

# ***Lobelia urens* L. in South-West England, 2013**

December 2013

PJ Wilson and DW Price



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## Introduction

*Lobelia urens* is a nationally rare plant in the UK, with historic records from 16 10km squares (Preston et al, 2002). It is now thought to occur in only six native sites in the south of England (Table 1) and its existence at some of these is thought to be threatened. It is protected under Schedule 8 of the Wildlife and Countryside Act, and is included under Section 21 of the Countryside and Rights of Way Act.

The purpose of this work was to determine the current status of *Lobelia urens* at its five sites in the south-west of England. This included estimates of population sizes, population trends, current management and management requirements.

Table 1. Extant native sites for *Lobelia urens* in England

County	Locality	Grid reference
Cornwall	Redlake Cottage Meadows	SX126586
Devon	Andrew's Wood	SX708516
Devon	Lobelia Cottage, Shute Hill	SY253989
Dorset	Hurst Heath, Moreton	SY784896
Hampshire	Hinton Admiral	SZ206949
Sussex/Kent	Flimwell	TQ720309

Much of the information on previous population sizes, autecology and management for *Lobelia urens* comes from the work of Janet Dinsdale (Dinsdale, Dale & Kent, 1997; Dinsdale 1996). Information about the history of *Lobelia urens* in Devon comes from Smith R (in press)(Appendix 2).

It was hoped to include a fifth site at Hinton Admiral in Hampshire, but it was not possible to obtain access permission.

The four sites were visited and a subjective assessment of site condition was made following current knowledge of the management requirements of *Lobelia urens*. Numbers of plants were counted at Redlake Cottage Meadows, Lobelia Cottage and Moreton. No count was made at Andrew's Wood as numbers were very high and an annual count is made by the Devon Wildlife Trust. At each site, representative 2mX2m vegetation quadrats were recorded. Vegetation stand types were classified using the National Vegetation Classification (Rodwell, 1991;1992).

## **Management requirements of *Lobelia urens*.**

*Lobelia urens* is a rhizomatous perennial with over-wintering leaf rosettes. It is probable that individual plants are relatively short-lived and regular reproduction from seed is likely to be essential. Flowering stems are produced from June, with flowering occurring in late summer and early autumn. Seed production from a large plant can be considerable, and the seeds themselves are small and rounded with no specialised adaptation to dispersal. This predicts that the seeds are capable of forming a long-lived seed-bank in the soil (Thompson et al, 1993). The appearance of large numbers of plants after soil disturbance events confirms this characteristic. It appears to be a poorly competitive plant unable to persist within dense grassland vegetation or under heavily shading scrub or woodland.

*Lobelia urens* requires periodic soil disturbance to allow germination of seed and establishment of seedlings. Vegetation cover needs to be kept open and relatively non-competitive. At Andrew's Wood these objectives have been successfully achieved by winter grazing by Exmoor ponies. These poach the wet soil and graze the relatively unpalatable vegetation remaining from the previous grazing season. It is likely that cattle of one of the hardier breeds that can be overwintered outside would also be a suitable grazing animal.

Where grazing is not sufficient to remove invasive scrub, manual clearance may be necessary. It may not be possible to graze some sites (eg Moreton site 2), and manual disturbance and vegetation clearance is essential.

The flowering shoots appear to be palatable to grazing stock, and grazing should be reduced or excluded during the summer flowering period between June and September.

## **References**

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Preston C, Pearman DW & Dines D (2002). New Atlas of the British Flora. Oxford University Press.

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Smith R (in press). The Flora of Devon.

## **Acknowledgements**

Thanks are due to Sean O'Hea, Shirley Bevan, Robin Walls, Roger Smith, Mike Locke and Marian Reed.

## Site Accounts

### Lobelia Cottage

SY252989

Owner: Shirley Bevan  
Lobelia Cottage, Shute, Devon EX13 7DX

*Lobelia urens* has been known from Shute Hill since 1762 when it was recorded by William Newbury a local botanist. This was the first UK record. In 1862 it occurred over an area of approximately 1 mileX100 yards, in abundance where the soil had been disturbed. There are four specific localities (Table 2; Map 1 & 2).

Table 2. Sites for *Lobelia urens* at Shute Hill.

Site	Grid ref	Last count	Last record	Current land use
Shute Common		1762-1778		Mostly conifer plantation
Old Football Field, Kilmington	SY262986	1963, 41 plants	1990	Improved pasture
Roman Road	SY259987	1963, 50 plants	1966	Conifer plantation
Studhayes	SY257992	1964, 30 plants	1969	Arable
Lobelia Cottage	SY252989	2002, 114 plants	2013	Unimproved grassland

Birch woodland which had developed over the common land of Shute Hill was felled and replanted with conifers between 1960 and 1962, although this may only have adversely affected the Roman Road site. The Studhayes and Football Field sites may have deteriorated following agricultural improvement.

The Lobelia Cottage site has been visited occasionally since 1964 (Table 3). While numbers of *Lobelia urens* have fluctuated it is interesting to note that under current management numbers in 2002 and 2013 were higher than in previous years for which counts are available.

Table 3. Numbers of *Lobelia urens* at Lobelia Cottage.

Year	Number
1964	30-40
1967	18
1984	50-100
1985	77
1994	30
2002	114
2013	160

The meadow behind Lobelia Cottage is on the north-facing slope of Shute Hill and is immediately adjacent to the coniferous plantation. Much of the field has been planted with ornamental trees in recent years, but the owners are aware of the importance of the *Lobelia urens* population and have left a broad strip along the top of the slope unplanted. At the time of survey the grassland was tall and dense, dominated by *Holcus lanatus*, *Agrostis capillaris*, *Anthoxanthum odoratum*, *Lotus uliginosus* and *Plantago lanceolata*. *Festuca rubra* and *Succisa pratensis* were also locally abundant. The NVC community was difficult to determine, and appeared closest to stands of U20, although *Pteridium aquilinum* was sparse here (Table 4).

Approximately 160 plants of *Lobelia urens* were recorded, although exact numbers were difficult to determine as many of the plants were very large and scrambling through the tall grassland.

The owners cut the grassland after *Lobelia urens* has finished flowering in the late summer/early autumn. All cuttings are removed from the field. The vegetation is also cut in the winter if necessary. Scrub and *Pteridium aquilinum* are also removed during the growing season. There has been no grazing since the 1980s.

*Lobelia urens* appears to be thriving here under current management conditions. The site should be regularly monitored to ensure continued favourable condition of the habitat and to ensure that numbers of the plant do not decrease. Particular attention should be paid to the effects of increased shading as the trees on the lower slopes grow.

A thorough search should be made of the former sites on Shute Hill and in Kilmington. Suitable habitat is still present in the area and additional habitat becomes available as forestry operations move around the plantations. Given the probable longevity of seed, it is possible that additional populations may still appear.

Table 4. Vegetation quadrats at Lobelia Cottage (Abundances on the Domin scale).

