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**TROOPERS HILL
PHOTOGRAPHIC MONITORING 2016**

For

BRISTOL CITY COUNCIL

TROOPERS HILL

PHOTOGRAPHIC MONITORING, 2016

INTRODUCTION

This is a report of the photographic and vegetation monitoring carried out at Troopers Hill during 2016, a repeat of similar exercises carried out in 1994, 1996, 1998, 2000, 2002, 2004, 2008 and 2011.

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 both grassland 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 2016 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 2016, 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. By 2016 some areas from which photographs were previously taken had become inaccessible due to scrub encroachment and it was no longer possible to replicate earlier photographs exactly.

RESULTS

The reports have, since 1994, described areas of heath vegetation across the site. These areas are shown on the maps below and are described in the appendix. Most are shown on the attached photographs. When viewing these photographs it should be remembered that grass growth on the hill varies significantly with the weather. The early summer of 2016 was very wet and the tall grass visible in several photographs is probably a consequence of this, rather than a reflection of a permanent trend.

In summary, the trends in the hill's vegetation remain broadly as described in 2011. The balance of the site's vegetation has changed significantly since the 1980s and early 1990s. This is probably largely due to the absence of serious fires, which were previously a regular occurrence, since 1995. This has allowed heath vegetation to become much more extensive and has also allowed scrub, in particular broom, to colonise significant areas of the hill. The effects have been different across different parts of the site:

- Much of the centre of the hill continues to support sparse grassland with patches of taller grassland where pockets of deep soil have developed in small hollows and scattered plants of heath and scrub species.
- The formerly open slope in the north-western part of the site (centred on areas E and F) is now dominated by broom scrub, although sparse grassland persists below and between plants of broom. Tree saplings, bramble and cotoneaster are also beginning to colonise the area.
- The slopes above the nursery (areas J to N) have extensive heath with a high diversity of grassland and tall herb plants. Continued growth of oak seedlings and scrub encroachment along the edges of the area are threatening the open habitats, although scrub removal has been effective in places.
- The southern corner of the site (areas N, P and O) has always had large amounts of scrub but this has spread considerably in recent years at the expense of grassland.
- The southern slopes (areas P to S) continue to be extremely diverse and the increase in heath and tall herb species has increased diversity since the 1990s. Clearance of scrub has been locally effective, but there are several areas that are threatened by scrub encroachment.
- The gully (areas S to Z) has been extensively colonised by heath species and is very diverse. Small scale tree and scrub removal has been effective.
- Troopers Hill Road Slopes (areas AA to DD) have become very overgrown and any open habitats here have either been lost or are under significant threat.

MANAGEMENT RECOMMENDATIONS

Management for wildlife on the hill has focused on the conservation of species-rich grassland, heath and bare ground, which is an important habitat for insects. Scrub is also a valuable habitat (three of the locally notable moths recorded during the visit are associated with broom) but if its spread at the expense of more open habitats is a threat to the site's, and Bristol's, biodiversity. Such spread appears to be happening at an increasing rate, probably due to the absence of serious fires in recent years.

The ideal response to the level of scrub encroachment at Troopers Hill would be to embark on a large scale programme of clearance. However, resources will probably not allow this and it is therefore recommended that certain areas should be prioritised, as follows:

- Some areas, such as the centre of the hill and the gully, are in a favourable condition and require relatively little action at present.
- Other areas, notably the slopes to the south and west of the chimney (areas S, R and P and the more open areas to their west) are in favourable condition but require some ongoing management to maintain this favourable condition.
- Parts of the western edge of the hill (areas F to N) are either in unfavourable condition or are approaching unfavourable condition but can be restored relatively easily through management in the near future.
- Some areas above Troopers Hill Road are in unfavourable condition and would require major resources for restoration. It is probably more sustainable to target resources elsewhere.

It is therefore recommended that the following are prioritised for management over the next five years:

The north-western corner (areas E and F) should be cleared of scrub and tree saplings, leaving a small number of broom plants around the edges of the area.

The slopes above the nursery should be cleared of scrub, including broom. Trees and saplings should be removed as far as possible; if felling of entire trees is not possible consideration should be given to removing lower limbs to reduce the degree of shading. Scrub on the edges of the area, including smaller trees, should be cut back. All accessible holm oaks should be removed, either by felling or by stem injection. Some of these plants are growing on very steep slopes and work here would require specialist access techniques, but if management is not carried out a valuable part of the site will be lost.

