

# TROOPERS HILL LOCAL NATURE RESERVE

## VEGETATION MONITORING 2008

### **INTRODUCTION**

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

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 both Bristol and the surrounding area. Particular attention in the monitoring has been paid to the heathland vegetation since through the 1980s and early 1990s it appeared that this 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 remain scattered amongst the heathland, which has a very open structure. 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 the focus of management has been conserving and enhancing these habitats.

### **METHODS**

The methodology used in 2008 followed that employed during previous visits. Photographs were taken from the locations mapped and described in the previous reports. Previous surveys have been carried out in August, but due to the exceptionally wet weather during the summer of 2008 the survey was delayed until 16<sup>th</sup> September, largely for health and safety reasons (the survey requires access to steep slopes that become slippery when wet). The wet weather meant that the heather species remained in flower into September 2008, but a combination of the poor summer and later season means that they might not appear as bright in these photographs as in previous years.

The aim of the survey has been to record:

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

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 fires having affected vegetation since 2002, probably as a consequence of wet weather.

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 continued to thicken since 2000 and has also spread slightly, but one block has been removed. Photograph 1 shows very limited spread of bracken and bramble since 2004, whilst heather has increased significantly. There has been a small fire in the area and this has promoted locally strong re-growth of broom.

The area can also be seen, more distantly, in the right-hand part of photograph 19, which shows that whilst the tops of the slope have remained scrub-free small clearings within the scrub have become overgrown.

B: This area, a dense patch of bramble, has been cut back on a rotation. Photograph 2 shows the area. In 2004 the cleared area was dominated by false oat-grass (*Arrhenatherum elatius*); rosebay willowherb (*Chamerion angustifolium*) is now more frequent. At the right of the photograph there is an area of grassland that continues to support black knapweed (*Centaurea nigra*).

C: The hedge here forms the edge of the site. It consists of a dense hedge of hawthorn, elder, goat willow and pedunculate oak, with small amounts of bramble. It has changed little over the last ten years.

North of D: The Japanese knotweed and ornamental dogwood, shown on photographs 3 and 4, increased substantially between 1994 and 1998 were then fairly stable between 1998 and 2000, followed by a slower increase between 2000 and 2004. Control since then has virtually eradicated the Japanese knotweed, although some re-growth was seen, and mixed tall herb vegetation now dominates the area. Frequent species here include willowherbs (*Epilobium spp*), wild carrot (*Daucus carota*), common ragwort (*Senecio jacobaea*), creeping buttercup (*Ranunculus repens*), stinging nettle (*Urtica dioica*), mugwort (*Artemisia vulgaris*) and tansy (*Tanacetum vulgare*). All of these species are widespread, but the habitat is probably 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.

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: The broom scrub here was severely affected by 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. 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*). Saplings of rowan (*Sorbus acuparia*), have appeared.

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, but broom has spread further since then.

H: In 1994 this was a patch of goat willow and silver birch with a small plant of bell heather. There has been a strong growth of bell heather here since 1998 and the patch is now too poorly defined to measure, due to the spread of small plants around the main patch. There has been strong growth of both heath species, and especially bell heather, across the slope to the west.

I: This is an area of tall grassland with scattered plants of bell heather, which have become steadily larger and more frequent since 1994. Comparison with the 1994 photographs shows that goldenrod has spread strongly across the area. Scrub in the background of the picture has also spread.

J: The trends noted in previous years continued here: a previously grassy slope with scattered bell heather and ling now has large quantities of both of these species and frequent goldenrod. Grassland species such as mouse-ear hawkweed remain on patches of sparse soil. Sapling trees around the edges of the area, especially in the bottom of the small gully in the centre right of photograph 13, have grown taller but do not appear to have spread. As in 2004 photograph 14 shows that bramble has not encroached onto the bottom edge of the area.

K: This area has become progressively more overgrown and tree saplings in the small gullies are now becoming large and are surrounded by spreading areas of bramble: in 1994 the area was largely open. Several holm oak saplings have been removed from this and surrounding areas.

L: Ling has spread extensively here, but it is now another area threatened by the spread of bramble and tree saplings.

M: In 1994 this was an area of tall grassland with scattered small plants of ling. Bell heather has colonised the area since 1996 and ling has become much more abundant and vigorous, a trend which has continued. There has been some spread of bramble and tree saplings in recent years.

N: This is a small valley, shown from various angles on photographs 16 and 17. Throughout the period since 1994 it has had good populations of both ling and bell heather, together with patches of bramble, oak and hawthorn. Both the heath species and the scrub have progressively spread, although holm oaks have been removed since 2004.

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 extent of hawthorn here has barely changed through the lifetime of the scheme but bramble spread aggressively across the rest of the area, to the extent that tall grassland is now largely absent. Broom decreased between 1994 and 2002, but had spread slightly by 2004 and has now spread further. It was noted in several places that broom was in extremely good condition on the site, presumably having benefited from recent wet summers.

P: This is a predominantly grassy slope with scattered plants of bell heather. Comparison of photograph 19 from 1994 to 2008 shows that heather has become much more frequent (at about 40% cover across the area in 2004, now in excess of 50%). The small scale spread in scrub previously noted has been halted by management. To the east of the path large quantities of lichen cover (various species of *Cladonia* and *Peltigera*) are present, this has not been noted in previous years and seems to be a newly developed feature. Several clumps of meadow oat-grass (*Helictotrichon pratense*), a species more often associated with calcareous soils, were found in the same area. The bare ground in the area is a key invertebrate habitat and one of the most important biodiversity features on the site. The wet summers have allowed more luxuriant growth of grass in the area, which has reduced the extent of bare ground slightly, but reasonable patches of bare ground remain.

