

Berkshire
Buckinghamshire
Oxfordshire



Conservation Report 2018

Berks, Bucks & Oxon Wildlife Trust (BBOWT)



BBOWT's impact on the biodiversity of
Berkshire, Buckinghamshire and Oxfordshire

Debbie Lewis, Ecology Manager, Feb 2019

Acknowledgements

The survey data contained within this report have been diligently collected and processed by many hundreds of volunteers, staff and contractors for more than 15 years, and we would like to express our thanks for their time, effort and dedication in collecting all this invaluable information.

We would also like to thank the many and varied volunteers who help the Trust carry out conservation management on nature reserves and in the wider countryside; without their help we would be unable to make such an amazing positive difference to local wildlife.

The Conservation Report was written by the Biodiversity Team with significant input (especially the case studies) from a large number of other staff whose time and assistance was crucial in being able to deliver the report.

Finally but definitely not least, we would also like to thank all the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust members, donors and grant giving bodies whose financial support makes our work possible.



Special thanks go to: Colin Williams and Andy Coulson-Phillips for their work on the case studies, and to Andy Fairbairn for data processing.

Other contributors include Haidrun Breith, Sam Cartwright, Simon Claybourne, Lisa Lane, Martyn Lane, Julia Lofthouse, Marcus Militello, Hilary Phillips, Kate Prudden, Neil Rowntree, Roger Stace, Giles Strother, Mark Vallance, Jude Verdon, Nicky Warden and Pim Young

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Executive summary

There is an ever increasing wealth of evidence that wildlife and wild places are essential for the health and wellbeing of people, as well as being an integral part of a functioning planet. Wildlife encounters, from great tits feasting on bird feeders, whistling kites wheeling overhead, the exquisite beauty of a newly emerged small tortoiseshell or the intense smell and colour of a woodland carpeted in bluebells, are inspiring and uplifting. And yet, despite this, wildlife is under threat and is declining at an alarming rate not just nationally, but here in Berks, Bucks and Oxon.

Every three years the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) takes stock of the work it has carried out to tip the balance in favour of wildlife, and to assess the impact that the Trust has made. This report aims to provide a balanced and objective overview of the status of wildlife BBOWT has influenced. Therefore the report details *both* successes and areas where activities have been less successful in benefiting wildlife. All data presented in this report covers the reporting period Jan 2016 – Sept 2018. Definitions for conservation status can be found in Table 1 (page 10).

Conservation work is focused on achieving the principles outlined in the 2010 Lawton Report¹:

- **More** – *land managed for nature conservation.*
- **Bigger** – *individual areas managed for nature conservation.*
- **Better** – *quality or condition of wildlife on land managed for nature conservation.*
- **Joined** – *more links and connectivity between nature conservation areas.*

This is primarily achieved through two different threads of work: managing a suite of nature reserves and engaging with external stakeholders.

Key findings – nature reserves

- Nature reserves cover 2644ha. This represents a 2.5% increase in landholding since 2015. The mean reserve size is 30.4ha and the median size is 9.4ha.
- 48% of the landholding is owned freehold, 38% is under a lease agreement and 14% is under a management agreement.
- The Trust manages 11% (by area) of Berks, Bucks and Oxon SSSIs.
- Over the last 10 years the proportion of land managed by BBOWT which is in favourable condition has roughly doubled from c.30% in 2009 to c.60% in 2018 (532ha, 1299ha respectively).
- Over the last 10 years the proportion of land managed by BBOWT that is unfavourable no change or declining has also roughly doubled from less than 10% in 2009 to c.20% in 2018 (147ha, 317ha respectively).
- As a result of the increase in reserves in poor condition the strategic plan target of 'greater than 95% of nature reserves in favourable or unfavourable recovering condition' has been missed in 2018 (86%). However, despite this, the data clearly shows that in general the overall trend is one of improving condition.
- 2018 snapshot: 49% (1000ha) of the area covered by primary features is in favourable status. However, just under half of that is vulnerable, and at risk of becoming unfavourable. 37% (782ha) is unfavourable but getting better for wildlife and 14% (291ha) is poor for wildlife and showing no signs of improvement.
- Woodland comprises the largest feature found on nature reserves. Heathland and meadows are the second largest feature groups.
- Four out of the ten biological features groups are greater than 85% favourable. Of the six feature groups with less than 85% in favourable condition, calcareous grassland and heathland are in the least favourable condition, in particular heathland which has no favourable hectares.

