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## **TROOPERS HILL LOCAL NATURE RESERVE**

### **PHOTOGRAPHIC MONITORING 2011**



**FOR**

**BRISTOL CITY COUNCIL**

# TROOPERS HILL LOCAL NATURE RESERVE

## VEGETATION MONITORING 2011

### **INTRODUCTION**

This is a report of the photographic and vegetation monitoring carried out at Troopers Hill during 2011, a repeat of similar exercises carried out in 1994, 1996, 1998, 2000, 2002, 2004 and 2008.

The purpose of the monitoring is to identify any changes in the vegetation of Troopers Hill; to monitor the success of management; and to identify any further priorities for management required to conserve and enhance the site's ecological interest.

There are two habitat types of major interest at the site - acidic grassland, (including partially bare areas that are of exceptional interest for invertebrates); and heathland. Both vegetation types, which are Biodiversity Action Plan (BAP) priority habitats, are the best examples of their kind in Bristol and the surrounding area.

The monitoring has placed particular emphasis on the heathland vegetation; through the 1980s and early 1990s it appeared that the heathland was threatened and might require targeted management. Over the course of the monitoring programme the extent of heathland on the site has grown significantly but it still occupies a much lower area of the site than the grassland, and grassland plant species and patches of bare soil of importance for invertebrates remain scattered amongst the heathland, which has a very open structure. There is no indication that the spread of heathland is anything other than a positive trend.

There are other habitat types of some interest on and around the LNR. These include scrub, particularly broom scrub, and woodland, particularly birch woodland. Management of the site recognises the importance of these habitats, but the acidic grassland and heathland are the most valuable features on the site and are threatened in places by scrub and tree encroachment. The primary ecological aim of management has been conserving and enhancing the grassland and heathland, with their associated species.

### **METHODS**

The methodology used in 2011 followed that employed during previous visits. Photographs were taken from the locations mapped and described in the previous reports. The survey was carried out on 25th August 2011, a similar date to the earlier surveys.

The aim of the survey has been to record:

- 1) the extent of scrub encroachment onto areas of both grassland and heath;
- 2) the size and health of the populations of the two heather species present - ling (*Calluna vulgaris*) and bell heather (*Erica cinerea*); and
- 3) the general appearance of the hill.

Patches of scrub and heath were mapped and identified with a letter and briefly described. In early years patches of heath were measured, recording width and length of the patch at its widest and longest. By 2008, however, measurement of patches had become impractical because many have grown and merged and many patches are now surrounded with seedlings and defining the edges of a patch has become impossible.

Photographs were taken from fixed points used in previous years, showing as many of the features of interest as possible, including areas where scrub encroachment appeared to be a potential problem. Where possible photographs were framed so as to include a fixed reference point such as a building.

## **RESULTS**

### Area Descriptions

The hill was affected by a widespread fire in 1995, which killed areas of both heather and scrub. Since then there have been several smaller burns, one of which affected an area of broom in area G between 2000 and 2002. There is little evidence of any extensive fire having affected vegetation since 2002.

In general it was noted that both heather species continue to exhibit high vigour and to spread. Golden-rod (*Solidago virgaurea*) has become noticeably more frequent within heathland areas. Meadow oat-grass (*Helictotrichon pratense*), which was noted for the first time in 2008, is still present. Heath grass (*Danthonia decumbens*), a speciality of the hill, is more frequent than previously especially on the east-facing slopes of the hill.

A: This is an area of mixed bramble and hawthorn scrub, with patches of bracken. Following the 1995 fire the area was very open but subsequently re-growth, especially of bramble, has been strong. The scrub vegetation has thickened since 2000 and has also spread slightly, and this trend seems to have accelerated slightly since 2008. Photograph 1 shows very limited spread of bracken and bramble since 2004, whilst heather has increased significantly. Comparison of photos 1 from 1994 and 2011 show that patches of open grassland within the scrub have disappeared; that bracken has spread across the

grassland on the lower slopes; and that the hummocks in the background, which were previously visible, are now hidden by scrub.

B: By contrast, photograph 2 from 1994 shows an extensive spread of bramble forming this area. This has now been cleared and has been replaced by a mix of tall grassland and tall herb vegetation.

C: The hedge that forms the edge of the site has changed little over the period of monitoring.

North of D: Control of the Japanese knotweed here has been almost entirely successful, and the tall herb vegetation that has developed includes some species of interest, such as tansy (*Tanacetum vulgare*) and the area is now of value for invertebrates.