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 2008 and the area can be seen on photograph 20.

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%. The area is shown in photograph 21; although not visible in the photograph, there are good quantities of lichen in the more open vegetation in the lower left of the picture.

T: In 1994 there was one small plant of ling in this area. There has since been a significant increase in heath vegetation. Clumps of both bell heather and ling increased between 1998 and 2004; 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.

U: In 1994 there were three clumps of ling 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 2004 and 2008. The bramble at the bottom of the slope, visible in the bottom left of photograph 24, spread in previous years but has now been cut back. Removal of the trees previously visible in photograph 25 has had substantial benefits in opening up heath and grassland habitat.

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 2004 and 2008.

X: There is scattered ling in a grassy sward on the slope of the gully here, with one patch of bell heather at the top of the gully slope. There has been little change in the vegetation of this area since 1994, but scrub on the edges of the area has been removed.

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 now been cut back.

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*). 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, although good amounts of sparse vegetation, an important invertebrate habitat, remain. Adjacent tree and scrub growth remains a potential threat.

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 c60% 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 threat to the area.

CC: This area, part of which is shown on photograph 31, has patches of ling around beds of bramble and other scrub and a small oak tree. Bramble has spread across the area, previously at the expense of rank false oat-grass dominated grassland, but now threatening the ling. Cotoneaster is also spreading here.

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 but it was noted in 2004 that this had accelerated and this trend has continued. It now poses a serious threat to the survival of this patch of heath. See photograph 33.

EE: This area is located directly above number 89 Troopers Hill Road. In 1994 it supported 2 clumps of ling and 1 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 3 plants of bell heather and 1 plant of ling were found. In 2002 many young plants of both species were present. In 2004 there were large patches of bell heather and smaller plants of ling, although the slope was predominantly grassy. This remains the case in 2008, but the broom noted as being present in small quantities in 2004 has grown and spread. The bramble patch, visible at the bottom left of photograph 34, is restricted to a patch of species-poor grassland and is not yet posing a threat to vegetation of interest although it has the potential to do so.

## **Summary**

The main trend on the reserve has been, as noted in both 2002 and 2004, the continued spread of both bell heather and ling across many parts of the site. This is probably due to less frequent fires on the hill, which is partly the result of wet summer weather in recent years. The character of large parts of the site has changed substantially since 1994, particularly on west facing slopes that were largely grass-covered and now have substantial heath cover. Associated with this trend has been the spread of tall herb species such as goldenrod. There may come a point when it is considered necessary to halt the spread of heath in order to protect grassland but such a time, if it arrives at all, is distant. Heath still occupies a smaller area than grassland and many grassland species survive in a

mixed sward with the heath species. The potential remains for a serious fire to significantly reduce the cover of heath species, as happened in 1995.

Other trends (with the exception of management, discussed below) are largely related to climate and in particular to the wet summers of recent years. These include the more verdant grass growth evident in several photographs and, probably, the vigour of broom growth and the development of lichen-rich swards (although the absence of fires may also have benefited these species). Rich grass growth has the potential to threaten patches of bare ground, a key invertebrate habitat and an important part of the site's, and Bristol's, biodiversity. At the moment good quantities of bare ground remain and a dry summer would weaken grass growth. Broom is an uncommon species locally and a good invertebrate habitat so its increase is welcome and the point at which it is sufficient to threaten more valuable habitats is distant. Lichen-rich swards are a very unusual feature locally and their growth is also welcome.

## **MANAGEMENT**

Site management should aim to produce an approximately 60:40 mix of acidic grassland to heath in areas where they currently exist and no part of these habitats should be lost to scrub. The proportion of heath remains lower than this although it has been increasing in recent years.

The area of bare or partially bare ground on slopes should remain at the 2002 level as a minimum. The proportion of bare soil fluctuates with rainfall and was higher in the drier years of the mid-1990s. There is no need at present to attempt to increase the availability of bare ground, and this would be difficult, but if bare patches shrink further then appropriate measures such as small-scale turf removal should be considered. No measures should be undertaken to reduce the extent of bare ground.

Broom scrub is a feature of interest in its own right and in the past it has become scarce on the hill. At present, however, it is growing and spreading very vigorously, particularly on the eastern slopes of the hill. This spread is threatening areas of 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 the 2004 report 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.



Some areas remain where scrub and tree control would be very beneficial. Potential areas for action include:

- gullies on west facing slopes, in and around areas K, L, M and N; and
- south-facing slopes in and around areas AA, BB, DD and EE. The spread of cotoneaster in this area is worrying and this species should be removed.

A few plants of holm oak remain on the site and removal of these would be beneficial.

The slope at areas E / F, in the north-western part of the site is potentially threatened by tree encroachment and open habitats are being threatened by broom growth. Broom should be removed from open habitats here. Rowan, which has colonised the area, should probably be viewed as a welcome addition to site diversity and be protected in any future management,

## **INVERTEBRATES**

As in previous years causal records of invertebrates were made, although due to the lateness of the survey and the poor weather few species were seen.

Those recorded were:

Butterflies: Red admiral, comma (larva) and peacock (larva).

Moths: Vapourer. *Agriphila tristella* and *Stigmella aurella* (larval leaf mine).

Orthoptera: Dark bush-cricket, long-winged conehead, field grasshopper, meadow grasshopper.