- Keeping features in good condition requires significant resources and ongoing site management. When deciding how to spend limited resources, maintenance of features in good condition is considered a higher priority than restoring those in poor condition.
- The top six issues driving features to be unfavourable or vulnerable are: deer browsing, dominating scrub, grazing levels, lack of control over water levels and woodland management. These are very similar to those identified in 2015, as issues with easy to fix solutions have already been implemented.
- There are a range of additional, underlying challenges which negatively impact upon feature condition. These include: climate change, ash dieback, nitrogen deposition, antisocial behaviour and changing agri-environmental schemes.
- The majority of these issues need to be addressed at the site level, as sites are unique and there is no 'one size fits all' style solution. Conservation management solutions currently being trialled include: improvements in provision for stalkers, use of new equipment such as 'tree poppers' and installing new water control structures.

Key findings – wider countryside

- So far in 2018/19 c.100ha have received wildlife positive management, c1150ha have received wildlife positive advice, and c. 220 landowners have been contacted.
- It is not currently possible to cumulate output statistics over reporting years and a more rigorous, cross-trust reporting system to address this and ensure accurate recording of wider countryside work, is under development.
- Across the three counties, each year over 3600 planning applications were screened for wildlife impacts to decide whether further engagement was necessary.
- On average, 40 – 60 planning applications and c. five strategic plans per county are commented on each year.
- Biodiversity outcomes of wider landscape work were assessed through intensive monitoring across the West Berks Living Landscape (as part of an HLF funded project

which ended summer 2018). The results from this showed that the condition of reedbeds and arable margins had improved as the result of conservation management.

- The top six issues which constrain work in the wider landscape are: being able to inspire landowners to make wildlife positive changes, maintaining long term benefits as landowners can change their minds, work being reactively led by interested landowners rather than ecologically strategic, a lack of clarity surrounding biodiversity off-setting within the planning system, increasing lack of resources in government agencies and local authorities and changes in (Natural England) staff providing landowner advice.
- Possible solutions to some of these issues include: fostering long term, stable relationships between those providing advice and the landowner; providing well developed, strategic input as early as possible into the local planning system and development of a pilot study to collect empirical data demonstrating the value to wildlife resulting from advice provided to developers.

Alternative approaches

- Against a backdrop of increasingly uncertain and changing political constraints there are some alternative, novel ways in which the Trust could provide positive wildlife gains. The Trust may wish to investigate these further. These approaches can be considered as appropriate for large nature reserves and/or as part of wider landscape work. They include: 'rewilding'; using off-setting income to fund land management; and engaging with a future Environmental Land Management scheme based on Natural Capital, an approach not taken by previous agri-environmental schemes.
- These approaches should be seen as complimentary to traditional reserve management rather than as either/or approaches. A wide variety of different strategies will need to be employed if the current biodiversity decline is to be halted and reversed.

Positive wildlife outcomes

Although there are many challenges yet to overcome, undoubtedly over the past three years BBOWT has made a significant, substantial positive difference to the fortunes of wildlife across Berks, Bucks and Oxon. Details can be found in the range of case studies within the report. They include:

- Increases in silver-washed fritillaries, following increases in hairy violet abundance resulting from coppicing at Warburg.
- Recovery in herb abundance post 2007 summer flooding at Chimney Meadows, so that the NNR is once again considered in favourable condition.
- The restoration of chalk grassland at Dancersend, which has resulted in significant increases in herbs such as wild marjoram and associated butterfly species diversity (up from 15 to 20 species).
- Restoration of Hosehill Lake island through scrub removal which has resulted in wading birds such as lapwing and redshank nesting, after a period of absence of 15 years.
- Significant increases in southern damselfly and keeled skimmer at Parsonage Moor, following targeted management of the runnels they need for breeding.
- Stable populations of farmland birds such as corn bunting at Wells Farm, counter to the significant national declines being experienced in the wider countryside.
- 1.2km of new hedgerow planted, helping link up the countryside as part of the Hedgerow Havens Project.
- Positive outcomes achieved for wildlife as a result of long-term engagement with the Gavray planning application and East West Rail.
- Conservation grazing using BBOWT livestock, helping maintain an Oxfordshire Local Wildlife Site in good condition.
- 600km² of Local Key Water Vole Areas monitored on rotation, management advice provided and defended from mink where possible.
- Engagement with 7 landowners in the West Berks Living Landscape area, including writing of management plans and active habitat management such as reed cutting.



Snake's-head fritillary at Iffley Meadows, where the population numbers c.70,000 individual plants

1. Introduction

Nature and wild places are uplifting and beautiful. For generations they have inspired people to care for the world around them. There is also a powerful moral argument that wildlife has an intrinsic value and should be respected and protected. Our children's children should inherit a world as rich and diverse as the one our forebears lived in. In recent years our understanding that wildlife and nature's intricate systems play a vital role in sustaining all life, perhaps especially humanity, has become increasingly apparent. This coupled with the ever increasing wealth of evidence that species and habitats are being pushed towards an ecological precipice means that now more than ever, is the time to act.

In 2010 Professor Sir John Lawton produced the seminal report, 'Making Space for Nature'¹. This report called for greater action by Government and Conservation NGOs to protect and restore coherent and resilient ecological networks across England. The report identified 4 key strategies by which this could be achieved:

- **More** – *land managed for nature conservation*
- **Bigger** – *individual areas managed for nature conservation*
- **Better** – *quality or condition of wildlife on land managed for nature conservation*
- **Joined** – *more links and connectivity between nature conservation areas*

Since it was formed in 1959, BBOWT has been a champion for wildlife across our three counties. In this pivotal age, more than ever, nature needs a voice and BBOWT is rising to respond to the 21st century challenges and solutions identified in 'Making Space for Nature'.

BBOWT's 2016 – 2021 Strategic Plan identifies the following Conservation Targets:

- **95% of nature reserves are in favourable or unfavourable recovering condition**
- **8% of land in unprotected areas is rich in wildlife by March 2021**

Every 3 years BBOWT takes stock of its achievements towards these targets; assessing the conservation status of nature reserves and the influence and impact it has made on the wider countryside.

Whilst it is easy to understand that management activities such as coppicing or taking a hay cut are good for biodiversity, the activity alone cannot be

used to categorically state that the desired biodiversity benefits have been achieved. Therefore, this report focuses primarily upon quantitative biodiversity outcomes. For example, the population size and trend of small blue butterflies on a given site, rather than reporting management activity data, such as the number of metres of fencing installed. Wherever possible the link between conservation management and biodiversity outcomes is highlighted.

A rigorous monitoring programme has been in place across nature reserves since 2002, and the data collated enables an accurate assessment of nature reserve condition to be generated. Biological and activity data for achievements in the wider countryside is patchier and work towards a more strategic, unified approach is under development.

It is important to be able to compare what is happening on nature reserves with national, regional and local wildlife statuses, so that BBOWT data can be put into context. This helps show whether a species trend is driven by site management or reflects a national trend due to factors outside nature reserve management control. Reports such as 'The State of Nature 2016'² have helped immensely to highlight the plight of many UK species, but there is still a significant knowledge gap of the status of much of UK native flora and fauna, and in particular the condition of habitats and ecosystems as a whole. Approximate values are available for the numbers of hectares of Biodiversity Action Plan (BAP) habitats across England, but what quality or condition they are in is largely unknown. The best dataset that exists is that for the condition of the SSSI series. Natural England, who are responsible for this assessment are seriously under-resourced and repeat visits to sites are scheduled to take place every 6 years at the earliest, thus data is often out of date and does not reflect the current status.