D: The large patch of ling seen in photograph 6 in 1994 had completely disappeared in 1996, presumably as a result of the fires of 1995. It had regenerated by 1998, although it was much smaller than it was in 1994. In 2000 it had recovered to its size in 1994 and it has remained at a similar size in 2002 (3.25m x 2.3m x 0.8m tall). In 2004 the main patch had grown slightly (to 3.4m x 2.5m x 0.9m tall). It has further grown slightly (to 4.1m x 2.9m x 0.9m tall) and there are smaller plants growing around what was previously an isolated patch. Photograph 6 now shows a large area of heather here, with many outlying seedlings and small patches.

E: Previously this was a patch of ling plants in an otherwise grassy sward but strong growth of ling has been noted since 1996. This growth remains strong and small seedlings continue to appear around the edges of the patch. It is now too large and diffuse to measure with any accuracy. The strength of this growth of heath species is clearly visible in photographs 7 and 8. Comparison of photograph 8 showed that large patches of bare ground were partially colonised by moss species, ling, common catsear (*Hypochaeris radicata*) and other plants between 1998 and 2004. This trend has continued, and there has also been some growth of broom and silver birch (*Betula pendula*).

F: This area has changed drastically since 1994. The broom scrub was almost eradicated by the the 1995 fire and had not attained its previous size by 2000 but photographs 9, 10 and 11 show that the patch of broom scrub had regained its size by 2002. It has continued to grow and spread slightly between 2002 and 2008. It has since spread slightly, and has become much more dense. Compared to 1994, the grass sward is now much more dense and bell heather, ling and golden-rod (*Solidago virgaurea*) have colonised the area. In more open areas there is strong growth of mouse-ear hawkweed (*Pilosella officinarum*), sheep's sorrel (*Rumex acetosella*) and hawkweed (*Hieracium sp*), and also species that are more widespread generally but are scarce at Troopers Hill, such as ox-eye daisy (*Leucanthemum vulgare*) and bird's-foot trefoil (*Lotus corniculatus*).

Nearby, bell heather is continuing to spread in small patches up the hill towards the chimney, where heath plants were entirely absent before 2002, and has been joined by ling.

G: In 1994 this was a patch of ling, with several seedlings. Bell heather has since colonised the area but since 1998 broom has regenerated strongly and although plants of both ling and bell heather remain under the broom they are much reduced in both size and vigour. There was little change in this area between 2000 and 2004; broom has spread further between 2004 and 2008, but has since stabilised.

H: Both species of heather have spread vigorously across this area since 1994, and the spread has continued between 2008 and 2011.

I: This area is shown on photograph 12. In 1994 this photograph shows a rather uniform expanse of open grass, with the then small plants of bell heather not visible. Since then both species of heather have progressively spread up the slope and tall herbs such as goldenrod have become more frequent.

J: This is another area where comparison with earlier photographs (numbers 13-15) shows enormous changes over the years. A previously rather open grassy slope now has large quantities of heath, and good amounts of several other plants. The lower edge of the slope and the small gullies running up the slope have seen substantial growth of trees, which now restrict several views that were previously open. Bramble and other scrub is encroaching on the northern edge of the area, and is restricting the quantity of open habitat here. This is a key area for insects, and several common lizards were also seen here.

K-N: Increasing tree growth in the gullies through this area can be seen on photographs 16-18. The heathland on the surrounding slopes is healthy, but shading from trees is likely to be an increasing problem.

O: At the start of the monitoring scheme this area consisted of a band of hawthorn scrub at the bottom of the hill and an area of tall grassland with patches of bramble and a considerable amount of broom on the slope above the hawthorn. The scrub is now much more dense, with most of the patches of tall grassland having disappeared, and has spread up the slope, as shown on photograph 19. Broom decreased between 1994 and 2002, but had spread slightly by 2004 and has spread significantly since then.

P: The trend of increased heath cover in this area, noted in previous years, has continued and this slope is now a very attractive and ecologically rich feature. The meadow oat-grass (*Helictotrichon pratense*), noted here in 2004, is still present. Patches of bare ground, a key invertebrate habitat, remain within the heath as well as in the more obviously open areas.

R: In 1994 this area had a cover of bell heather of approximately 75%, with some hawthorn, bracken, bramble and broom in the north-eastern part of the area. In the fire of 1995 the area of bracken and bramble was significantly reduced and the broom was destroyed. The cover of bell heather was significantly reduced. Since 1996 bell heather has spread and ling has colonised the area. The broom has regrown well. These trends continued between 2004 and 2011. Photograph 20 shows some spread of broom and, in particular, of the gorse on the middle skyline of the picture.

S: In 1994 this area of heathland had a cover of bell heather varying from 30% at the south-eastern end to 90% at the north-western end. The area was burnt in the 1995 fire and, although patches of bell heather remained, its cover was much reduced. Since then the cover of bell heather has increased throughout the area and now varies from 70% to 95%. Photograph 21 shows this area to be in a good condition, with large amounts of heath and little scrub encroachment.