Species	Quadrat 1	Quadrat 2
<i>Holcus lanatus</i>	5	6
<i>Anthoxanthum odoratum</i>	5	5
<i>Agrostis capillaris</i>	6	6
<i>Festuca rubra</i>	5	
<i>Plantago lanceolata</i>	5	4
<i>Lotus uliginosus</i>	5	5
<i>Succisa pratensis</i>	2	
<i>Potentilla erecta</i>	2	2
<i>Potentilla reptans</i>	1	
<i>Rumex acetosa</i>	2	
<i>Juncus conglomeratus</i>	1	1
<i>Rubus fruticosus</i>	1	1
<i>Taraxacum sp</i>	1	
<i>Trifolium repens</i>	2	
<i>Lobelia urens</i>	4	5
<i>Agrostis stolonifera</i>		2
<i>Teucrium scorodonia</i>		2
<i>Prunella vulgaris</i>		1
<i>Salix cinerea</i>		1
<i>Betula pubescens</i>		1
<i>Circaea lutetiana</i>		2
<i>Cirsium palustre</i>		1
<i>Juncus acutiflorus</i>		2
<i>Pteridium aquilinum</i>		1
<i>Pulicaria dysenterica</i>		1

Additional species not recorded in quadrats: *Leucanthemum vulgare*, *Carex flacca*, *Carex pendula*, *Potentilla anserina*, *Veronica chamaedrys*, *Digitalis purpurea*, *Hypericum tetrapterum*, *Centaurea nigra*.



Map 1. Localities for *Lobelia urens* in the Shute and Kilmington area. Former sites.



Lobelia Cottage



Map 2. Lobelia  
Cottage

Mown  
path

Ornamental trees  
planted on this slope

*Betula pubescens* tree





## Andrew's Wood

Owner: Devon Wildlife Trust.

Contact Jackie Gage, Devon Wildlife Trust, Cricklepit Mill, Commercial Road, Exeter, Devon EX2 4AB 01392 279244

Andrew's Wood is a 39ha nature reserve, formerly open mire and grassland, but which has become largely invaded by scrub and secondary woodland since the 1950s. From the 1970s onwards the Devon Wildlife Trust have been maintaining and expanding two large open areas.

*Lobelia urens* was first recorded in the area in 1889, but the majority of the rough grazing land was agriculturally improved in the 1940s and 1950s, and Andrew's Wood is the remaining site for *L. urens* in this area. In 1995 the field immediately adjacent to the reserve was in set-aside, and more than 2000 plants of *Lobelia urens* appeared, and large numbers have been seen here since depending on the land-use.

*Lobelia urens* is present in two parts of the reserve (fields G1 and G2)(Map 3). The numbers of plants have fluctuated since counts began in the late 1960s, depending on the condition of the fields (Table 5), but in general numbers are considerably higher in field G1 than in G2. Vegetation in both areas is M25c and M23a mire. The uncommon *Parentucellia viscosa* is also frequent in these fields (Table 6).

The two parts of the reserve where *Lobelia urens* occurs are managed similarly. The aim is to maintain the fields free of invasive scrub and *Pteridium aquilinum*, to remove scrub where stands have developed and to maintain an open, species-rich sward with open areas. This is achieved by grazing between September and April each year with Exmoor ponies (between two and five in recent years), and by scrub and bracken clearance by contactors and volunteer work parties. This management has resulted in the maintenance and improvement of site condition for *Lobelia urens*, with abundant poached soil in the spring and an open grassland canopy which is however free from grazing during the flowering season. It has proven more difficult to ensure grazing in compartment G2 as access is more difficult, and this may be reflected by the lower numbers in this area.

Under this management regime, numbers of *Lobelia urens* have shown a continued increase since the 1960s when the Devon Wildlife Trust took the lease for the reserve. It is recommended that current management continues. If sufficient grazing animals become available in the future, they should be allowed to range over adjacent parts of the reserve in order to spread seed in dung.

It is not known how the field to the south-east of the reserve is managed. It is currently under an ELS agreement. Plants of *Lobelia urens* were first recorded here in 1995 when it was in set-aside. In 2000, more than 2000 plants were recorded from the field margins, and large numbers were present in 2012 in the centre of the field. Dormant seeds of *Lobelia urens* had evidently persisted in the soil between the early 1960s and 1995.



Table 5. Numbers of plants of *Lobelia urens* at Andrew's Wood.

Year	Number
1968	760
1972	220
1973	169
1974	257
1975	2560
1976	4897
1977	5325
1978	2315
1979	3915
1980	3970
1981	3028
1982	5602
1983	5694
1984	2965
1985	2191
1986	2144
1987	842
1988	1520
1989	3193
1990	5608
1991	4948
1992	3772
1993	2637
1994	4217
2006	2694
2007	4488

2008	7734
2009	9828
2010	7392

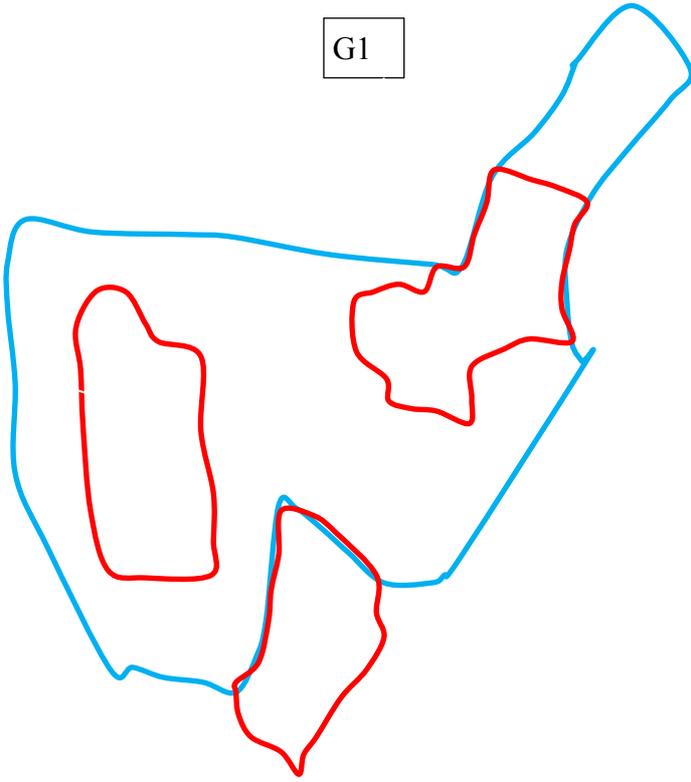
Table 6. Species associated with *Lobelia urens* at Andrew's Wood. Abundances on Domin scale.