The slopes to the south and west of the chimney should be kept clear of encroaching scrub, including the small broom plants that are beginning to appear. This will be relatively straightforward in the coming years, and would prevent more challenging management requirements in future years. This area is one of the most important on the site for insects.

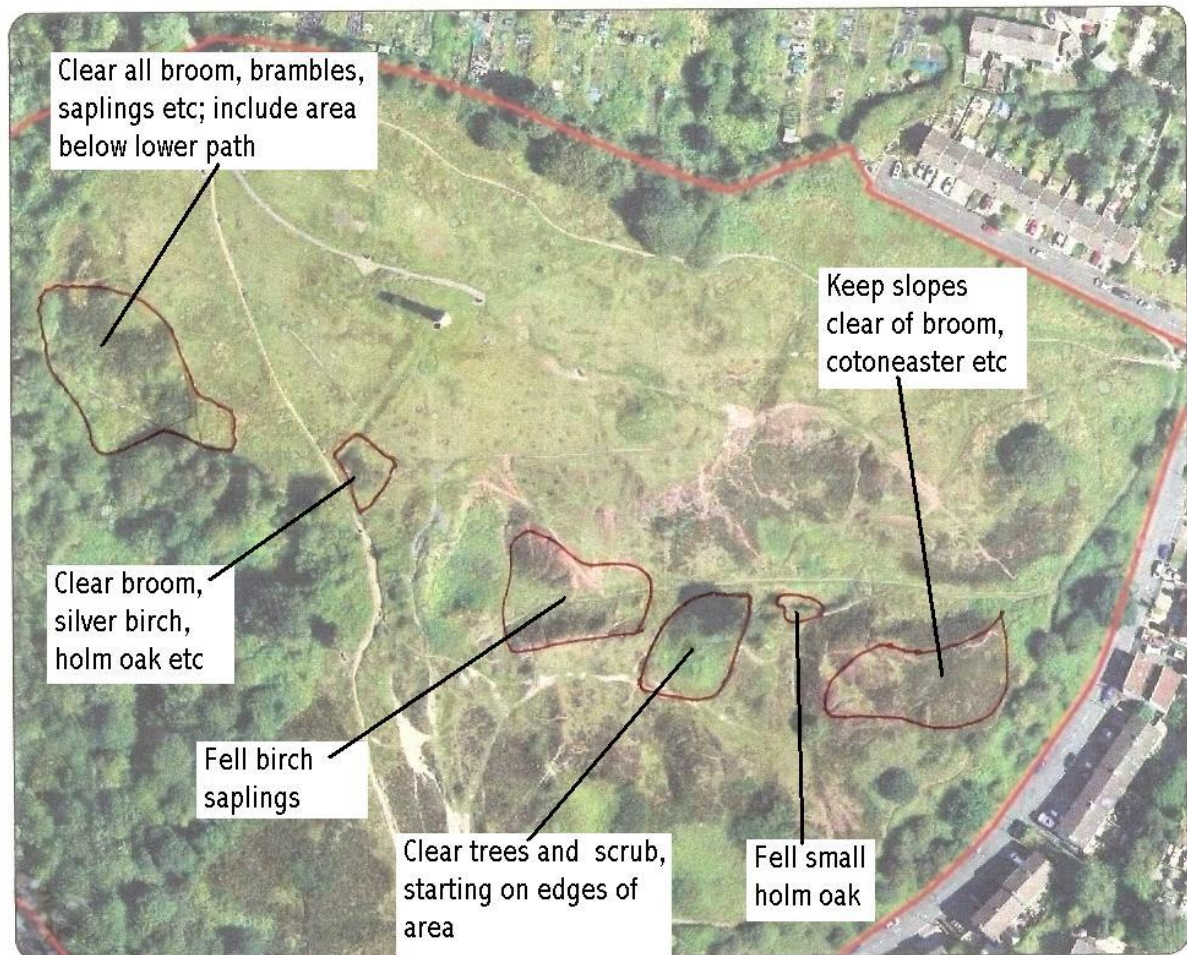
In the gully scattered silver birch saplings towards the western end should be removed. To the south of the gully there are patches of trees and encroaching scrub that could be kept clear of trees and scrub relatively easily.

FUTURE MONITORING

It is recommended that this monitoring programme is repeated in full in five years time. However, if this is not possible then it would still be useful to repeat those photographs that are easiest to locate and are most informative: photographs 1, 6, 7, 8, 12, 13, 14, 15, 20, 21, 22, 23, 25, 26, 28, 33 and 36.

