolium</i>	Yarrow	2
<i>Campanula rotundifolia</i>	Harebell	2
<i>Cirsium palustre</i>	Marsh Thistle	2
<i>Euphrasia</i> sp.	Eyebright	15
<i>Galium saxatile</i>	Heath Bedstraw	5
<i>Gentianella amarella</i>	Autumn Gentian	2
<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	20
<i>Plantago lanceolata</i>	Ribwort Plantain	5
<i>Potentilla erecta</i>	Tormentil	20
<i>Prunella vulgaris</i>	Selfheal	10
<i>Ranunculus repens</i>	Creeping Buttercup	20
<i>Scorzoneroidea autumnalis</i>	Autumn Hawkbit	5
<i>Thymus vulgaris</i>	Thyme	5

Management required

If possible increase grazing pressure, ideally with cattle.

Images





Site – GC32 a,b,c Ingleborough south of wall (S)

Description

2012 1 plant

2016 1 plant on grid ref. Short sward, with good level of open ground Further two plants found 100m north of this location

This population comprises a small scattering of plants at various locations in the thin grasslands bordering limestone pavement across this plateau. Further surveys are required to locate all the plants, and the while there appears to be a good amount of suitable habitat the small size of the population is a concern

The High Brae population (purple flag on figure) was not refound and the sward here at the bottom of the slope appeared too thick to be likely to support any plants.

Locations



Other Species

<i>Agrostis capillaris</i>	Common Bent	10
<i>Briza media</i>	Quaking-grass	20
<i>Carex flacca</i>	Glaucous Sedge	25
<i>Carex panicea</i>	Carnation Sedge	25
<i>Festuca ovina</i>	Sheep's-fescue	25
<i>Sesleria caerulea</i>	Blue Moor-grass	10
<i>Euphrasia sp.</i>	Eyebright	5
<i>Scorzonoides autumnalis</i>	Autumn Hawkbit	10
<i>Thymus vulgaris</i>	Thyme	20

Management required

Continue with existing, the sward appears to be favourable, particularly in the more skeletal soils abutting the limestone pavement.

Images

High Brae



GC32 a,b,c



Site – GC33 Conistone

Description

2011 20+8 plants

2016 2 rather unhappy looking plants. Site sheep grazed with dense tallish sward and low overall amount of forbs.

The vegetation height and thickness is unsuitable for Field Gentian and it seems likely that without intervention it will be lost from this site

Location



Other Species

<i>Agrostis capillaris</i>	Common Bent	20
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	20
<i>Avenula pratense</i>	Meadow Oat-grass	10
<i>Briza media</i>	Quaking-grass	5
<i>Carex flacca</i>	Glaucous Sedge	20
<i>Festuca ovina</i>	Sheep's-fescue	15
<i>Koeleria macrantha</i>	Crested Hair-grass	5
<i>Luzula campestris</i>	Field Wood-rush	5
<i>Conopodium majus</i>	Pignut	10
<i>Filipendula vulgaris</i>	Dropwort	5
<i>Galium saxatile</i>	Heath Bedstraw	5
<i>Galium verum</i>	Lady's Bedstraw	5
<i>Helianthemum nummularium</i>	Common Rock-rose	5
<i>Linum catharticum</i>	Fairy Flax	8
<i>Plantago lanceolata</i>	Ribwort Plantain	5
<i>Potentilla erecta</i>	Tormentil	8
<i>Prunella vulgaris</i>	Selfheal	8
<i>Sanguisorba officinalis</i>	Great Burnet	5
<i>Succisa pratensis</i>	Devil's-bit Scabious	5
<i>Trifolium pratense</i>	Red Clover	5
<i>Trifolium repens</i>	White Clover	2
<i>Viola riviniana</i>	Common Dog-violet	2
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss	2

Management required

The level of sheep grazing at this site appears to be gradually creating a dense sward, dominated by grasses and with fewer forbs. The vegetation requires significant opening up, either with periodic cattle grazing or even a late summer mow.