Species	Quadrat 1	Quadrat 2
<i>Molinia caerulea</i>	7	6
<i>Agrostis capillaris</i>	5	
<i>Holcus lanatus</i>	4	
<i>Anthoxanthum odoratum</i>	2	
<i>Carex panicea</i>	2	1
<i>Centaurea nigra</i>	4	1
<i>Filipendula ulmaria</i>	4	
<i>Salix aurita</i>	2	1
<i>Salix cinerea</i>	2	1
<i>Betula pubescens</i>	2	1
<i>Rubus fruticosus</i>	3	
<i>Eupatorium cannabinum</i>	1	1
<i>Prunella vulgaris</i>	3	2
<i>Lotus uliginosus</i>	3	4
<i>Juncus acutiflorus</i>	2	6
<i>Pulicaria dysenterica</i>	2	2
<i>Thuidium tamariscinum</i>	3	
<i>Parentucellia viscosa</i>	1	
<i>Lythrum salicaria</i>	1	1
<i>Lobelia urens</i>	2	2
<i>Angelica sylvestris</i>	2	4
<i>Plantago lanceolata</i>	3	2

<i>Cirsium palustre</i>	1	1
<i>Potentilla erecta</i>	1	2
<i>Succisa pratensis</i>	4	
<i>Rhinanthus minor</i>	1	
<i>Carex flacca</i>		1
<i>Equisetum palustre</i>		1
<i>Luzula multiflora</i>		1
<i>Ranunculus acris</i>		2
<i>Hydrocotyle vulgaris</i>		4
<i>Galium palustre</i>		1
<i>Epilobium palustre</i>		1
<i>Plagiomnium undulatum</i>		3
<i>Quercus robur</i>		1
<i>Scutellaria minor</i>		1
<i>Hypericum tetrapterum</i>		2
<i>Athyrium filix-foemina</i>		2
<i>Anagallis tenella</i>		3
<i>Calliergon cuspidatum</i>		3
<i>Lathyrus pratensis</i>		1
<i>Cerastium fontanum</i>		1

G2

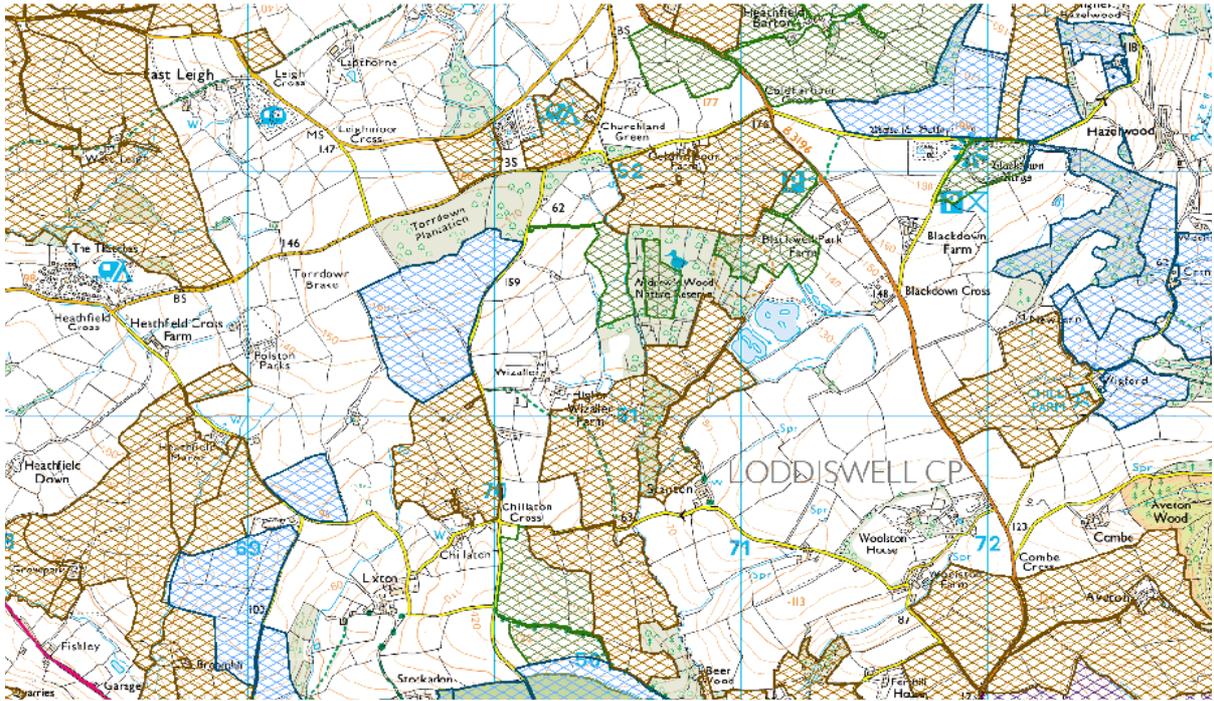
G1



Field outside reserve



Map 3. Andrew's Wood DWT reserve showing locations of *Lobelia urens* populations.



Map 4 . Location of Andrew's Wood DWT reserve.

## Moreton

Owner: Moreton Estate, Richard Hobbs.

Contact: Robin Walls, Dorset Flora Group. [robin@rmwalls.plus.com](mailto:robin@rmwalls.plus.com)

This is a large area of conifer plantation and secondary woodland that has developed over former heathland. *Lobelia urens* has been recorded in two places in this area (Map 5). *Lobelia urens* has been known here since 1956.

Site 1. This is a small clearing within woodland of *Pinus sp* and *Quercus robur* with some *Salix cinerea*, *Betula pubescens* and *Ilex aquifolium*. To the north of the clearing the vegetation is dominated by *Pteridium aquilinum*, while to the south the slightly wetter soil has M25a dominated by dense, tussocky *Molinia caerulea* (Table 8).

*Lobelia urens* has been present here in very large numbers in the past, usually after management has been carried out (Table 7). The high numbers in the early 1970s followed excavation to restore the field drainage system. Numbers have declined since 1994 in the absence of the large-scale management that the site requires. Only two very large plants could be found in a more open part of the M25a in 2013.

Table 7 . Numbers of *Lobelia urens* plants at Moreton site 1.

Year	Number
1945	1
1957	4-5
1965	5
1967	80
1968	150
1973	1629
1974	2101
1978	260
1988	>1000
1994	C2000
2003	200
2012	20
2013	2

Table 8. Vegetation associated with *Lobelia urens* at Moreton site 1. Abundances on the Domin scale.

Species	
<i>Molinia caerulea</i>	9
<i>Rubus fruticosus</i>	5
<i>Scutellaria minor</i>	2
<i>Erica tetralix</i>	1
<i>Salix cinerea</i>	1
<i>Luzula multiflora</i>	1
<i>Potentilla erecta</i>	1
<i>Lobelia urens</i>	1
Litter	5

Additional species not recorded in quadrats: *Salix repens*, *Cirsium dissectum*, *Succisa pratensis*, *Agrostis canina*, *Carex flacca*.

Management of this site has been erratic. Large-scale clearance and rotovation was carried out in 1987 and this resulted in the appearance of large numbers of plants. Since then, work has been less extensive and there has been encroachment of the surrounding woodland and development of dense, competitive vegetation within the clearing. All recent work has been carried out with the permission of the tenant farmer, but there has been no communication with the site owner. The clearance of surrounding scrub and woodland, removal of *Molinia caerulea* tussocks, control of *Pteridium aquilinum* and disturbance of the soil are now essential. Access to the site from the nearest road is difficult, but machinery could be brought into the woodland from the adjacent field. Ideally following clearance and disturbance, grazing stock should be allowed restricted access to this part of the woodland. Annual maintenance following restoration of the site may just require strimming.

Site 2. *Lobelia urens* has been known here since 1970, and in 1988 the population was described as “low numbers” on the “banks of a ditch between conifers and field of grass crops”. Scrub development was noted as a potential threat then. The high numbers in 1980 followed trampling of the ditch banks by cattle. In 1991, 215 plants were recorded, but subsequently the area where they had been recorded was fenced by the Dorset Wildlife Trust and this became grown over by dense vegetation. It was refound here in 2012 to the north of the original locality.