T: In 1994 there was one small plant of ling in this area, which is at the western end of the gully. There has since been a significant increase in heath vegetation. Clumps of both bell heather and ling increased between 1998 and 2004 and remained high to 2011; there is now a complete sward of the two species, visible in the middle right of photograph 22. Scrub control since 2004 has opened up the quarry faces, but lower faces are now becoming covered once again.

U: In 1994 there were three clumps of ling on the northern side of the gully here. Photograph 23 shows that the spread of heather across this area has continued and there is now a continuous sward in places. The spread of bell heather and ling across the slope between areas U and V, which were previously open grassland, has also continued.

V: This is a small bowl in the south-facing slope of the gully, shown on photographs 24 and 25. In 1994 there were substantial patches of ling with one clump of bell heather. Both ling and bell heather have increased progressively since and this trend continued between 2008 and 2011. The bramble at the bottom of the slope, visible in the bottom left of photograph 24, spread in previous years but was cut back before 2004 and there has been little regrowth. Removal of the trees previously visible in photograph 25 has had substantial benefits in opening up heath and grassland habitat, although several oak seedlings were noted here in 2011.

W: This area is on the north-facing slope of the gully, opposite area V. In 1994 there were 3 moderate-sized patches and 1 very small patch of ling. The cover of ling increased significantly between 1994 and 1996 but then decreased between 1996 and 1998. Since 1998 it has increased again and this increase continued between 2008 and 2011 and excellent amounts of ling, and smaller quantities of bell heather, are now present.

X: There is scattered ling in a grassy sward on the slope of the gully here, and previously one patch of bell heather at the top of the gully slope. There has been little change in the cover of ling here, but the bell heather has spread since 2008.

Y: In 1994 ling made up approximately 75% of the cover in this area. This proportion remained roughly the same in 1996 but it has since increased to 100%. Photograph 26 now shows a slope dominated by ling, as opposed to a grassy slope with scattered ling in 1996. It was noted in 2004 that bramble, visible in the bottom left corner of photograph 26 and spread of bracken, visible to the left of photograph 27, had spread. Both species have been cut back since then and there has been some spread of heather into the cleared area.

Z: At the beginning of the monitoring scheme there were scattered clumps of ling on the south and south-east facing slopes of the gully here. At the bottom of the slope the coverage of ling has gradually increased to 100% and at the top of the slope, where heath species were previously absent, both bell heather and ling are now scattered in a grassy sward dominated by wavy hair-grass (*Deschampsia flexuosa*) and have become more vigorous since 2008. As in 2008 photograph 28 shows that ling has spread slightly at the top of the slope and is now much taller.

AA: This is a small gully that has supported dense ling throughout the life of the monitoring scheme. The vigour of the plants has increased progressively and there are several seedling plants around the edge of the main patch. The spread is most obvious at the top of the slope, and can be seen in photographs 29 and 30. The latter photograph in particular shows an excellent mixture of habitats types. Adjacent tree and scrub growth remains a potential threat and there is slight encroachment of bramble at the bottom of the slope.

BB: In 1994 ling was scattered across this slope and formed a dense patch only around the patch of bramble. The area was affected by the fire of 1995 and since then the ling has spread quickly, and is now much more vigorous than it was in 1994, forming c80% of the vegetation cover. Bell heather colonised the area after 1996 and golden-rod is also more frequent. The bramble has also spread and several plants of broom are now present. Scrub encroachment is a continued threat to the area.

CC: This area, part of which is shown on photograph 31, had patches of ling around beds of bramble. In recent years ling has become much more frequent but the spread of bramble at the bottom of the slope has continued.

DD: There has consistently been a patch of ling and bell heather, in approximately equal quantities, here. The heath species continue to do well in this area. Small scale bramble encroachment was noted in 2002 and was more

serious in both 2004 and 2008. Clearance since then has reduced the threat that the bramble posed to this patch of heath. See photograph 33.

EE: This area is located directly above number 89 Troopers Hill Road. In 1994 it supported two clumps of ling and one clump of bell heather on the main slope and a clump of bell heather at the bottom of the slope. No heath species were found here in 1996 or 1998 following the fire in 1995, although the broom did re-grow. In 2000 three plants of bell heather and one plant of ling were found. In 2002 many young plants of both species were present. In 2004 and 2008 there were large patches of bell heather and smaller plants of ling, although the slope was predominantly grassy, but in the latter year the broom had grown and spread. This spread of broom has continued since 2008 and is now a threat to the area.

## **MANAGEMENT**

The photographs show that the key features of the hill are doing well and that since 1994 there has been an increase in the biodiversity value of the LNR. In particular bell heather, ling and tall herbs such as goldenrod have become much more frequent. It is likely that much of this improvement is due to a reduction in both the frequency and the severity of fires on the site.

