

Field Gentian

Gentianella campestris (Field Gentian) in Cornwall 2015

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Introduction

Gentianella campestris was formerly widespread in Cornwall with a total of 46 1km square records from the county since it was first recorded in 1896. The majority of sites were on lowland heathland and associated grassland near but not on the northern (Atlantic) coast with a cluster of sites on the Lizard heathlands. There a few inland records. This contrasts with its distribution in Pembrokeshire where there is a dense concentration of sites, many of which are extant, on coastal grasslands to the south of Pembroke.

Between 1950 and 1963 the period of preparation of the first Atlas of the British Flora (Perring and Walters, 1963), the number of 10km square records in Cornwall had decreased to five, all but two of which were on The Lizard. Between 1987 and 2000 when records were being collected for the second atlas of the British Flora (Preston et al, 2003), the numbers of individual sites in Cornwall had further decreased to four within three 10km squares, Lizard Downs, Brea Cot (Goonhilly Downs), Hayle Kimbro Pool and the only non-Lizard site at Kit Hill near Callington.

These declines parallel those observed throughout lowland Britain and much of upland northern Britain and mainland of North-Western Europe too. The New Atlas of the British Flora calculated a change index of -1.28, one of the highest for any non-archaeophyte species.

As a result of these declines, *Gentianella campestris* is now listed on Section 41 of the Natural Environment and Rural Communities Act (2006). The Cornish sites are therefore of great importance for the conservation of this species in the UK.

All sites recorded in Cornwall since 1978 were surveyed in August and September 2015. These included the large and diffuse site on Lizard Downs, three separate sites on Goonhilly Downs, Traboe Cross, Hayle Kimbro Pool and Kit Hill. At all sites a thorough search was made for *Gentianella campestris* and an assessment was made of the condition of the site for *G. campestris*. Vegetation communities were classified using the National Vegetation Classification (Rodwell, 1991 & 1993) as follows:

H4c *Ulex gallii*-*Agrostis curtisii* heath, *Erica tetralix* sub-community.

H5a *Erica tetralix*-*Schoenus nigricans* heath, typical sub-community.

M25a *Molinia caerulea*-*potentilla erecta* mire, *Erica tetralix* sub-community

M25c *Molinia caerulea*-*potentilla erecta* mire, *Angelica sylvestris* sub-community

U4a *Agrostis capillaris*-*Festuca ovina*-*Galium saxatile* grassland, typical sub-community

MG5c *Centaurea nigra*-*Cynosurus cristatus* grassland, *Danthonia decumbens* sub-community

Site Accounts

Goonhilly Downs (Map 1)

The sites for *Gentianella campestris* are all within the Goonhilly Downs SSSI which forms part of The Lizard SAC and NNR.

Gentianella campestris has been recorded from four 1km squares on Goonhilly Downs. There are however only three relatively recent records localised to six-figure grid reference. These are all situated to the east of the road from Traboe Cross to Kuggar and to the west of Gwenter. This is a large expanse of wet and humid heathland over gently undulating land typical of the Lizard plateau.

South West corner at SW72751832 (Brea Cot). Species-rich H4c heathland on relatively well-drained land surrounding a small quarry. This grades into very wet H5 heathland to the east. This heathland is dominated by *Erica vagans* and *Ulex gallii* with *Agrostis curtisii*, *Carex panicea* and *Erica cinerea*. Other frequent species include *Genista anglica*, *Thymus praecox*, *Stachys officinalis*, *Serratula tinctoria*, *Pedicularis sylvatica*, *Viola lactea* and *Euphrasia micrantha*. Although the heathland cover is generally too dense and tall for *Gentianella campestris*, there are numerous horse tracks and other runnels through the heath which may be suitable. The more disturbed and open vegetation around the small quarry may also be suitable. *Gentianella campestris* was last recorded here in 2005 when 40 plants were found. Photo 5.

Near Gwenter. The two places where *Gentianella campestris* was recorded in 1978 appear to be on an old track crossing the heathland from north to south. This track is not marked on the 1804 Ordnance Survey first series map or the 1935 land-use map. The heath itself is very wet H5a dominated by tall and dense *Molinia caerulea*, *Schoenus nigricans*, *Erica vagans* and *Ulex gallii* and totally unsuitable for *G. campestris*. The track is open, but very wet with approximately 30% standing water at the time of survey. Photos 3,4

Potential habitat was searched along the northern boundary of this heathland compartment from SW7379 1878 to SW7332 1896. This has some moderately species-rich U4/M25c grassland including *Parentucellia viscosa*, *Radiola linoides* and *Viola lactea*.