In 2013 two small plants were recorded on the ditch bank. This runs along the eastern edge of a small area of secondary woodland planted with *Pinus sp* and including *Betula pendula*, *Acer pseudoplatanus* and *Salix cinerea*. Vegetation here is open with much exposed sandy soil and is typical of a disturbed woodland edge (Table 10). The adjacent field was cropped with maize.

Table 9. Numbers of *Lobelia urens* plants at Moreton site 2.

Year	Number
1972	110
1973	31
1974	2
1980	742
1991	215
1993	0
2013	2

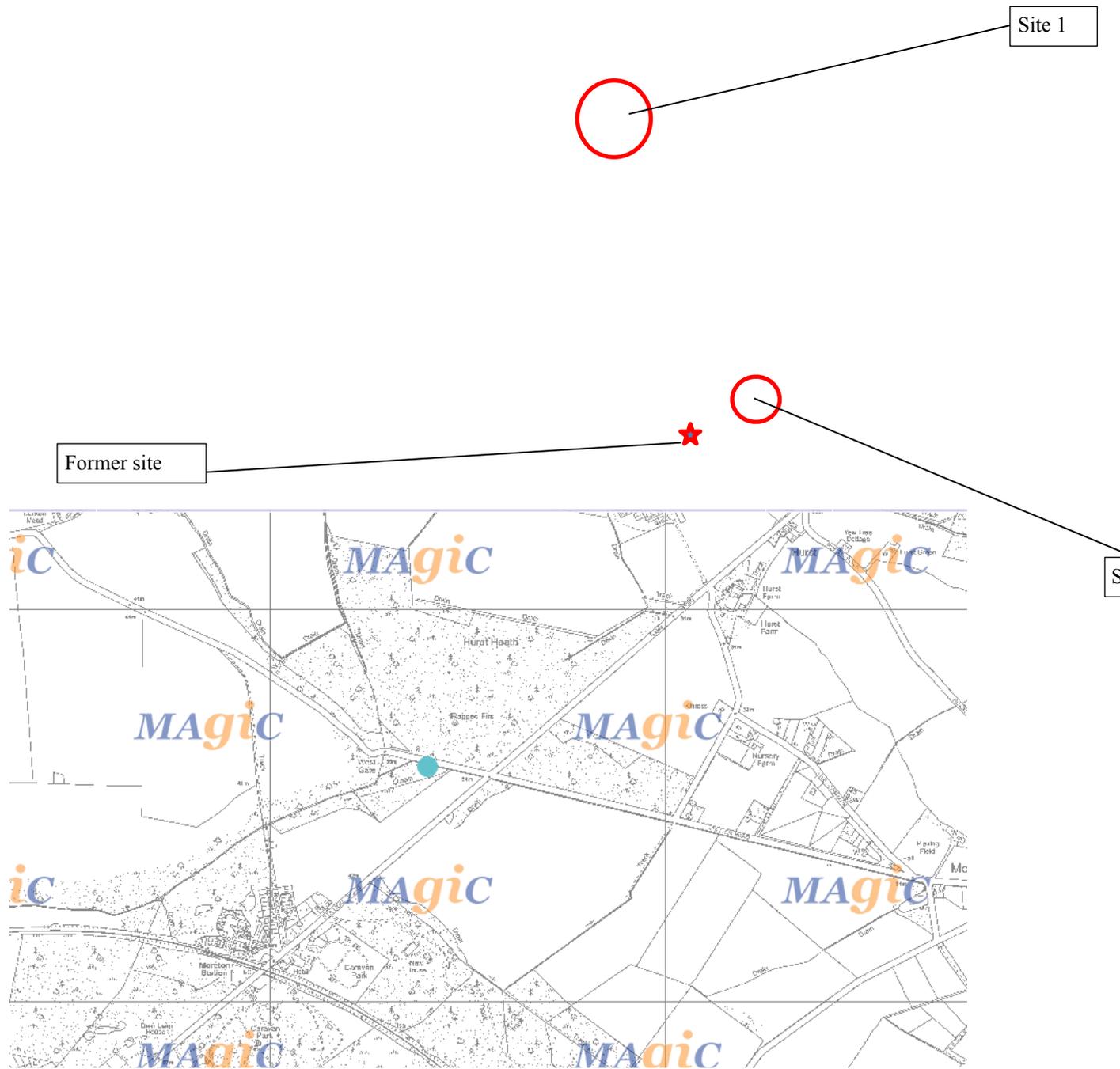
Table 10. Vegetation associated with *Lobelia urens* at Moreton site 2. Abundances on the Domin scale.

Species	
<i>Juncus effusus</i>	5
<i>Rubus fruticosus</i>	5

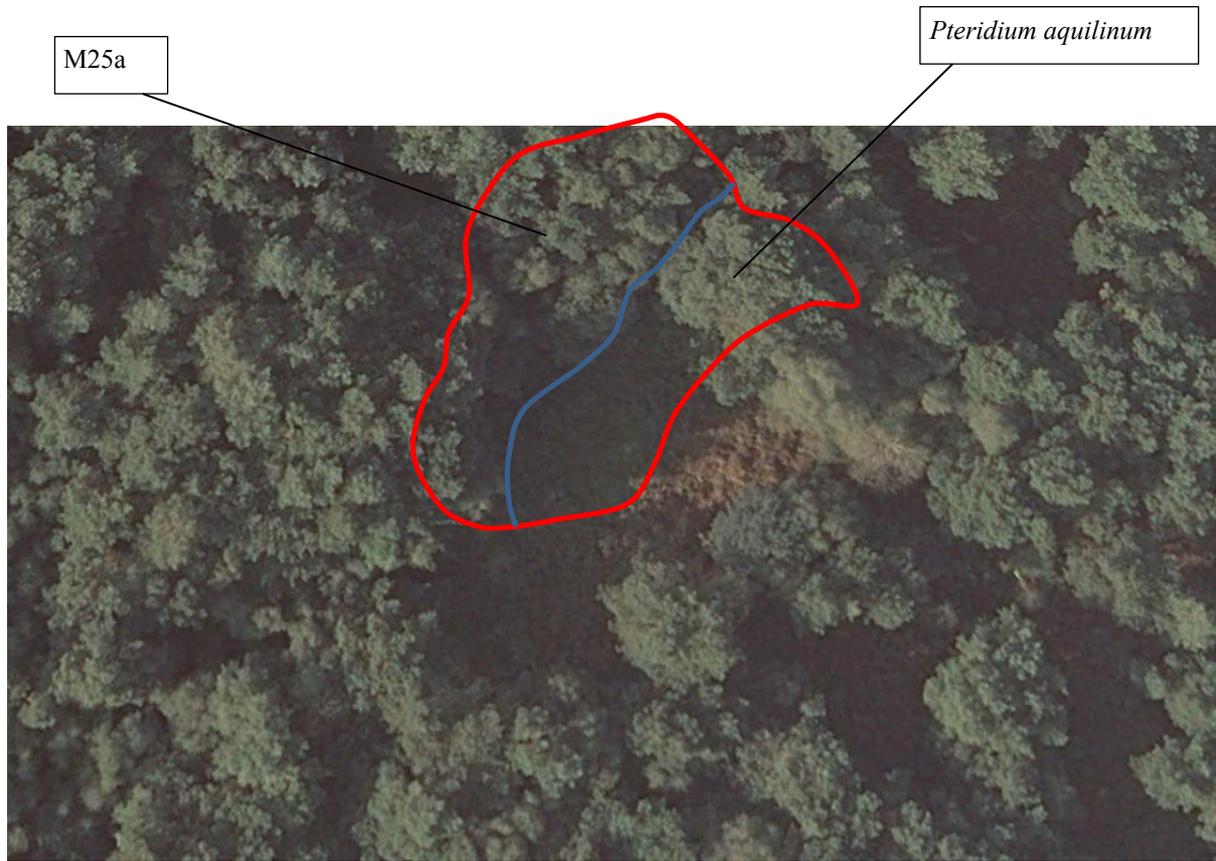
<i>Cirsium palustre</i>	2
<i>Dactylis glomerata</i>	1
<i>Agrostis capillaris</i>	6
<i>Holcus lanatus</i>	4
<i>Epilobium montanum</i>	1
<i>Dryopteris affine</i>	1
<i>Eupatorium cannabinum</i>	4
<i>Lonicera periclymenum</i>	4
<i>Pulicaria dysenterica</i>	1
<i>Pseudoscleropodium purum,</i>	4
<i>Lotus uliginosus</i>	1
<i>Brachytecium rutabulum</i>	5
<i>Eurhynchium praelongum</i>	5
<i>Hedera helix</i>	2