This makes it particularly difficult to draw any meaningful comparisons between BBOWT condition assessments and other wildlife-rich sites, never mind the wider countryside. Despite these constraints, where accurate, informative data exists, comparisons have been made between nature reserves and national data throughout this report.

This report aims to provide a balanced and objective overview of the status of wildlife BBOWT has influenced. Therefore the report details *both* successes and areas where activities have been less successful in meeting the strategic conservation targets. Challenges and potential solutions have also been identified to help ensure that BBOWT is best placed to address them over the coming years.

This report has been written to enable the reader to travel seamlessly from cover to cover, or to dip into a subject of particular interest.

All data in this report is accurate up to and including Sept 2018.



BBOWT Dexter cattle, conservation grazing the fen at Dry Sandford Pit

2. Nature reserves – ‘More, Bigger and Better’

One of the Trust’s core areas of work delivering its conservation objectives is the management of a suite of nature reserves. Nature reserves help towards the Lawton objectives of:

More – *by increasing the area of land under conservation management.*

Bigger – *by increasing the size of individual nature reserves.*

Better – *by focusing site management to achieve good condition status for wildlife.*

It should be noted that ‘Bigger’ areas under conservation management are also achieved through influencing nature reserve neighbours. Work towards this is detailed within ‘Wider countryside’ section (page 68).

This section of the report gives details of the current nature reserve portfolio, such as the size and number of reserves and the condition of the features found across these sites. Where possible, comparisons over time are made.

The majority of features that nature reserves are managed for are of nature conservation interest. However BBOWT’s landholding also contains features designated for their archaeological and geological interest and these have also been included as the Trust has a legal management responsibility to maintain these in good condition.

2.1 Reserves - overview

During 2013/14 the Trust's landholding significantly increased as a result of taking on a suite of council owned sites from Buckinghamshire County Council and West Berkshire Councils. The last three years have been a relatively stable period for the estate (see Fig 1).

Since the previous report in 2015, Bray Pit in Berkshire has been relinquished and Duxford Old River and Woodford Bottom, both in Oxfordshire have been acquired.

BBOWT's nature reserves currently cover 2644 ha. This represents a 2.5% increase in landholding since 2015.

The smallest nature reserve is Burrows at 03.ha and the largest is Greenham and Crookham Commons at 452ha.

The mean size of nature reserves is 30.4ha (increased from 29ha in 2015). The mean nature reserve size is skewed by a handful of large sites, primarily Greenham Common, Chimney Meadows and the Upper Ray Meadows. The median is therefore a more indicative value to use; this is currently 9.4ha and remains the same as in 2015 report (Fig 2).

48% of the landholding is owned freehold, 38% is under lease agreement and 14% is under a management agreement.

The Trust manages 0.46% of the area of Berkshire, Buckinghamshire and Oxfordshire. The Trust is also responsible for managing 11% of SSSIs by area across Berkshire, Buckinghamshire and Oxfordshire.