Rosuic Common. To the north of Goonhilly Downs near Traboe Cross is a further 1978 record. This area is now dense, closed wet H5a heathland with no obviously suitable habitat for *Gentianella campestris*.

Recommendations: The heathland at Brea Cot has areas that may still be suitable for *Gentianella campestris*. These runnels and pony tracks would be easy to search thoroughly with the help of volunteers.

Hayle Kimbro Pool (Map 2)

This site is within the West Lizard SSSI but is under private ownership.

Gentianella campestris was first recorded from the field to the south-east of Hayle Kimbro Pool in 1997, when thousands of plants were present. In 1998, similar numbers of plants were recorded in three places in the field. It was last recorded here in 2008 when the field was described as “semi-improved grassland reverting to species-rich grassland”, but a lack of grazing was noted, and only 15 plants were seen.

The field appears to have been ungrazed since the mid-2000s but although the roadside boundary is not fenced, it is probably stockproof due to the dense hedge of *Prunus spinosa*. The field is divided into two parts by a belt of young scrub dominated by *Prunus spinosa* and *Salix cinerea*.

The northern section has M25a dominated by tussocky *Molinia caerulea* (Photo 6). This is moderately species-rich with abundant *Succisa pratensis*, *Potentilla erecta*, *Stachys officinalis* and *Achillea ptarmica* with patches of *Calluna vulgaris*, *Erica cinerea* and *Erica vagans*. Species characteristic of more mesotrophic grasslands include *Plantago lanceolata* and *Trifolium pratense*. The alien *Sisyrinchium sp* is locally frequent. To the south of this section there are patches of ungrazed grassland with affinities to MG5c, dominated by *Agrostis caillaris* and *Festuca rubra* with *Potentilla erecta*, *Succisa pratensis*, *Centaurea nigra*, *Euphrasia nemorosa*, and *Dactylorhiza praetermissa*.

The southern section of the field is largely grassland, with patches of *Erica vagans*, *Calluna vulgaris*, *Erica cinerea* and *Rubus fruticosus* in a matrix of species-rich grassland between 20-30cm tall, related to U4 and M25c (Photo 7). *Agrostis capillaris*, *Festuca rubra*, *Plantago lanceolata*, *Potentilla erecta*, *Dactylis glomerata*, *Molinia caerulea* and *Holcus lanatus* are abundant, with *Sanguisorba officinalis*, *Succisa pratensis*, *Angelica sylvestris*, *Dactylorhiza praetermissa* and *Viola lactea*.

None of the grassland or heathland present in 2015 was suitable for *Gentianella campestris*. It would however become suitable with the reintroduction of a suitable grazing regime which would aim at the recreation of a mosaic of open heath and well-grazed species-rich grassland. It should be noted that a 2011 condition assessment by Natural England of the SSSI unit of which this is a part, assessed it as in favourable condition.

Recommendations: The reintroduction of grazing at this site is urgently required. The longevity of seed of *Gentianella campestris* in the soil is unknown, but it is hoped that some seed still remains in the seed-bank. Heavy grazing by mixed stock would be ideal in order to return the associated vegetation to a suitable condition and to cause some disturbance which might stimulate germination. This would be of benefit not only to any potential population of *G. campestris* but also to the overall diversity and quality of the vegetation. It may be necessary to ensure that the eastern boundary along the roadside is stockproof. The SSSI unit should be divided into logical sections and suitable targets set to allow adequate assessment.

Lizard Downs (Map 3)

Lizard Downs are part of The Lizard SAC, The West Lizard SSSI and The Lizard NNR. It is managed by Natural England.

Gentianella campestris has been known from heathland on Lizard Downs to the east of Kynance since at least 1894. In 2013 surveys by David Pearman and Ian Benallick recorded it in 15 small sub-populations between SW68981380 in the west and SW69521392 in the east, on and beside trackways running across Lizard Downs from Kynance Cove to the A3083 to the east at Mile End and Mile End Cottage. These trackways are marked on the first edition Ordnance Survey maps from 1804, and it is likely that they are ancient (Maps 4&5)(Photo 8). Before the mid-20th century, the Lizard heathlands would have been much more intensively managed than at present, and it is likely that these tracks would have been well-used by graziers, quarry traffic and other activities. It is possible that the tracks would have been somewhat wider than currently with mosaics of heath, grassland, disturbed vegetation, open soil and seasonal pools, and would have offered ample habitat for short-lived plants of disturbed habitats including many of the Lizard specialities.