Images



Site – GC36a Malham: Hummock

Description

2011 25 plants

2016 12 plants, some very small. Hemmed in on island of short calcareous grassland. The sward here is in excellent condition for the plant, short and species rich without a high dominance of grasses, and there is no clear reason for the decline of the population. This site will always be threatened by its isolation, comprising a small hummock surrounded by Mire vegetation

Location



Other Species

<i>Agrostis capillaris</i>	Common Bent	2
<i>Agrostis vinealis</i>	Brown Bent	2
<i>Briza media</i>	Quaking-grass	1
<i>Carex caryophylla</i>	Spring Sedge	5
<i>Carex flacca</i>	Glaucous Sedge	10
<i>Carex panicea</i>	Carnation Sedge	5
<i>Danthonia decumbens</i>	Heath-grass	15
<i>Festuca ovina</i>	Sheep's-fescue	15
<i>Koeleria macrantha</i>	Crested Hair-grass	10
<i>Sesleria caerulea</i>	Blue Moor-grass	10
<i>Campanula rotundifolia</i>	Harebell	5
<i>Euphrasia</i> sp.	Eyebright	12
<i>Linum catharticum</i>	Fairy Flax	2
<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	5
<i>Plantago lanceolata</i>	Ribwort Plantain	5
<i>Polygala vulgaris</i>	Common Milkwort	5
<i>Potentilla erecta</i>	Tormentil	15
<i>Prunella vulgaris</i>	Selfheal	1
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	8
<i>Ranunculus repens</i>	Creeping Buttercup	2
<i>Thymus vulgaris</i>	Thyme	20
<i>Trifolium repens</i>	White Clover	1
<i>Veronica officinalis</i>	Heath Speedwell	1
<i>Rhytiadelphus squarrosus</i>	Springy Turf-moss	8

Management required

Continue with existing, but carry out further surveys to map all populations and investigating possibilities of providing linking habitat features.

Images



Site – GC36c Malham – Great Close Plantation

Description

2011 21 plants 65x10m 2016 0 plants found at main site, 1 plant found 65m to west and 1 plant higher up slope to southwest.

2016 0 plants found. The habitat appears suitable, although the sward was slightly too thick in places. It is a difficult area to survey and the plants are likely to be in between the boulders, so further surveys earlier in the year when the plants are flowering may well reveal their location.

Location



Other Species

Not recorded

Management required

In a smaller area it would be worth considering raising the grazing levels to break up the swards, however with the extensive areas involved at Malham this would be unlikely to have a direct effect on this area. If plants are found it may be worth considering some localised 'scuffing' of the ground to aid dispersal and establishment of seedlings.