A 10m strip of woodland should be cleared along the ditch, removing all encroaching *Rubus fruticosus* and shading trees along a length of approximately 30m. The former site should also be cleared of all vegetation and the soil disturbed.

Map 5 . Sites for *Lobelia urens* at Moreton.



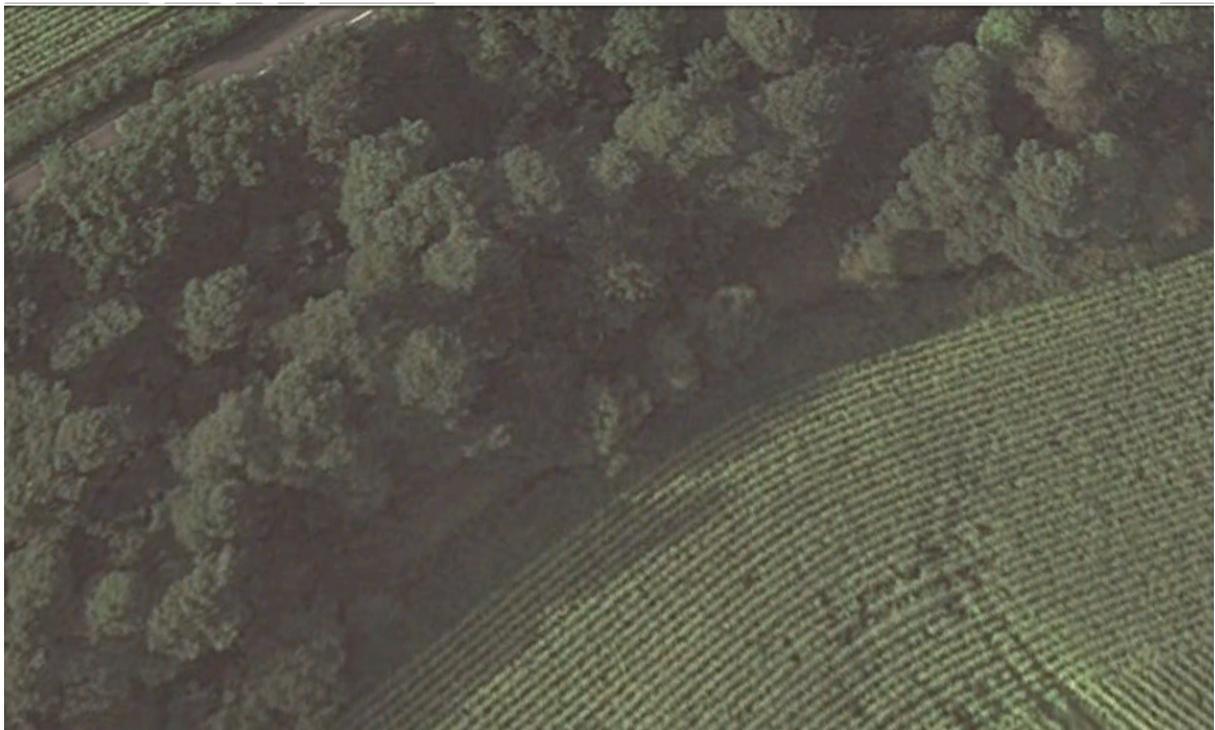
Map 6. Moreton Site 1.



Map 7 . Moreton Site 2.



2 plants *Lobelia urens*



### **Redlake Cottage Meadows.**

Owner: Cornwall Wildlife Trust.

Contact: Sean O’Hea, Cornwall Wildlife Trust, Five Acres, Allet, Truro, Cornwall, TR4 9DJ.  
01872 273939

*Lobelia urens* was first recorded in Cornwall in 1878 from a site between Lostwithiel and St Veep, and it was subsequently found in several localities in this area until the 1930s. The

only site remaining is Redlake Cottage Meadows which is now owned by The Cornwall Wildlife Trust (Map 9).

This reserve is largely wet heathland with wet acidic grassland in two fields at the southern end. There are also areas of scrub and wet woodland. *Lobelia urens* has been found mainly in the southern fields in M25a *Molinia caerulea* grassland. This grassland is rather tussocky with a considerable amount of scrub invasion. There has been much scrub clearance in the past, but there are serious problems with scrub regeneration. The grassland is species-rich with an open canopy of *Molinia caerulea* tussocks with *Juncus acutiflorus*, *Juncus effusus* and low scrub of *Rubus fruticosus*, *Betula pubescens*, *Salix cinerea* and *Ulex europaeus*. The understorey includes abundant *Agrostis capillaris*, *Succisa pratensis*, *Potentilla erecta* and frequent *Stachys officinalis*, *Centaurea nigra* and *Lotus uliginosus*. The uncommon *Hypericum undulatum* is also present (Table 11).

Table 11. Vegetation associated with *Lobelia urens* at Redlake Cottage Meadows. Abundances on the Domin scale.

Species	Quadrat 1	Quadrat 2
<i>Molinia caerulea</i>	4	7
<i>Juncus acutiflorus</i>	3	6
<i>Agrostis capillaris</i>	6	1
<i>Juncus effusus</i>	2	4
<i>Succisa pratensis</i>	6	5
<i>Rubus fruticosus</i>	5	5
<i>Potentilla erecta</i>	5	3
<i>Betula pubescens</i> (g)	5	
<i>Centaurea nigra</i>	2	
<i>Athyrium filix-foemina</i>	2	1
<i>Salix cinerea</i>	1	
<i>Ajuga reptans</i>	3	
<i>Lotus uliginosus</i>	2	2
<i>Luzula campestris</i>	1	
<i>Dryopteris filix-mas</i>	1	
<i>Cirsium palustre</i>	1	1
<i>Ulex europaeus</i>	1	

<i>Plantago lanceolata</i>	1	
<i>Lobelia urens</i>	2	1
<i>Mentha aquatica</i>		3
<i>Plagiomnium affine</i>		1
<i>Pulicaria dysenterica</i>		1
<i>Epilobium palustre</i>		2
<i>Galium palustre</i>		2
<i>Calliargon cuspidatum</i>		1
<i>Angelica sylvestris</i>		1
<i>Hypericum undulatum</i>		1

Only 36 plants could be found during a brief visit in 2013. Twenty-nine of these were in a small temporary enclosure of electric fencing wire, with additional plants protected by open *Rubus fruticosus*. A further two outlying plants were recorded by the site manager (Map 10).