In 2015, 245 plants in 17 sub-populations were recorded between approximately SW6892 1373 and SW6928 1402 on the main track from Kynance Cove to Mile End, and on the track branching off this to Mile End Cottage between the junction and SW6954 1391. These tracks pass through H4c (*Ulex gallii*-*Agrostis curtisii* heath, *Erica tetralix* sub-community) and H5a (*Erica vagans*-*Schoenus nigricans* heath, typical sub-community), typical heathland types of the gently undulating Lizard plateau where the soils are acidic but mineral-rich, and where drainage is impeded. This heathland is generally moderately tall, giving a closed canopy of heathland shrubs with little of the open ground required for the germination of short-lived plants apart from areas where water gathers and there are patches of poor-fen related vegetation within the heathland matrix.

Gentianella campestris occupies a very narrow and restricted zone on the margins of the tracks (Photos 11&12). Here, the closed heathland canopy is kept open by the passage of walkers and their dogs and occasional vehicles. It is however not so frequently disturbed as to prevent the establishment of vegetation. This zone is very slightly raised above the surface of the surrounding heath and to a greater extent above the level of the tracks where there are temporary and semi-permanent pools and larger expanses of bare soil. This zone therefore has sufficient exposed soil for germination of *G. campestris*, an open canopy which does not shade the plants excessively, and which is better-drained than much of the heathland. It is however very vulnerable to an increase or decrease in disturbance levels and consequent destruction of plants or lack of germination and out-competition. At one sub-site (SW69273 14023), *Gentianella campestris* occurs on very open heathland immediately to the north of the main track, possibly where there have been other parallel tracks in the past (Photos 9 & 13).

The vegetation where *Gentianella campestris* was recorded is closest in composition to H4c. This was confirmed by analysis using the Match programme (this compares quadrat data with the vegetation data on which the published NVC accounts are based). *Molinia caerulea*, *Ulex gallii*, *Erica cinerea*, *Carex panicea*, *Agrostis curtisii*, *Calluna vulgaris*, *Erica tetralix* and locally *Erica vagans* are all abundant, with *Potentilla erecta*, *Schoenus nigricans*, *Carex demissa*, *Dactylorhiza maculata*, *Pedicularis sylvatica* and a range of other species at lower frequencies including *Succisa pratensis*, *Stachys officinalis*, *Serratula tinctoria*, *Viola lactea* and *Polygala serpyllifolia*. There is between 10% and 20% bare soil associated with the areas where *G. campestris* was recorded.

Numbers of plants and area of occurrence were higher than in 2011, but this probably just reflects natural variation between years for this species.

Recommendations: The numbers of *Gentianella campestris*, the extent of the population and the condition of the habitat should be monitored annually. A minimum required population should be determined by reference to recent past counts, and any significant decrease in relation to this for two years or more should trigger management intervention. This would be ideal work for a volunteer group. A set of condition assessment guidelines should be produced to enable this to be carried out consistently and effectively.

It was agreed with the Natural England site manager (Steve Townsend) that he would carry out some experimental vegetation cutting alongside the tracks where *Gentianella campestris* populations are known. This should be monitored in 2016 and subsequently.

Location of *Gentianella campestris* sub-populations on Lizard Downs

Grid reference SW	Number in 2011	Number in 2015	
68934 13752		6	
68947 13788		47	
68986 13802	2	1	
68990 13809		7	
69000 13807		2	
69067 13892	16	1	
69107 13920	4	7	
69217 13905		4	
69220 13912	2	1	
69227 13904		9	
69273 14023		59	
69279 14024	5		
6932 1391	15		
69353 13922	8	86	Short, grazed and trampled heath slightly raised above the adjacent damp heath. 2 plants off the main track.
69382 13928		1	
69412 13924		1	
69434 13928	32	3	
69514 13924	40	2	
69534 13920		8	
Total	124	245	

Species recorded in 4m² quadrats. Abundances of all species are given on the Domin scale.