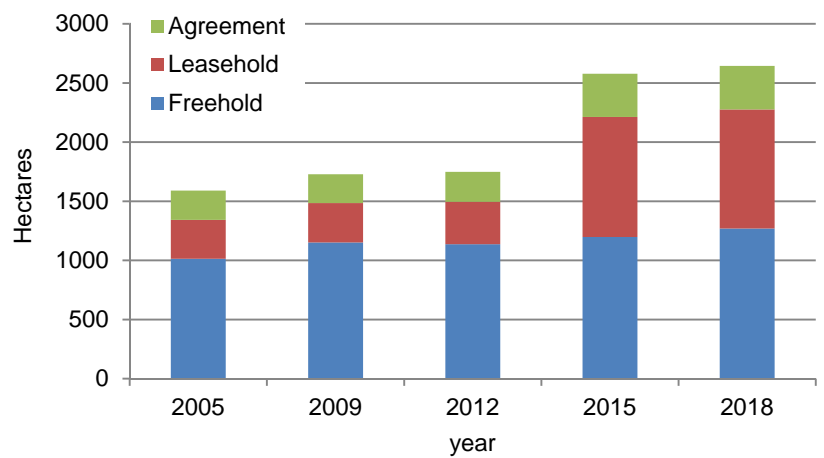


Fig 1: Reserve ownership status over time

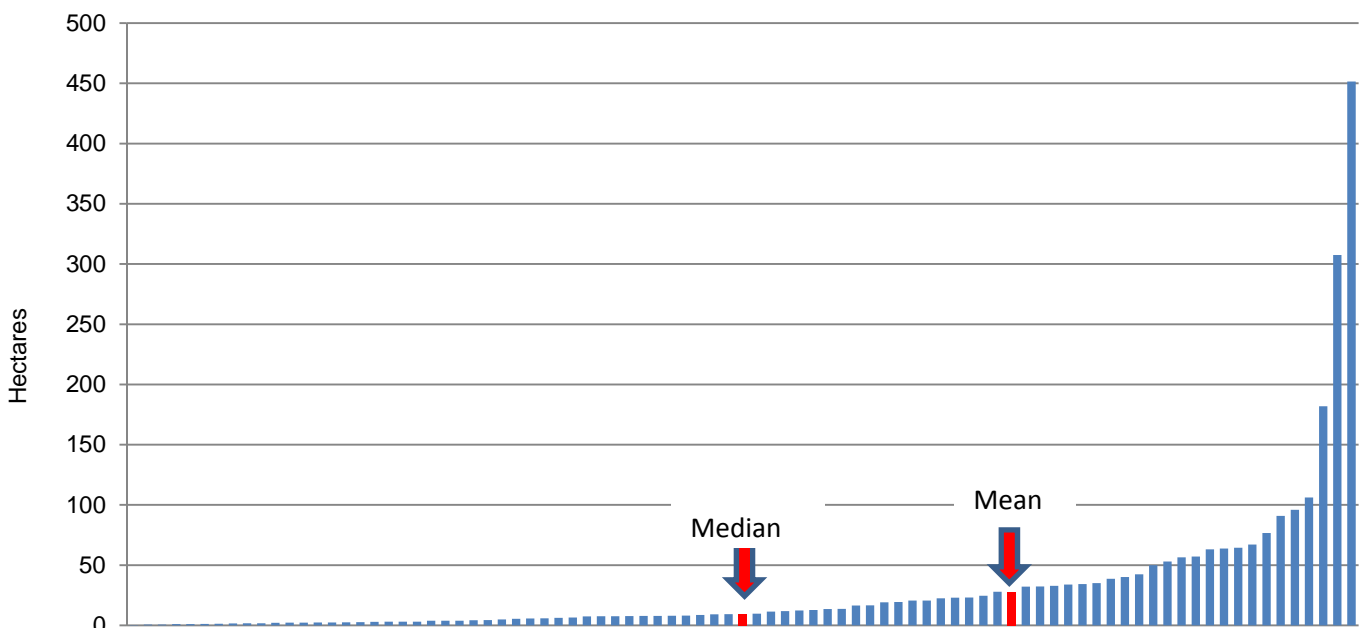


Fig 2: Size of each nature reserve in 2018

2.1.1 Feature condition - overview

The assessment of the biodiversity condition of nature reserves takes place at the 'feature' or individual ecological unit level. In most situations 'features' roughly equate to a habitat e.g. woodland and scrub. Individual reserves may have several features depending on the complexity of habitats present. The location of each feature is precisely mapped, thus providing area data for each feature. The condition status or biodiversity health for each individual feature is then assessed. This is based on survey data covering key species groups such as birds, butterflies and reptiles and also results from bespoke habitat condition monitoring. Further details on how condition status is derived can be found in Appendix 1. Definitions of condition categories are provided in Table 1.

Individual features are then grouped together (for example, all woodlands and scrub) and, using the area data, the proportion of the landholding in each condition category can be calculated.

A small number of features are excluded from this analysis. These are features for which there is no condition data which are given an 'unknown' condition status and secondary features. Unknown features are primarily those which fall within the reserves portfolio but do not have wildlife outputs as their main objective. Examples of this include areas used for educational activities, layback for livestock and land where the Trust has no management control. Additionally areas which have received no ecological monitoring due to resources constraints are categorised as 'unknown'.