SUGGESTED PRIORITIES FOR MANAGEMENT





APPENDIX 1: 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.

A: This is an area of mixed bramble and hawthorn scrub, with patches of bracken, shown on photograph 1. 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, and this trend seems to have accelerated since 2008. Comparison with earlier photographs 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. Lower down the slope heather has continued to increase significantly.

B: Photograph 2 from 1994 shows an extensive patch of bramble forming this area. Periodic clearance has resulted in this being replaced by a mix of tall grassland and tall herb vegetation, which shows little sign of change since 2011.

C: The hedge that forms the edge of the site has spread slightly over the period of monitoring but is otherwise unchanged.

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). In 2011 it had further grown slightly (to 4.1m x 2.9m x 0.9m tall) but in 2016 it has shrunk (to 2.1m x 2.2m x 1.1m). By contrast there has been some spread of ling in the area visible towards the rear of photograph 6.

E: Previously this area, which is shown on photographs 7 and 8, was a patch of ling plants in an otherwise grassy sward but strong spread of ling was evident between 1996 and 2011. Whilst ling growth remains strong the most obvious feature is now the presence of several bushes of broom. There are still patches of bare ground, which are not readily evident on the photographs, but these are much smaller than previously.

F: There have been dramatic changes in this area, which is shown on photographs 9, 10 and 11, over the course of the monitoring. In 1994 it had open broom scrub but this disappeared following the 1995 fire and did not attain its previous size until 2002. It then spread slightly between 2002 and 2008. Since this trend has continued and seems to have accelerated since 2011. The diverse grassland described in 2011 survives in the area but in small patches and bare soil is much reduced here.

G: In 1994 this was a patch of ling, with several seedlings but since 1998 broom has regenerated strongly and is now dominant.

H: Broom has also spread across this area, which had open heathland between 1994 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 although taller grass growth in 2016 means that heath is not as evident as it was in 2011.

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, broom 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.

K-N: This area is shown on photographs 16-18. Compared with early photographs, which show a largely grass-covered slope, the spread of heathland is impressive. However, tree saplings and bramble are spreading and are likely to threaten the biodiversity interest of the area in coming years.

O: At the start of the monitoring scheme this area, which is shown on photograph 19, 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. Broom decreased between 1994 and 2002, but had spread slightly by 2004 and has spread significantly since then.

P: This area continues to be of very high ecological value, supporting a mixture of heath, diverse grassland and the patches of bare ground that are important to invertebrates. There are a few small plants of broom in the area, which have appeared since 2011; these are not currently affecting the area's biodiversity but might in the future if they are allowed to spread.

R: In 1994 this area, shown on photograph 20, 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. Broom regrowth has been strong and now exceeds, in both extent and density, its status in 1994.

S: In 1994 this area of heathland, shown on photograph 21, 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%. Growth of scrub, dominated by gorse, along the ridge above the area has been very strong

T: The state of the western end of the gully, as shown on photograph 23, has varied according to the amount of management. In 1994 it was fairly open but then became rather overgrown, but was open again in 2000. It is now very overgrown. This is of relatively low significance in ecological terms, but it does reduce access to a feature of geological significance.

U: In 1994 there were three clumps of ling on the northern side of the gully here and heath cover remained low until 2000. 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 and is shown on photograph 24.

V: This is a small bowl in the south-facing slope of the gully, shown on photograph 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 has accelerated since 2008. A patch of bramble at the bottom of the slope, visible in the bottom left of photograph 25 was cut back before 2004 and there has not regenerated. Removal of the trees has had substantial benefits in opening up heath and grassland habitat, although several oak seedlings are present and are visible on photograph 26.

W: This area is on the north-facing slope of the gully, opposite area V, and is shown on photograph 27. 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 heath cover is now complete over the upper slope, although there has been some spread of bracken in the lower area.

X: Heath has spread over this area, in common with other parts of the gully, although patches of open ground remain frequent. Bell heather is more frequent than ling across this area.

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% and growth remains vigorous. Photograph 28 shows the spread of bracken in the area adjacent to the path from which bramble was cleared between 2004 and 2008.

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. The coverage of ling has gradually increased to 100% on the lower slopes, where heath species were previously absent. Until 2004 the upper slopes had scattered bell heather and ling in a grassy sward dominated by wavy hair-grass (*Deschampsia flexuosa*). The heath became markedly more frequent in 2004 and is now dominant.