This change has also allowed broom and other shrub and tree species to spread in places. Broom scrub is a feature of interest in its own right and in the past, following fires, it has become scarce on the hill. Since 2000, however, it has spread very vigorously. This spread is threatening areas of heath and sparse grassland, which are of interest for other species including rare invertebrates. Management to limit this spread is required, although the aim of this should be to contain broom in the areas where it is well established, rather than to eradicate the species.

Various management measures were recommended in previous reports and most of these have been implemented. In particular, holm oak has been largely eradicated from the site, Japanese knotweed has been controlled and there has been control of scrub and tree encroachment, particularly along the gully (areas T to Z) and nearby. These have been successful in protecting and enhancing the reserve's biodiversity interest.

The photographic survey shows that tree and scrub encroachment remains a problem in places, and poses a risk to open habitats and key features such as common lizard, open grassland and heath and populations of rare invertebrates.

It is suggested that management should focus on three areas:

**The north-eastern corner of the site, around the broom scrub at areas D to G.** At the western edge of the hill here there has been some clearance of scrub

and this has been successful, encouraging the spread of species including ling, golden-rod, hawkweed, goldenrod and mouse-ear hawkweed. Tree regeneration is threatening this area and treatment of regrowth would be beneficial. The main block of broom scrub has spread and become much more dense, threatening areas of known value for invertebrates and for grassland plants. Removal of broom and bramble from the more open parts of this area would be beneficial.

**The eastern slopes of the hill, above the children's nursery at areas I to N.** There are two areas of particular concern here. Along the north-western part of the slope (the edge of area I) scrub is gradually creeping into the heathy slope and should be cleared back. Secondly, around the gullies to the south of here trees are growing and spreading and beginning to shade out adjacent areas of heath. Removal of the majority of these trees, including holm oaks at the bottom of the slope, would be beneficial.

**The south-eastern edge of the hill, above Troopers Hill Road.** There are several areas here where scrub has spread and is threatening habitats of value. The following in particular would be beneficial: removal of bramble and broom from the slope shown in photograph 19; removal of at least some of the gorse from area S, as seen in photograph 21; control of bramble at the bottom of the slope shown in photographs 29 and 30 (area AA); clearance around areas BB and CC; and clearance of broom from area EE, shown in photograph 34.

There are two minor tasks that would benefit the gully and surrounding areas. On the northern slope of the gully oak seedling are appearing, particularly around the areas from which oak trees have been removed. Removal or treatment of these would be beneficial. At the eastern end of the gully the oak tree that is visible on photograph 33 has grown significantly. Removal of such a prominent tree is not justified, but it would be beneficial to raise the crown of the tree by removing lower limbs, which would reduce the degree of shading of adjacent heathland.

## INVERTEBRATES

Casual records of insects have been made as follows:

	1994	1996	1998	2000	2002	2004	2008	2011
<b>Butterflies</b>								
Grayling	P	6						
Small heath	P				30+	50+		30+
Meadow brown				10+	15+	10+		5+
Gatekeeper				5+		4		10+
Common blue				4	10+	20+		30+
Holly blue								2
Small copper	P			4	1	3		6
Brown argus				3		1		
Clouded yellow		P						
Speckled wood				1	4	4		10+
Red admiral							P	
Peacock							P	
Comma							P	
Painted lady		P						
Silver-washed fritillary						1		
Large white					1	6		10+
Small white						6		4
<b>Moths</b>								
Silver Y		P		10+				5+
Square-spot rustic					1			
Knotgrass					1			
Vapourer				2		1	1	
Rush veneer		P		100+	1			
Agriphila tristella		P		10+	10+	3	10+	20+
Agriphila straminella		P		10+	10+			
Agriphila inquitella		P						
Adaina microdactyla								5+
Celypha lacunana								3
<b>Orthoptera</b>								
Mottled grasshopper			P	P	P	P		P
Field grasshopper	P		P	P	P	P	P	P
Meadow grasshopper	P		P	P	P	P	P	P
Common green grasshopper					P	P		P
Dark bush-cricket	P		P	P	P	P	P	P
Long-winged conehead					2+	10+	10+	50+
<b>Bugs</b>								
Alydus calcaratus								10+

In addition common lizard was seen in area I, on the western slope of the hill, and along the gully.

It is significant that small heath butterfly, which is now a BAP priority species due to population declines, remains on the hill in high numbers. Heath bug, *Alydus*

*calcaratus*, is an uncommon species, which has previously been recorded on the site by Dave Gibbs and Ray Barnett. During this survey it was seen in good numbers in area I.