Management of the site clearly presents many problems, and these are discussed in O’Hea and Dinsdale (2013)(Appendix 1). There have been difficulties in obtaining cattle especially during the winter when poaching of the ground is required, and there have been periods when grazing pressure has not been sufficient to control scrub establishment, leading to an ongoing need for scrub control and removal. At the time of survey the site was being grazed by 10 ponies.

Essential requirements here are to ensure the presence of open soil in the spring by livestock poaching during the winter, to protect flowering plants from grazing during the summer by removal of grazing stock, and to ensure removal of vegetation by grazing in the autumn. O’Hea and Dinsdale (2013) have presented options for achieving these aims.

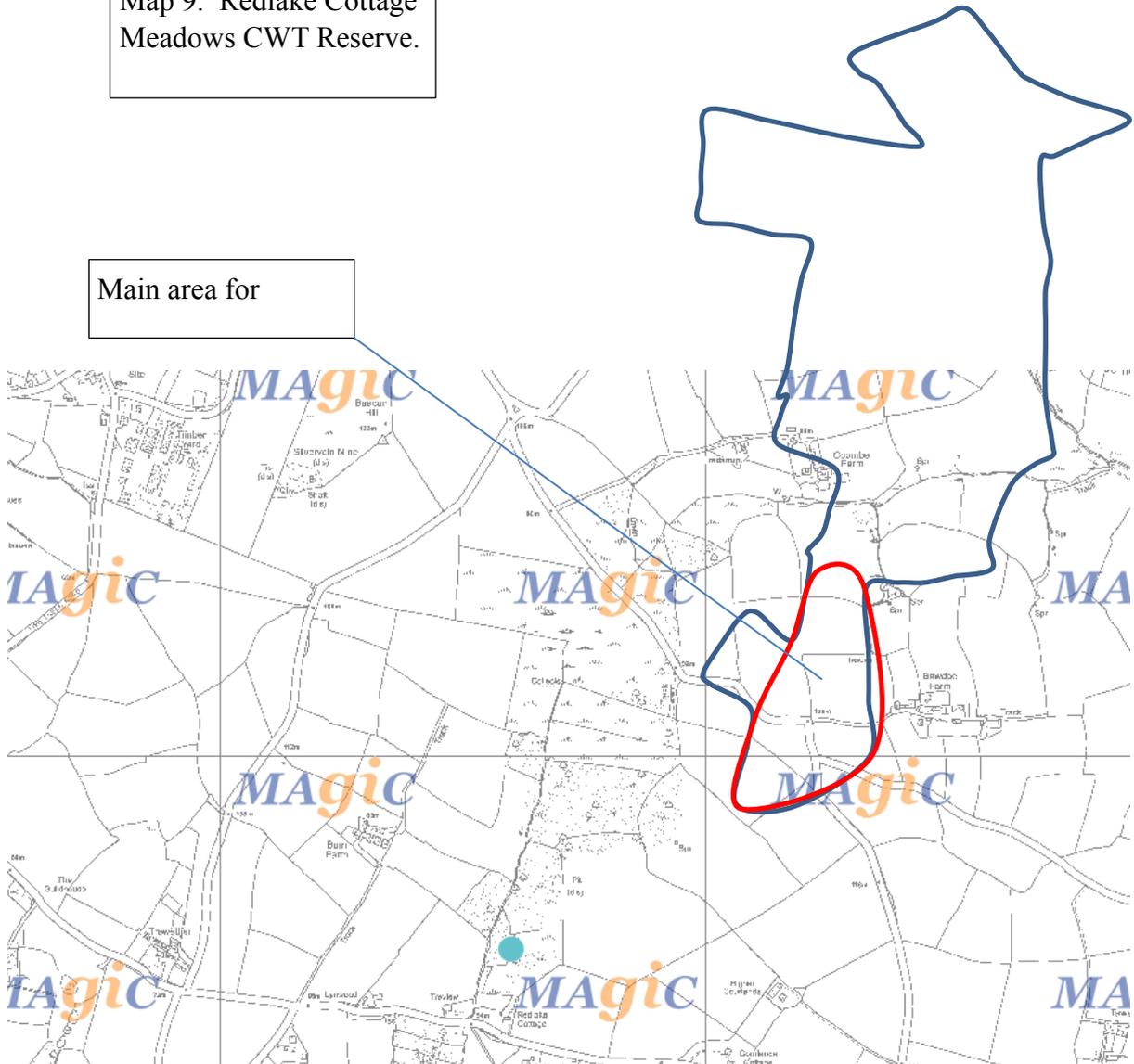
Table 12. Numbers of plants of *Lobelia urens* at Redlake Cottage meadows.

Year	Number
1964	20-30
1965	12
1966	>100
1968	250
1972	60-70

1978	200-300
1979	138
1982	9
1983	137
1984	1221
1985	745
1986	265
1987	507
1988	572
1989	612
1990	544
1991	221
1992	207
1993	197
1994	142
1998	78
2000	80
2001	113
2002	72
2005	147
2009	118
2011	<100
2012	38

Map 9. Redlake Cottage Meadows CWT Reserve.

Main area for



Map 10.

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Grid Reference	Label	No. Individual Plants	No. Spikes Per Plant
sx1262658705	191	2	1,7
sx1261758705	192	1	1
sx1261358705	193	1	2
sx1262058706	194	1	1
sx1263958692	195	7	6,6,1,1,2,2,2
sx1264158698	196	1	3
sx1264258701	197	14	1,3,2,1,1,1,3,1,1,1,1,2,3,3
sx1264358703	198	9	1,1,1,1,1,1,3,1,2
sx1266658783	199	1	4
sx1261258589	200	1	1

**Redlake Cottage Meadows**  
**Southern Meadows**  
**Heath Lobelia Survey 6th August 2013**  
**Surveyors: Seán O'Hea and Jan Dinsdale**



**Cornwall Wildlife Trust**  
**Five Acres, Alet, Truro**  
 Produced by Seán O'Hea

# Appendix 1

## Notes from Site visit to Redlake Cottage Meadows 6<sup>th</sup> August 2013

Seán O’Hea and Jan Dinsdale

### Background...

We visited the site to carry out a count of heath lobelia (*Lobelia urens*) plants, and to consider the management of the site with this species in mind utilising Jans’ knowledge of the plant and site developed during her PhD study in the 1990’s.

We discussed the past management recommendations for the site and compared them to the recent management. We surveyed the site and did a count of individual plants and the number of shoots from each, searching for young plants and seedlings as we did so. For the count we recorded both the number of individual plants and the number of flowering spikes of each. The previous method of just counting total number of flowering spikes confounds the population size and the size of individual plants.

### Observations...

We concluded that the ‘recruitment’ of new plants was low and therefore the population of heath lobelia comprised mostly of a number of older established plants but with several newer plants also being found. The location of all the new plants we saw on molehills or weed killed areas indicates that each plant requires a significant area of bare ground in which to grow and establish to adulthood - which confers with Jan’s PhD findings.. As the older plants age and eventually die off inevitably there will be significant decreases in number of seeds produced and any further regeneration would be from the seedbank – a finite, though potentially abundant resource. Therefore, given the long term decline of the plant on site and the relatively few plants present we concluded that some ‘emergency’ measure might be appropriate to reinvigorate the population by encouraging new plants from the seed bank.