	69374 13929	69227 13903	68900 13807	68986 13802	69279 14024	Constanc y
<i>Molinia caerulea</i>	7	5	4	7	5	5
Bare soil	5	5	5	5	5	5
<i>Carex panicea</i>	4	5	6	5	5	5
<i>Agrostis curtisii</i>	4	5	6	6	5	5
<i>Ulex gallii</i>	4	3	5	5	4	5
<i>Erica cinerea</i>	3	3	5	5	4	5
<i>Gentianella campestris</i>	3	3	1	3	3	5
<i>Potentilla erecta</i>	3	2	3	2	2	5
<i>Calluna vulgaris</i>	5	5		5	4	4
<i>Erica tetralix</i>	5	5		6	6	4
<i>Carex demissa</i>	2	3	2			3
<i>Pedicularis sylvatica</i>	2		1		1	3
<i>Schoenus nigricans</i>		4	2	2		3
<i>Erica vagans</i>			5	5	1	3
<i>Dactylorhiza maculata</i>	2				3	2
<i>Polygala serpyllifolia</i>			2	3		2
<i>Agrostis canina</i>	2					1
<i>Succisa pratensis</i>	1					1
<i>Agrostis capillaris</i>		3				1
<i>Stachys officinalis</i>			4			1
<i>Viola canina</i>			3			1
<i>Thymus praecox</i>			2			1
<i>Hypochoeris radicata</i>			1			1
<i>Serratula tinctoria</i>			1			1
<i>Viola lactea</i>				1		1
<i>Danthonia decumbens</i>					2	1

Match analysis of quadrat data.

	1	2	3	4	5
Community	H4c	H4	H4a	H6c	H4d
Coefficient	67.9	66.3	61.2	58.9	55.6

Kit Hill (Map 6)

Kit Hill is a Local Nature Reserve managed by Cornwall County Council.

Gentianella campestris was first recorded from Kit Hill in 1980, and has been seen at more or less the same place on several occasions until 2014. Precise directions are given for the location of the population and it was seen by PJW in 1999. No plants could however be located in 2015.

The site is the area surrounding the former buildings, capped shafts, chimney and spoil heaps of Kit Hill South mine (Photo 1). It is highly likely that the very freely-draining soils here are rich in toxic metals. *Gentianella campestris* has been recorded on the closely rabbit-grazed grassland over the spoil heaps and old buildings to the south-west of the chimney. This grassland is species-rich U4a, dominated by *Agrostis capillaris* and *Festuca ovina* with abundant *Thymus praecox*, *Hylocomium splendens*, *Polytrichum juniperinum*, *Galium saxatile*, *Anthoxanthum odoratum*, *Lotus corniculatus*, *Pilosella officinarum*, *Trifolium dubium*, *Trifolium micranthum* and *Rhytidadelphus squarrosus* (Photo 2). The north face of the spoil tip has young scrub of *Crataegus monogyna* and *Rubus fruticosus*.

Grassland condition appears ideal for *Gentianella campestris*. The sward is grazed to a height of 2-3cm, and there is approximately 5% bare soil.

Species recorded in 4m² quadrats. Abundances of all species are given on the Domin scale.

	SX37433 70976	SX37416 70976
<i>Agrostis capillaris</i>	7	6
<i>Hylocomium splendens</i>	6	2
<i>Festuca ovina</i>	4	5
<i>Polytrichum juniperinum</i>	4	
<i>Galium saxatile</i>	4	
<i>Anthoxanthum odoratum</i>	3	3
<i>Holcus lanatus</i>	3	3
<i>Rhytidiadelphus squarrosus</i>	3	3
<i>Dicranum scoparium</i>	3	
<i>Viola riviniana</i>	3	
<i>Cladonia furcata</i>	3	
<i>Thymus praecox</i>	2	5
<i>Euphrasia nemorosa</i>	2	2
<i>Trifolium repens</i>	2	2
<i>Agrostis curtisii</i>	2	
<i>Rhytidiadelphus triquetrus</i>	2	
<i>Linum catharticum</i>	1	3
<i>Plantago lanceolate</i>	1	2
<i>Peltigera rufescens</i>	1	1
<i>Taraxacum sp</i>	1	1
<i>Hedera helix</i>	1	
<i>Calluna vulgaris</i>	1	
<i>Sagina procumbens</i>	1	
<i>Rubus fruticosus</i>	1	
<i>Polypodium vulgare</i>	1	
<i>Asplenium adiantum-nigrum</i>	1	
<i>Lotus corniculatus</i>		4
<i>Pilosella officinarum</i>		4
<i>Trifolium dubium</i>		4
<i>Trifolium micranthum</i>		4
<i>Weissia sp</i>		4
<i>Nardus stricta</i>		3
<i>Bellis perennis</i>		3
<i>Achillea millefolium</i>		3
<i>Pseudoscleropodium purum</i>		2
<i>Poa humilis</i>		1
<i>Cerastium fontanum</i>		1
<i>Senecio jacobaea</i>		1
<i>Euphrasia confusa</i>		1