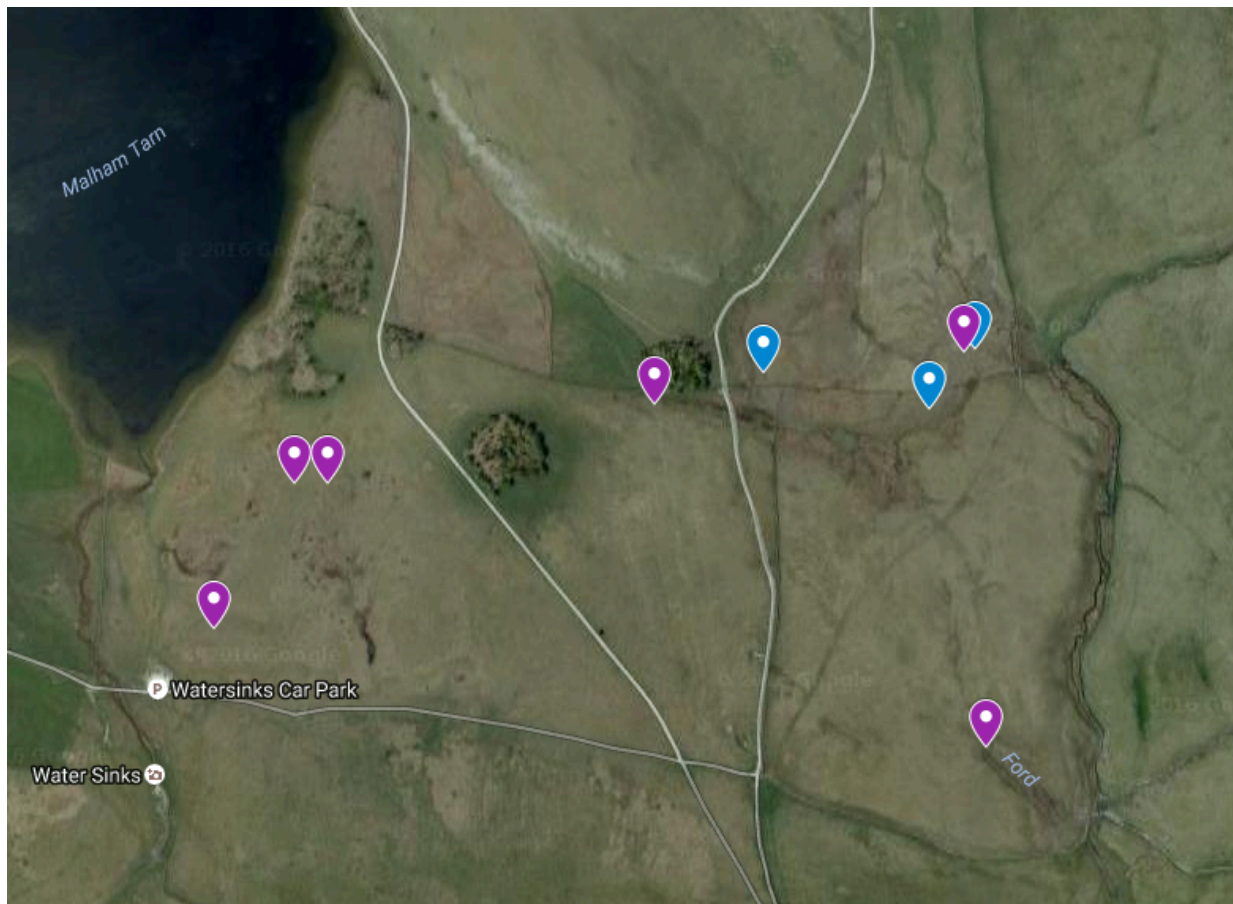
Images



Malham Tarn - other sub-sites

During the data analysis several other references to sites at Malham Tarn were found (marked here in purple with Dwarf Milkwort sites marked in blue) including two sites to the south which were not looked at in 2016.

Further surveys are necessary to look at all these sites and confirm presence/absence.