Previous management recommendations had focussed around winter grazing with cattle to create the necessary ground disturbance and bare ground for germination. Whilst this principle still has merit, it does not take into account the necessity of summer grazing to reduce plant competition and remove plant litter. Also availability of suitable livestock, at all, and particularly for winter grazing is a significant issue. Given the need for some action to reinvigorate the population, and the lack of suitable livestock we agreed that some form of mechanical ground disturbance would be appropriate this coming winter.

### Wildlife Gardening...

We had a long discussion about the principle of ‘wildlife gardening’ in the wider countryside and more specifically on nature reserves to which we are both opposed in principle. However, since the site is a nature reserve where the conservation of this species in particular is a priority, and given that the site is not going to be farmed in a way which causes significant ground disturbance as a by-product of agricultural production we felt that some form of artificial disturbance would be justified. Also, during this discussion we concluded that many of the accepted practices we carry out in the management of nature reserves could well be considered gardening, which was an interesting point.

### Mechanical Ground Disturbance...

Any ground disturbance should take place directly adjacent to past and current locations of the plant where seed should be present. Work should be carried out during the months of mid-winter (Dec – February) to minimise the chance of the bare ground being covered by other plants. Jans research showed that winter and early spring recruitment had the highest chance of making it to adulthood, whereas seedlings recruited from late spring and into summer had zero chance of survival. Late seasonal recruitment is no more than a drain on the seed bank resource. It should take place over small areas, patches no bigger than 4m x 4m and a range of the following techniques could be trialled – they are ranked in order of preference, number one being the most preferable  
NB: In every case the potential for encouraging growth of birch or other undesirable plants by providing bare ground is a real possibility, and should be monitored.

- **ONE - Rotovation - Using a motorised rotovator, or some form of agricultural implement on the tractor to turn the soil over and mix the upper layers.**

**Pros:** This would disturb the seed bank and create bare ground whilst leaving the soil in-situ.

**Cons:** Hire and transport of equipment.

- **TWO - Digging areas of ground by hand - Either turning ground over in patches by garden fork or cutting patches of turf and inverting them in the same hole or disposing of them.**

**Pros:** Cheap, already have equipment. Turf cutting and inverting keeps the seed bank present. Turning patches by fork could replicate molehills, seen to be effective.

**Cons:** Labour intensive – requires time and a workforce. Inverted turf method may lead to drying out of the turf, hindering germination and development. Removal of turf could remove many seeds though considered preferable to inverting them.

- **THREE - Spraying off patches of vegetation with herbicide – perhaps in partnership with option two:**

**Pros:** Seen to be effective where incidental patches sprayed off around stump treatment – despite lack of soil disturbance. Quick and easy to do.

**Cons:** Use of herbicides not always desirable. Killing off other plant species locally. No disturbance of soil involved. Cost of herbicide.

- **FOUR - Hand clearance of scrub, with burning on site:**

**Pros:** People dragging scrub from the cutting site to the (carefully situated) bonfire site on a wet winters day would disturb the ground. The scrub needs to be managed anyway. Stump treatment of scrub may lead to patches of surrounding vegetation being sprayed off (see above).

**Cons:** Allowing the scrub to reach suitable maturity for the stumps to be easily treated means letting it grow for a number of years, leading to nutrient deposition. This is not the most time and cost effective way of managing scrub.

- **FIVE - Removal of scrub stumps by winching:**

**Pros:** Scrub management is an on-going and very necessary management activity. We already have the equipment. Two birds with one stone. Creation of scattered pockets of bare ground.

**Cons:** Labour intensive. The stumps may already be dead, as they are effectively killed by application of herbicide either by weedwiper, or application to cut stump – therefore no real necessity to winch out as more effectively managed by herbicide. Disposal of stumps.

- **SIX - Harrowing - with a chain harrow, or the tines of a digger bucket for example:**

**Pros:** Creation of discrete niches, no soil to dispose of.

**Cons:** Difficult to do over a small area (with a chain harrow). Would it create enough disturbance and bare ground? Impact on other plants. Hire of digger and borrowing/hire of chain harrow.

- **SEVEN - Creation of shallow scrapes with a digger:**

**Pros:** Would create clear bare ground, and the movement of a tracked digger on site would create further disturbance. The spoil could be used to infill drainage ditches (see below). Potential benefit for invertebrates.

**Cons:** The soil would have to be disposed of, and any moisture retaining, micro-climate creating vegetation would be lost – mosses for example. The seed bank containing the heath lobelia seed could be removed. Cost of hiring a digger.

### **Scrub Management...**

Management of the scrub – mostly birch but some encroachment by alder noted – is considered of high importance. One area where heath lobelia had been found was seen to have been invaded by scrub to the direct detriment of the plant. We intend to weedwipe the scrub during the growing seasons as it is considered the most effective management method for young scrub.

### **Grazing Management...**

Grazing management at the right times is considered to be of key importance. Winter grazing with, ideally, cattle is considered to be the most ‘natural’ way of creating bare ground, whilst managing scrub and other vegetation – so should be carried out if and when stock are available, though not necessarily every year. If this can be achieved periodic over grazing should be carried out to lead to maximum disturbance in the minimum time – so the stock aren’t left there too long with poor keep. Some summer grazing is required to manage molinia particularly but has to be balanced with the threat to new seedlings. Previous recommendations of withdrawing grazing during spring (March to June) to enable seedlings to establish appears to be relevant. This combination of different needs of the plant including:

- Provision of bare ground and disturbance in winter to promote germination and recruitment of seedlings,
- Management of competing vegetation inc. scrub to enable seedlings to develop to maturity,
- Withdrawal of grazing pressure in spring to enable seedlings to develop to maturity,
- Withdrawal of grazing pressure in summer to enable mature plants to go to seed.

... seeks to exploit the seed bank to encourage growth of new plants, and to allow existing plants to go to seed. This appears to show some conflicting needs, leading us to the conclusion that the same management prescriptions each year are not appropriate for the species. Some years a hard winter graze and/or mechanical disturbance could be used to promote new plants, following which withdrawal of grazing for all of the following spring and summer may be necessary to allow the new plants to mature and set seed. The summer after the site would need to be grazed to some extent, so some spring grazing could be carried out potentially sacrificing plants which may have germinated that year, but withdrawing the grazing later in the summer to let established plants go to seed without being grazed off. In both instances there is a real concern that molinia and scrub would not be controlled effectively by such a light grazing regime, degrading the habitat and hindering further spread of heath lobelia.

A compromise in this balance could be to use electric fencing in either cycle to either protect young seedlings during grazing following a winter of disturbance, or to protect adult plants during summer grazing. However at some point the livestock should be allowed to graze areas with the plant in to prevent development of rank vegetation and scrub. If these ‘emergency’ measures are successful then hopefully the population of the plant

would become more widespread on the site, and subsequently be able to endure sub-optimal conditions at times. Some form of 4-5 year cycle should be trialled on this basis, however the priority at the current stage is to carry out disturbance as discussed above to promote recruitment with the effectiveness of the techniques used closely monitored.