Recommendations: This site should be monitored annually. Should no plants be recorded again in 2016, management action should be taken. The removal of scrub from the south-face of the spoil heap should be considered.

Seed Collection

Seed was collected for the Royal Botanic Gardens Millennium Seed-bank. Ripe and near-ripe pods were collected from 20 plants from the Lizard Downs population.

Training Day

A training day on 24th Sept 2015 was organised by The Species Recovery Trust for volunteers interested in future monitoring schemes in Cornwall. Ten volunteers and the Natural England site manager attended. After a brief introductory talk about rare plants on The Lizard and *Gentianella campestris*, the group moved to Lizard Downs to count *G. campestris* and assess the heathland habitat (Photo 14).

Conclusions and Recommendations

Of the four Cornish sites at which *Gentianella campestris* was recorded in 2005, plants were only found at one, Lizard Downs, in 2015. Two other sites where plants were recorded in 1978 were surveyed and plants were not found at these either.

At Lizard Downs the number of plants was higher than recorded in 2008 and 2013, and occupied a larger number of sub-sites over a length of approximately 0.8km of ancient trackway margin. While this appears to be satisfactory, the area of suitable habitat is actually very small. Plants are restricted to a very narrow zone along the track edge where they are raised above the level of seasonal inundation, where they receive occasional disturbance and where the heathland canopy cover is sufficiently open. This zone is very vulnerable to any changes in management. Should use of the tracks by walkers and occasional vehicles reduce, then the available habitat may well disappear.

Experimental cutting and disturbance has been recommended for areas of heathland adjacent to the existing populations, in the hope that *Gentianella campestris* will colonise. These should be monitored and management extended if successful.

The field to the east of Hayle Kimbro Pool had thousands of plants in the mid-2000s when it was still being grazed. Cessation of grazing has however led to the development of tall, dense heathland and grassland. Without resumption of grazing here it is unlikely that *Gentianella campestris* will re-appear. Restoration of *G. campestris* populations here will depend on the presence of a persistent seed-bank. Should there be no seed remaining in the soil, then the reintroduction of seed from the nearby Lizard Downs site should be considered after the resumption of suitable management. The last area of Goonhilly Downs where *Gentianella campestris* was recorded was at Brea Cot. While the heath here is too tall and dense for *G. campestris*, there are numerous pony tracks and runnels with open, species-rich vegetation which may be suitable and which should be searched thoroughly in the future.

The only recent site not on The Lizard peninsula is at Kit Hill. While good populations have been seen here in recent years, and despite the site being in favourable condition, no plants could be found in 2015. Search in 2016 is recommended before any remedial action is considered. It is clear that the loss of sites throughout lowland Britain for this very vulnerable species is continuing. This is happening even though many of the sites are protected as nature reserves and

SSSIs, and have been assessed by Natural England as being in favourable condition. This species appears to have a relatively short-lived seedbank (by analogy with other *Gentianella* species, perhaps two years)(Milberg, 1994), and any period of adverse conditions in excess of this may be fatal especially to small and isolated populations.

Experimental investigation of seed-longevity would be desirable, and development of a set of guidelines for the assessment of habitat conditions is essential. A long-term annual monitoring programme for sites in lowland Britain using volunteers should be designed.