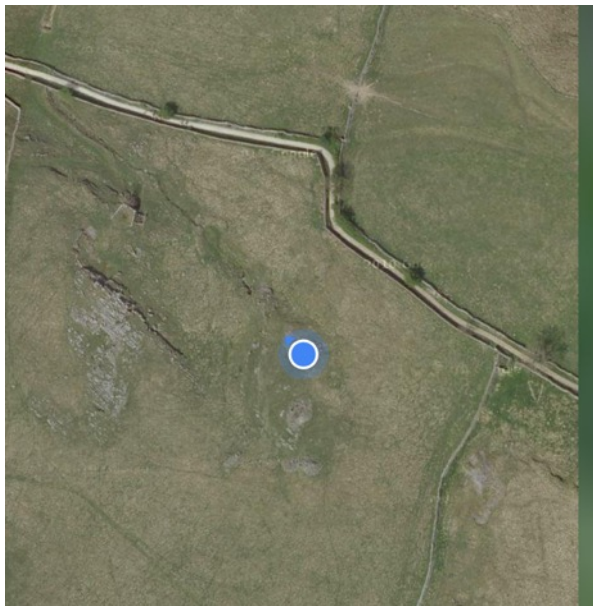
Site – GC37 Lower Winskill Farm

Description

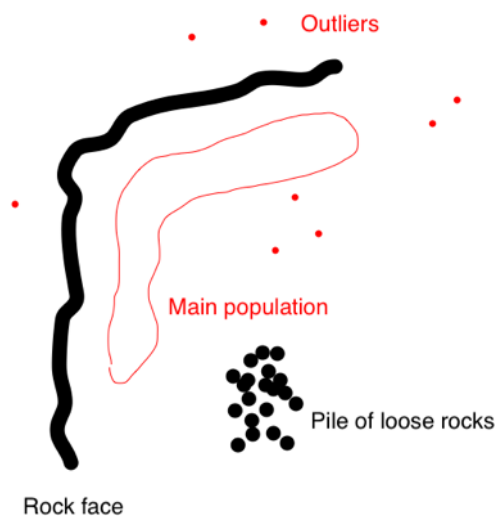
167 Plants scattered along north-east side of escarpment in 20x20m patch with some outliers. Growing on skeletal soils amongst bare exposed rock.

Increase from 39 plants in 2012.

Location



GC63 Lower Winskill



Other Species

<i>Agrostis capillaris</i>	Common Bent	5
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	15
<i>Avenula pratense</i>	Meadow Oat-grass	5
<i>Avenula pubescens</i>	Downy Oat-grass	5
<i>Briza media</i>	Quaking-grass	5
<i>Carex flacca</i>	Glaucous Sedge	15
<i>Danthonia decumbens</i>	Heath-grass	10
<i>Festuca ovina</i>	Sheep's-fescue	15
<i>Sesleria caerulea</i>	Blue Moor-grass	5
<i>Achillea millefolium</i>	Yarrow	2
<i>Betonica officinalis</i>	Betony	2
<i>Campanula rotundifolia</i>	Harebell	2
<i>Cerastium fontanum</i>	Common Mouse-ear	2
<i>Cirsium acaule</i>	Dwarf Thistle	3
<i>Conopodium majus</i>	Pignut	2
<i>Euphrasia</i> sp.	Eyebright	3
<i>Galium verum</i>	Lady's Bedstraw	5
<i>Helianthemum nummularium</i>	Common Rock-rose	5
<i>Linum catharticum</i>	Fairy Flax	2
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil	10
<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	10
<i>Plantago lanceolata</i>	Ribwort Plantain	2
<i>Plantago media</i>	Hoary Plantain	3
<i>Potentilla erecta</i>	Tormentil	15
<i>Primula veris</i>	Cowslip	3
<i>Ranunculus acris</i>	Meadow Buttercup	10
<i>Sanguisorba minor</i>	Salad Burnet	2
<i>Succisa pratensis</i>	Devil's-bit Scabious	8
<i>Trifolium repens</i>	White Clover	2

Management required

Continue with existing – winter grazing with cattle clearly having a huge beneficial impact on this population.