Secondary features are small parcels of land (often woodland), which do not hold significant biodiversity value with site management resources being focused elsewhere. For example, a small block of edge woodland on a site which is primarily chalk grassland.

Figure 3 shows the hectareage covered by each of the grouped features across all nature reserves. As in previous reports this is dominated by woodland, with meadows and heathland making up the second largest components.

Table 1: Condition categories

Favourable – maintained	Feature in good condition for wildlife and was in previous assessment
Favourable – recovered	Feature in good condition for wildlife and was unfavourable previous assessment
Favourable – vulnerable	Feature in good condition for wildlife but under serious threat, so that unless this is address the feature is likely to be out of condition in the near future
Unfavourable – improving	Feature in 'middle' condition for wildlife, management has significantly pushed it towards being favourable since last assessment
Unfavourable – recovering	Feature in 'middle' condition for wildlife, management has slightly pushed it towards being favourable since last assessment
Unfavourable – no change	Feature in poor condition and was poor in previous assessment
Unfavourable – declining	Feature in poor condition and has got worse since previous assessment
Unknown	Condition status is not known

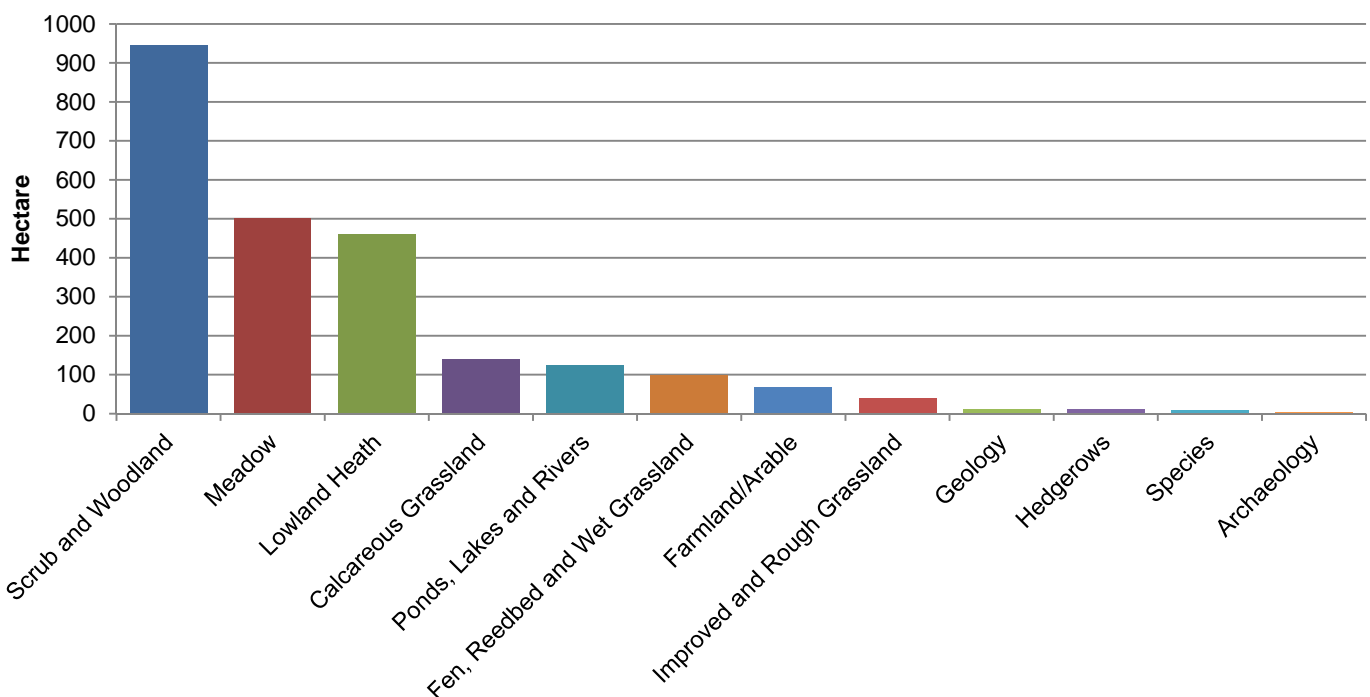


Fig 3: Feature composition of BBOWT nature reserves

2.1.2 Feature condition - changes over time

Condition trends provide information on whether or not the Trust is improving the wildlife status of its nature reserves.