AA: Scrub growth has been vigorous in this part of the site and it is no longer possible to take photographs 29 and 30 from exactly the same places. Some ling remains, as previously, but it is now much threatened by growth of scrub, particularly bramble and heather.

BB: This was originally an open slope with small amounts of bramble and ling. It has since been colonised by ling and associated species such as bell heather and goldenrod. Scrub encroachment has now become extensive and is threatening the open habitats in 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. The spread of bramble noted in the previous reports has continued and broom is also now spreading into the area.

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 but has not spread as rapidly as in some areas. Bramble clearance has been successful in maintaining open habitats but photographs 32 and 33 show scrub encroachment along the top of the slope.

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. Continued spread of broom was noted in 2008 and the area is now under serious threat.



Photograph 1: Growth of scrub above the far hillside (above the van) is evident, as is a marked increase in the cover of heath on the lower slopes.



Photograph 2: Earlier images show a greater extent of bramble before clearance began c1999. The small sapling was not present before c2010 and minor paths have since grown over.



Photograph 3: Japanese knotweed spread rapidly here during the 1990s but has since been controlled. The large willow has grown rapidly and the hedge along the edge of the playing field is much more prominent than it was during the 1990s.



Photograph 4: Bramble has spread here, at the expense of rough grassland rather than more valuable habitats and scrub growth on the edge of Crew's Hole has largely obscured a previously open skyline.



Photograph 5: Other than path improvements there have been few changes in this area. The trees to the left of the bench are noticeably taller than previously.



Photograph 6: Photographs from the 1990s show a patch of ling, which has not recovered from fire damage, in the foreground of this photograph. Broom has spread onto the far edge of the grassland.



Photograph 7: The vegetation has changed from sparse grassland with scattered patches of heath in the early 1990s to taller grassland and continuous heath in 2000. Grassland and heath survive between the broom plants.



Photograph 8: In the 1990s the area occupied by broom was largely bare; heath spread progressively from small plants, but broom has colonised very recently.



Photograph 9: Until 2000 broom was confined to the lower edge of this slope, which it now largely obscures, and the grassland was short with frequent moss and bare patches.



Photograph 10: Broom has always been frequent in this slope, except in the immediate aftermath of fires but the growth is now denser than in any previous photograph.



Photograph 11: Photographs from the 1990s show a very open slope, with broom seedlings and small patches of heather. Broom has spread steadily since then.



Photograph 12: Tree growth on the edge of the site has largely obscured landmarks by the river and the lower slope is more overgrown. Heath species and golden-rod have become much more frequent here and the grassland is generally taller.



Photograph 13: Heather has spread here, in particular since 2000, and broom has colonised since 2008 as has goldenrod. Oak trees growing in the small gully now obscure the slope beyond, which remains open but with greatly increased heath.



Photograph 14: Trees obscure a previously open view to the nursery. Heath is much more abundant . Broom has spread only slightly since 2000. The bramble and other scrub at the bottom of the slope have encroached noticeably.



Photograph 15: Heath is much more luxuriant here and broom has spread. Goldenrod was previously absent. Management has kept scrub encroachment on the right hand side of the photograph under control.



Photograph 16: The large oak now obscures much of what was previously an open view. Although much of the area it now shades was previously bramble rather than open habitat seedlings can be seen encroaching into heath.



Photograph 17: This area previously had open grassland, across which the spread of heath is striking. The threat bramble and tree seedlings pose to the heath is evident in the photograph.



Photograph 18: Trees to the right of the people have been felled but saplings are present. Heath has grown markedly but a good area of sparse grassland remains.



Photograph 19: Much of this area was open in the early 1990s but scrub was encroaching by 2000 and has thickened since. Broom has been displaced by bramble at the bottom of the slope and has spread up the hill.



Photograph 20: Management in the 1990s and since has opened up much of the area in the left part of this image, but the scattered broom has spread from a single plant since 2000.



Photograph 21: The scrub at the rear has become more dense, but the grassland and heath in the foreground has changed little, although goldenrod is now far more prominent.



Photograph 22: During the 1990s the gorse-covered slope to the right was open grassland; in the early 2000's it had low heath. Further spread into diverse grassland and heath is evident in this photograph.



Photograph 23: Scrub over and below the rock face is now more extensive than it has been for some years. Heath has spread markedly over the slope on the right hand side of the photograph since 2000.



Photograph 24: Heath has spread markedly here and the scattered growth in the top right hand corner of the photograph has colonised recently.



Photograph 25: Heath is more frequent here but the vegetation is otherwise little changed.