Images

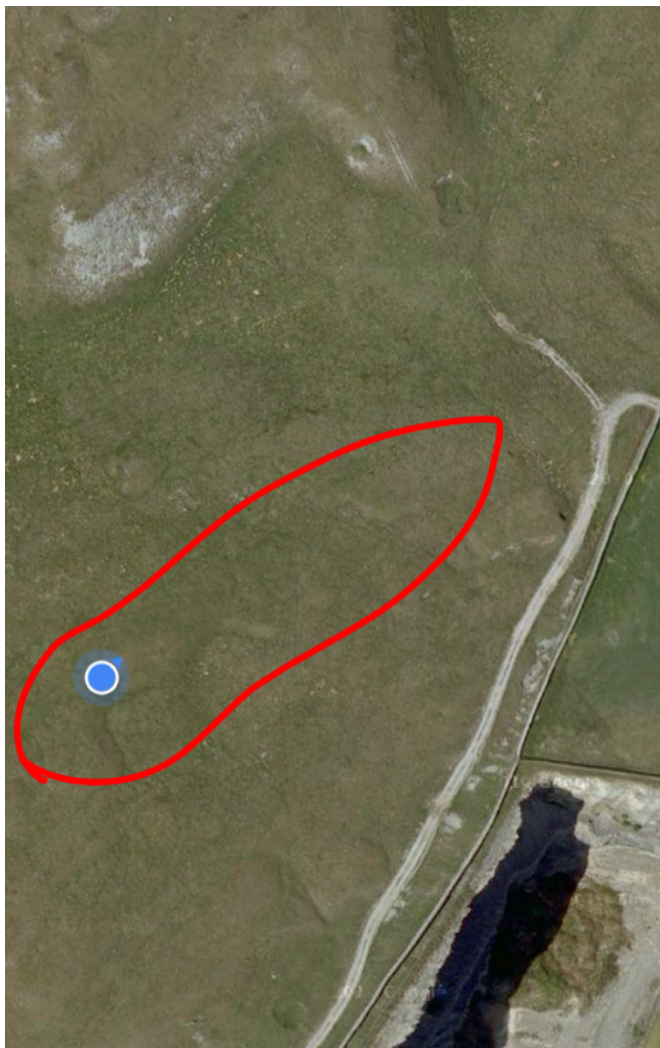


Site – GC38 Kilnsey Moor: High Ox Pasture

Description

2016 109 plants stretching c. 100m along limestone escarpment. Short and relatively dense sward with some open patches and good diversity of plants.

Location



Other Species

<i>Agrostis capillaris</i>	Common Bent	20
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	30
<i>Avenula pratense</i>	Meadow Oat-grass	10
<i>Briza media</i>	Quaking-grass	5
<i>Carex flacca</i>	Glaucous Sedge	15
<i>Festuca ovina</i>	Sheep's-fescue	5
<i>Campanula rotundifolia</i>	Harebell	5
<i>Euphrasia</i> sp.	Eyebright	8
<i>Filipendula vulgaris</i>	Dropwort	5
<i>Galium saxatile</i>	Heath Bedstraw	5
<i>Gentianella amarella</i>	Autumn Gentian	5
<i>Helianthemum nummularium</i>	Common Rock-rose	10
<i>Linum catharticum</i>	Fairy Flax	10
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil	5
<i>Potentilla erecta</i>	Tormentil	10
<i>Sanguisorba minor</i>	Salad Burnet	15
<i>Sanguisorba officinalis</i>	Great Burnet	10
<i>Succisa pratensis</i>	Devil's-bit Scabious	15
<i>Thymus vulgaris</i>	Thyme	2
<i>Trifolium repens</i>	White Clover	2
<i>Viola riviniana</i>	Common Dog-violet	2
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss	5

Management required

Continue with existing. The combination of extensive sheep grazing and skeletal soils appears to be maintaining this population in good condition.