Acknowledgements

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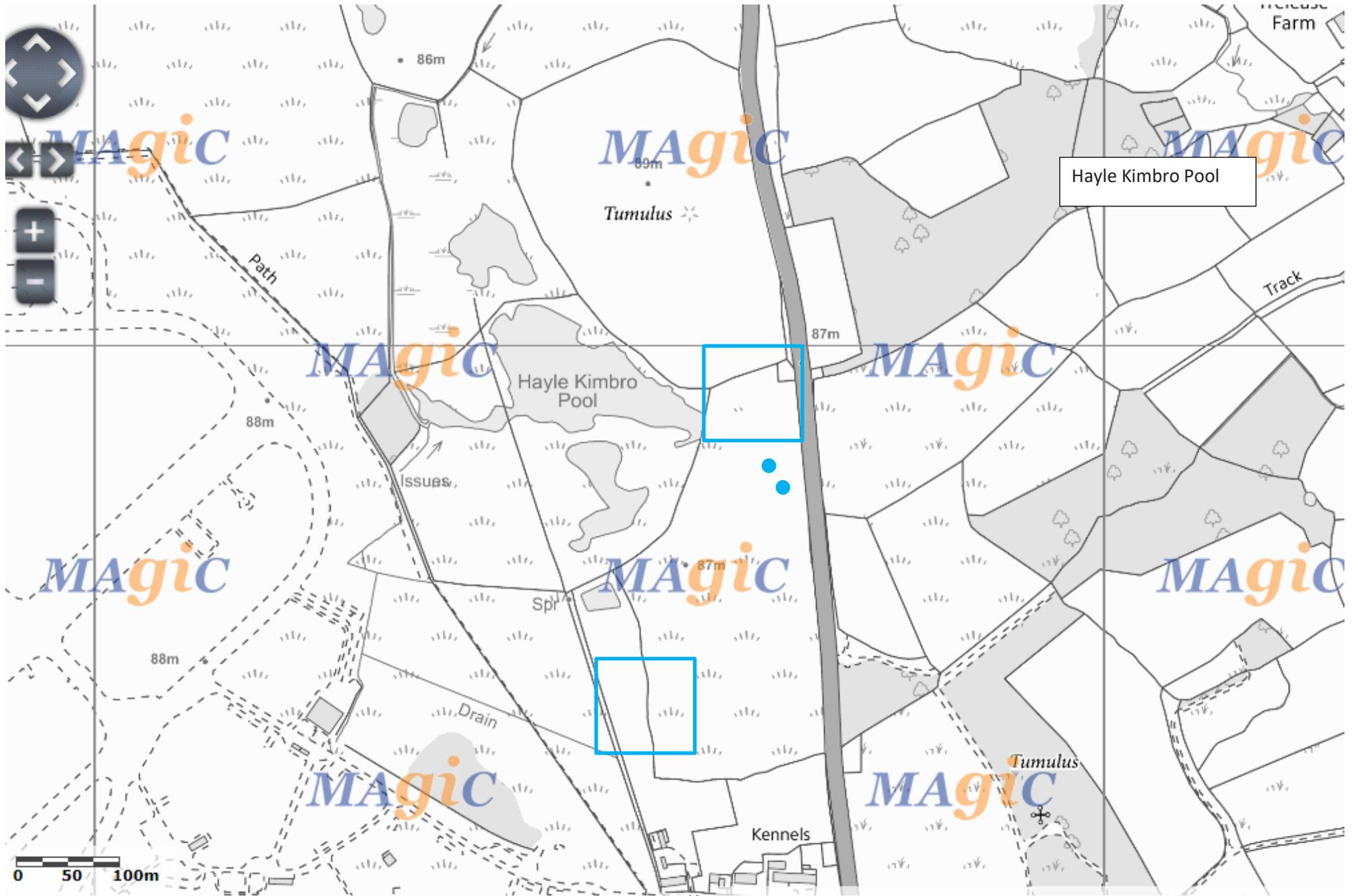
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Maps.