**The Bigger Picture...**

The general habitats and other species present should not be exceptionally affected by this tweak in management prescriptions and broadly their needs are the same – some form of grazing management and scrub control.

**Monitoring...**

Having carried out the first detailed count of the plants present in some years, continuation of this monitoring is now understood to be critical to monitor the results of the management, and will be continued annually and recorded in the same way (on GIS).

**Drainage...**

Filling in of the drainage ditches along the sides of some of the meadows would have benefits to the species, and wider benefits to the habitats – control of birch potentially. This should be considered, though sourcing the in-fill could be problematic. This would not be considered a key priority.

**Lessons learned...**

Considering the decline of heath lobelia on this site over the years, it seems fairly clear that a poor understanding of the detailed ecology of the species by the site manager has been partly to blame, though being a tricky species to develop a management strategy for in tandem with the requirements of M24/25 grasslands has played a significant part. Livestock would certainly have been present on the site during the key spring months on many occasions leading to poor recruitment of new plants. Availability of appropriate livestock at the right times continues to be a real problem. Cattle grazed the site for one winter in the past 8 years, so the necessary disturbance hasn't come from livestock and a reluctance to undertake mechanical disturbance for the sake of not 'wildlife gardening' has meant that seeds haven't had much of a chance to germinate. The combination of these factors is likely to have led to a decline.

The focus has been on managing the scrub, either mechanically, with herbicides or by grazing. This has led to overgrazing in the past, until the realisation came that grazing alone was not going to manage this problem long term. Whilst many hours have been spent managing the scrub, with the weedwiping particularly being very effective in the short term, the constant resurgence of birch particularly continues to be a major issue on the site threatening the heath lobelia along with most of the other interest features so is a key consideration.

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## Appendix 2. Extract from the forthcoming Flora of Devon.

### *Lobelia urens* L.

#### Heath Lobelia

Very rare. Native. Nationally rare. Populations vary erratically. On moderately acidic, moist to relatively dry soils in pastures, heath, scrub and open woods dominated by *Molinia caerulea* with a history of disturbance (Dinsdale *et al.* 1997). It was first recorded as a British plant at Shute Common between 1762 and 1778 by William Newbury, a herbalist from Stockland (Edwards 1862, Briggs 1883). In 1862 it ranged over a distance of one mile by about 100 yards where it often appeared in great abundance on newly turned ground (Edwards 1862). The birch woodland on the common, where it had thrived, was felled and replanted with conifers between 1960 and 1962 when two of the populations gradually declined and were, eventually, lost. It survives in one place at Lobelia Cottage.

It was once widespread over a large expanse damp heathy grassland at Stanton Moor where it was first recorded by Capt. Harris Wise in 1889 (Flora, **BM**). Most of the area was improved for agriculture from the 1950s onwards. Part of this area, now known as Andrew's Wood, was declared a site of Special Scientific Interest in 1952, became a nature reserve owned and managed by the Devon Trust for Nature Conservation in 1986, is now its national stronghold.

The importance of disturbance, first recorded by Edwards (1862) at Shute Common, and the presence of a persistent soil seed bank was demonstrated at Yarner Wood (Archibald 1971) and at Andrew's Wood and other sites in southern England (Dinsdale *et al.* 1997). In 1995, a population of thousands of plants found in a 'set-aside' field adjacent to the southeast side of Andrew's Wood (Smith 2002), are believed to have come from the soil seed bank. These fields were ploughed and reseeded sometime during the 1960s, grazed by cattle until the early 1990s then ploughed and cropped at least once by 1995. The field has been ploughed and cropped again more than once. In 2000 an estimated 2000 plants appeared on the fallow margin of a flax crop (*G. Waterhouse*). The field was fallow again in 2012 and large numbers of plants were flowering in damp depressions in the centre of the field where it was first seen in 1995 (R.E.N.Smith & C.J.Smith).

The population at Yarner Wood found by W. K. Martin in 1901 survived until 1913. It appeared there again in 1958 when the area was felled but was last seen in 1969. The only evidence of a population at Maristow are the herbarium specimens collected by W.S.Hore in 1839 (SLBI, PTH). However, Hore (1844) notes that *Lobelia urens* is only known from the neighbourhood of Axminster. At Branscombe, a population seen by Dr. Stansfield, which may have been introduced, has not been seen again. Recent records, from Little Bradley and Chudleigh Knighton Heath are likely to be due to contact of people or ponies between these sites and Andrew's Wood.

Flora p.439, Atlas p.170 (5), 1987 onwards (4).

### VC3

**SX46** Naturalising where introduced, Rumleigh, SX442679, 2005, D.Fenwick.

- SX75** Stanton Moor, Loddiswell, 1889, *Capt. Harris Wise* (Flora, **TOR, BM**); Andrew's Wood, SX7051, SX7151, between 1979 and 2000 an average of nearly 4000 flowering plants has been counted with a low of about 800 in 1987 to 12700 in 2000, *G. Waterhouse et al.* An additional 2000 plants was estimated to be present in 2000 on the field boundary area to the southeast of the reserve where plants were first recorded in 1995. 27000 plants were counted across the whole area in 2002 (Pocock & Kunin 2002).
- SX77** Abundantly, 'in three spots a few hundred yards apart' at Yarnar Wood, Tetrad SX7678, 1901 -1913, *W.K Martin* (Martin 1901, **RAMM, TOR, BM**); 38 plants re-appeared in 1958 following woodland clearance but there were only one or two by 1969 (Archibald 1971) and it has not been seen since (A.Knott pers. Comm. 2012).
- SX87** Little Bradley SX8377, 1981, *B.Merritt*, perhaps carried there on the boots of conservationists from Andrew's Wood (Dinsdale *et al.* 1997). Chudleigh Knighton Heath SX8377, 2003, *M.Edmonds*, where it may have been introduced on the hooves of ponies which had been grazing at Andrew's Wood.
- SY10** Honiton, 1874, *T.B.Blow* (**HLU**), perhaps the site at Shute.
- SY18** Branscombe, 1930s, *T. Stansfield* conf. *A.Perry*, in a meadow where it may have been introduced (Flora). A partial search of the area was made in 1936 but the plant was not relocated (Cranfield & Stansfield 1937).
- SY29** Shute Hill, Kilminster, 1768, *W.Newberry* (Flora). It survived into the 1950s and 1960s at least four stations (Allen 2004, **TOR, RAMM**). Old Football Field, ST262986, once common here the population had declined to 41 plants by 1963, *W.H.Tucker*, and just one plant was found in 1990, *W.H.Tucker & L.J.Margetts*. The Roman Road, ST257987, at least 50 plants in 1963, seen again in 1964 and 1966 but gone by 1972, *W.H.Tucker*. Studhayes, SY257992, about 30 plants, 1964, still there 1966 and 1969, *W.H.Tucker*; none in 1997 though habitat appeared unchanged (Dinsdale *et al.* 1997), ploughed up subsequently. Dry grassland at Lobelia Cottage SY252989, 30-40 flowering plants, 1964, *J.F.Archibald*; 18, 1967, *W.H.Tucker*; at least 114, 2002 (Pocock & Kunin 2002). The record from Shute Woods, Kilminster Hill SY2697, 1954, *M.Bolitho* (BSBI Atlas) probably refers to one of the sites already listed.