Images



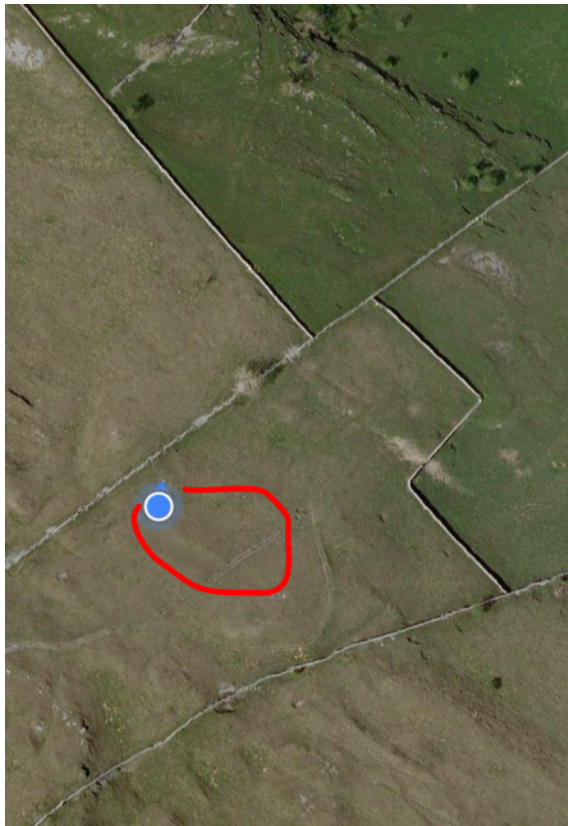
Site – GC39 Kilnsey: High Sleets

Description

2012 48 plants 50x30m

2016 65 plants 50x30m. Plants scattered on strip of N-facing slope mirroring distribution of Devil's-bit Scabious

Location



Other Species

<i>Agrostis capillaris</i>	Common Bent	10
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	15
<i>Avenula pratense</i>	Meadow Oat-grass	10
<i>Briza media</i>	Quaking-grass	5
<i>Carex flacca</i>	Glaucous Sedge	15
<i>Festuca ovina</i>	Sheep's-fescue	5
<i>Luzula campestris</i>	Field Wood-rush	5
<i>Campanula rotundifolia</i>	Harebell	5
<i>Euphrasia sp.</i>	Eyebright	10
<i>Helianthemum nummularium</i>	Common Rock-rose	20
<i>Linum catharticum</i>	Fairy Flax	20
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil	5
<i>Potentilla erecta</i>	Tormentil	10
<i>Sanguisorba minor</i>	Salad Burnet	20
<i>Sanguisorba officinalis</i>	Great Burnet	5
<i>Succisa pratensis</i>	Devil's-bit Scabious	5
<i>Trifolium repens</i>	White Clover	3
<i>Viola riviniana</i>	Common Dog-violet	1
<i>Rhytiadelphus squarrosus</i>	Springy Turf-moss	5

Management required

Continue with existing. Although the sward is slightly thicker here than other sites the population is faring well.

Images



Next Steps

During surveys seed was collected from some sites for accession into the Millennium Seedbank at Kew Gardens, Wakehurst Place. It is hoped eventually that samples from all population can be collected and stored here, both as a backup should localised extinctions occur, but also as a resource for future research and possible re-introduction.

The northern populations appear to flower earlier than those in the south, and also occur on calcareous grassland compared with the acid grassland/heathland of the southern populations, and this differentiation between the populations would benefit from more detailed study.

In the immediate future the remaining sites in the Dales need to be surveyed and if possible a regular monitoring programme put in place to track population sizes from year to year.

Management at most of the sites appears to be benefitting the plants, with some unexplained declines from previous surveys which are hard to explain and may be part of a natural fluctuation of populations (surveyor error cannot be ruled out, especially as the 2016 surveys were done after the plants had flowered).

The Conistone site currently stands out for facing the highest risk of localised extinction, and liaison should be held with the owners about the possibility of changing grazing regime to reduce the density of the wards in this field.

About Us

The Species Recovery Trust is a charity set up to tackle the loss of some of the rarest species in the UK.

There are over nine hundred native species in the UK that are classed as under threat, with several hundreds more currently widespread but known to be in significant decline. The countryside is now bereft of many species that were a familiar sight a mere generation ago.

A small number of these species are on the absolute brink of existence, poised to become extinct in our lifetimes; our goal is to stop them vanishing.

Our aim is to remove 50 species from the edge of extinction in the UK by the year 2050. In addition we are reconnecting people with wildlife and the natural world through training programmes and awareness raising.



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