All location maps:  past records
 2015 records

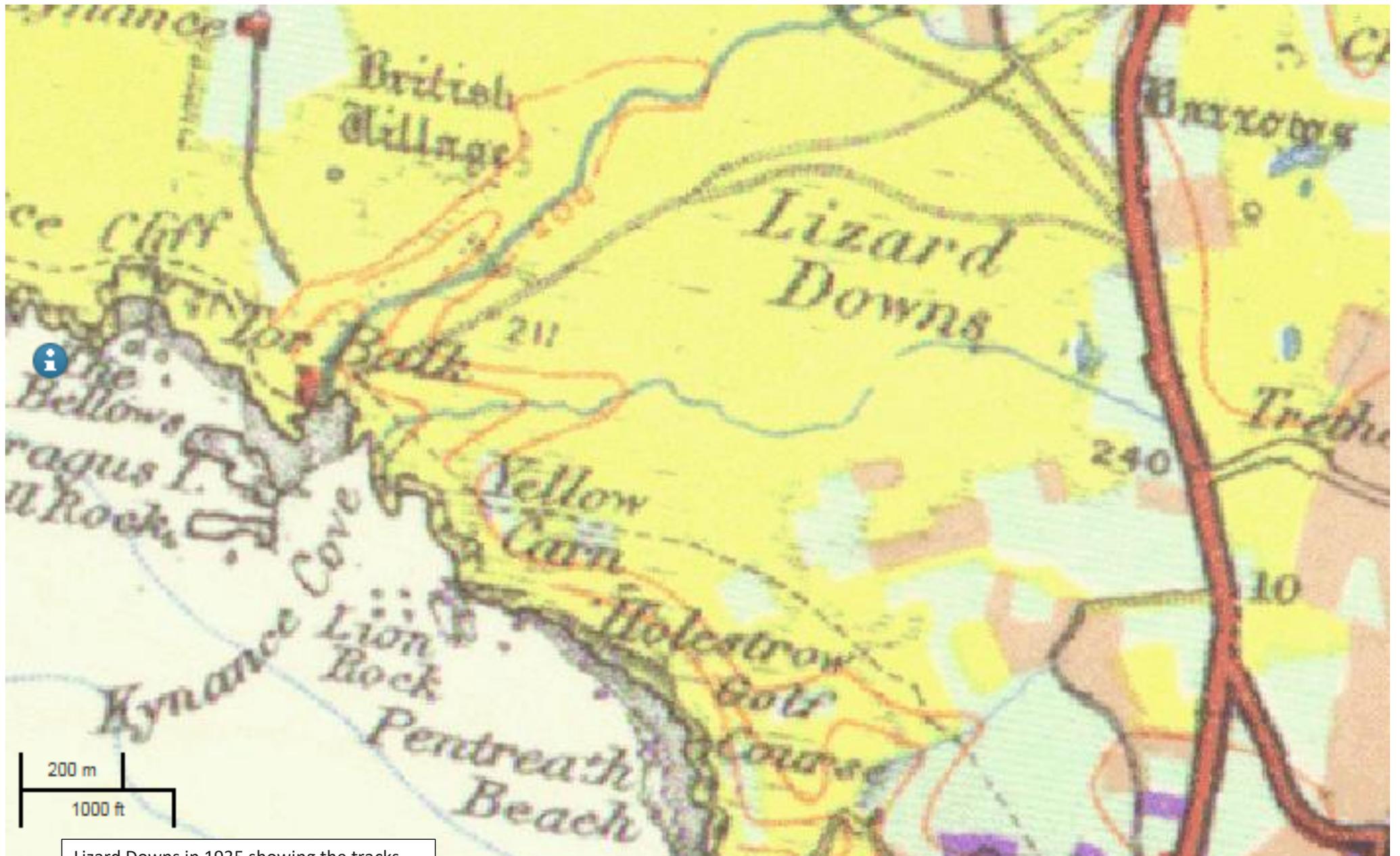
- 1 Goonhilly Downs
- 2 Hayle Kimbro Pool
- 3 Lizard Downs
- 4 Lizard Downs in 1804 showing the tracks from Kynance Cove to Mile End. (Ordnance Survey First Series maps)
- 5 Lizard Downs in 1935 showing the tracks from Kynance Cove to Mile End. (Land Utilisation Survey of Great Britain)
- 6 Kit Hill