Photograph 26: Heath has spread into the area previously occupied by a tree in the centre of this photograph, a positive outcome of management. Small saplings are visible in the same area.



Photograph 27: Bracken has spread at the bottom of this slope, but open heath remains in the upper area.



Photograph 28: Heath is far more vigorous on both slopes than in the early 2000s. Management since then has pushed scrub back to the area it occupied in the early 1990s, but bracken has spread across much of the cleared area.



Photograph 29: The original point this photograph was taken from is now inaccessible due to scrub growth. This image shows increased heath growth and some spread of scrub below the path.



Photograph 30: Again scrub growth meant that this photograph was taken from a different place. This image shows increased scrub in this area.



Photograph 31: Heath has spread markedly here and broom is now much more obvious. Bramble is also becoming frequent.



Photograph 32: Scrub has spread markedly across the distant slope. Heath continues to be healthy in the foreground.



Photograph 33: The location from where this photograph was originally taken is now inaccessible in dense scrub. This more distant view shows limited scrub encroachment on the upper slopes.



Photograph 34: Both heath and scrub have become more frequent here, with bramble encroaching over several previously open areas.



Photograph 35: Heath and goldenrod have become more frequent here, and broom and other scrub species are beginning to encroach over the slopes.



Photograph 36: This area has benefited from scrub removal work in the past and is now open. Heather has become more frequent.

APPENDIX 2: INVERTEBRATES

Casual records of insects have been made during each of the surveys. The weather during the 2016 visit was poor and relatively few insects were on the wing, but some significant records were made of larvae (marked as L in the table below).

	1994	1996	1998	2000	2002	2004	2008	2011	2016
Butterflies									
Grayling	P	6							
Small heath	P				30+	50+		30+	
Meadow brown				10+	15+	10+		5+	5+
Gatekeeper				5+		4		10+	5+
Common blue				4	10+	20+		30+	
Holly blue								2	
Small copper	P			4	1	3		6	1
Brown argus				3		1			
Clouded yellow		P							
Speckled wood				1	4	4		10+	3
Red admiral							P		
Peacock							P		
Comma							P		
Painted lady		P							
Silver-washed fritillary						1			
Large white					1	6		10+	
Small white						6		4	
Moths									
Silver Y		P		10+				5+	2
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+				5+
Agriphila inquinatella		P							
Adaina microdactyla								5+	
Aristotelia ericinella									10+
Carcina quercana									1
Celypha lacunana								3	4
Coleophora juncicolella									L
Coleophora saturatella									L
Epiphyas postvittana									2
Hellinsia osteodactylus									4
Leucoptera spartifoliella									L
Mirificarma mulinella									2
Parornix betulae									L
Orthoptera									
Mottled grasshopper			P	P	P	P		P	P
Field grasshopper	P		P	P	P	P	P	P	P
Meadow grasshopper	P		P	P	P	P	P	P	P
Common green grasshopper					P	P		P	
Dark bush-cricket	P		P	P	P	P	P	P	P
Long-winged conehead					2+	10+	10+	50+	50+
Roesell's bush-cricket									20+
Bugs									
Acanthosoma haemorrhoidale									2

	1994	1996	1998	2000	2002	2004	2008	2011	2016
Alydus calcaratus								10+	
Kleidocerys resedae									100+
Notostira elongata									5+
Orthotylus ericetorum									20+
Flies									
Dysmachus trigonus									1
Machimus cingulatus									2
Macrosiphoniella artemisiae									L
Microperza lateralis									1
Phytomyza solidaginus									L
Spaherophoria scripta									1
Stemonocera cornuta									L
Trypeta artemisiae									L
Bees									
Colletes similis									1
Beetles									
Orchestes rufi									L
Subcoccinella 24-punctata									1

The species recorded in 2016 include heathland specialists such as the robberfly *Dysmachus trigonus* and the stiltfly *Microperza lateralis*: both have previously been recorded by Dave Gibbs. Moth records of interest, with notes from The Moths of the Bristol Region include *Coleophora juncoliella*, which feeds on heather and had not been recorded locally for some decades; *Coleophora saturatella*, which feeds on broom and is known locally only from this site; *Aristotelia ericinella*, a heathland specialist that is locally rare; *Hellinsia osteodactylus*, which feeds in golden-rod and has only one recent record locally; *Leucoptera spartifoliella*, which feeds on broom and is known locally only from Troopers Hill; and *Mirificarma mulinella*, another broom feeder known locally only from this site.