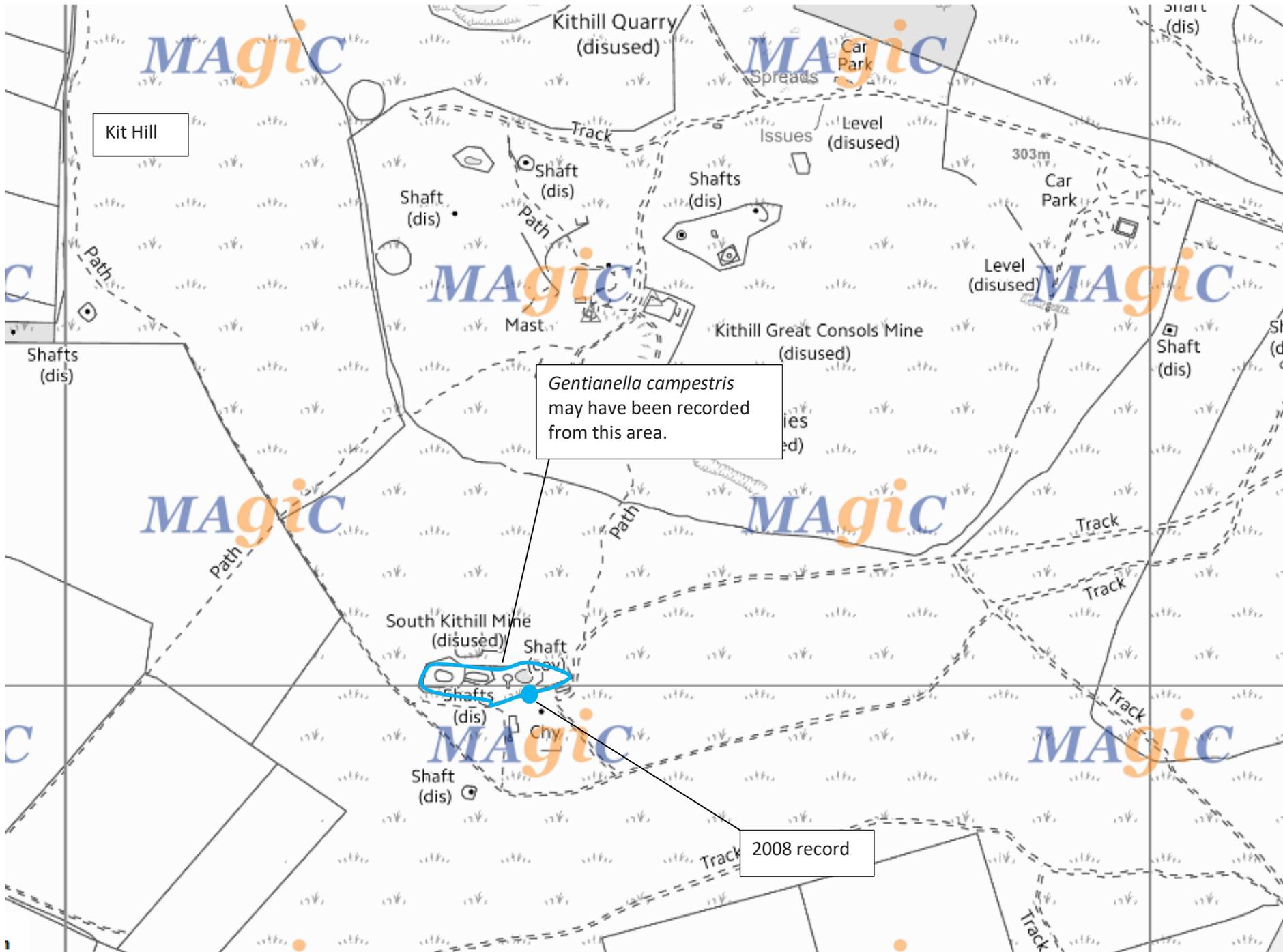
Hayle Kimbro Pool

0 50 100m





Lizard Downs in 1935 showing the tracks from Kynance Cove to Mile End. (Land Utilisation Survey of Great Britain)



Kit Hill

Gentianella campestris
may have been recorded
from this area.

2008 record



1 South Kit Hill Mine. View looking east across the spoil heap.

2 South Kit Hill Mine. Typical sward.





3 Goonhilly Downs.
Track near Gwenter
looking north.



4 Goonhilly Downs.
Track near Gwenter
Northern end.



5 Goonhilly
Downs, Brea Cot.
Pony track
through
heathland.



6 Hayle Kimbro
Pool.
Regenerating wet
heathy grassland,
ungrazed.



7 Hayle Kimbro Pool. Ungrazed MG5c with patches of heath.



8 Lizard Downs.
Track across the
heath from Kynance
Cove to Mile End.



9 Lizard Downs.
Track parallel to the
main track at
SW6927 1402.



10 Lizard Downs.
Species-rich, short
heathland with *G.
campestris*.



11 Lizard Downs.
Margin of
seasonally wet track
with *G.campestris*.



12 Lizard Downs.
Track through
heathland.



13 Lizard Downs.
Short heathland
on parallel track
at SW6927 1402
with *G.
campestris*.



14 Volunteer training on Lizard Downs.

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 courses and awareness raising.

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