Over the years it is clear that the Trust's suite of nature reserves has changed considerably. Both in terms of losing and gaining sites; and sites themselves have altered in size as neighbouring land has been acquired or relinquished.

Consequently condition trends are calculated in two different ways to take into account the changes in the reserve portfolio. The results from these trends show slightly differing aspects.

The first method compares the condition of the Trust's entire suite of nature reserves over time, regardless of which reserves made up the portfolio at the point in time when the condition assessment was made. This provides a condition trend for all nature reserves together, regardless of what the individual makeup of the estate was in any given year. The advantage of this method is that it provides a full, comprehensive comparison of all land that the Trust is managing, and how the condition of all nature reserves has changed over time. The drawback of this method is that the actual makeup of nature reserves will not be directly comparable. Inevitably the landholding will include land recently acquired and possibly under restoration, thus potentially skewing the results.

The second method compares a suite of core 'indicator' nature reserves which are highly likely to

remain in the Trust portfolio for perpetuity and therefore provide a directly comparable condition trend between years. The drawback with this method is that the core indicator sites represent an ever decreasing proportion of the landholding as time progresses, and new land acquired is not included in the comparison.

Both methods are employed in order to generate as balanced a picture as possible of the improvement, or otherwise, of the Trust's nature reserves for wildlife.

Fig 4a shows the condition trend for all nature reserve land between 2009 and 2018 (method 1). The chart is based on the number of hectares, rather than the proportion of nature reserves within each condition criteria. This helps to take into account the increasing size of the nature reserve landholding. The results show that over the last 10 years the amount of land managed by BBOWT which is in favourable condition has roughly doubled from 532ha to 1299ha. However the amount of land that is unfavourable no change or declining has also roughly doubled from 147ha in 2009 to 317ha in 2018.

This trend of increasing area both in good and poor condition is mirrored in Fig 4b which shows the proportion of nature reserves in each condition category (excluding the 'unknown' land). However, despite the increase in land in poor condition, overall across the suite of nature reserves there is a greater absolute and relative amount of land in favourable condition.

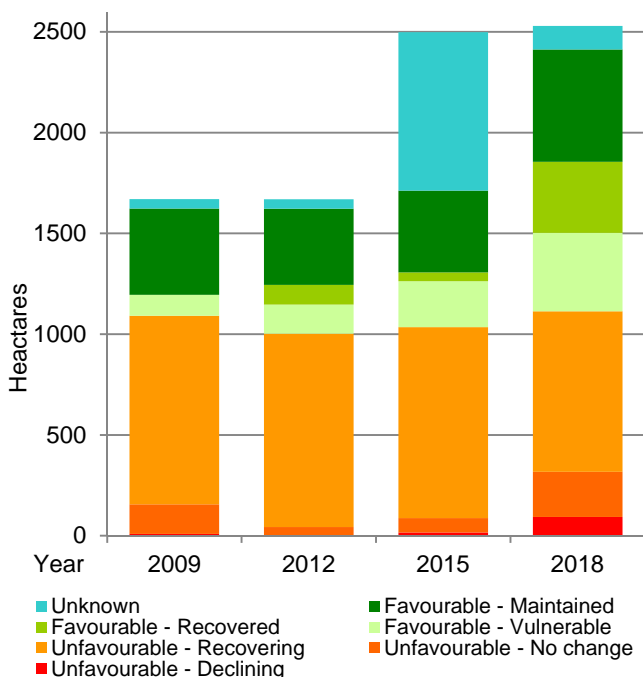


Fig 4a: Condition of all nature reserves, by total number of hectares

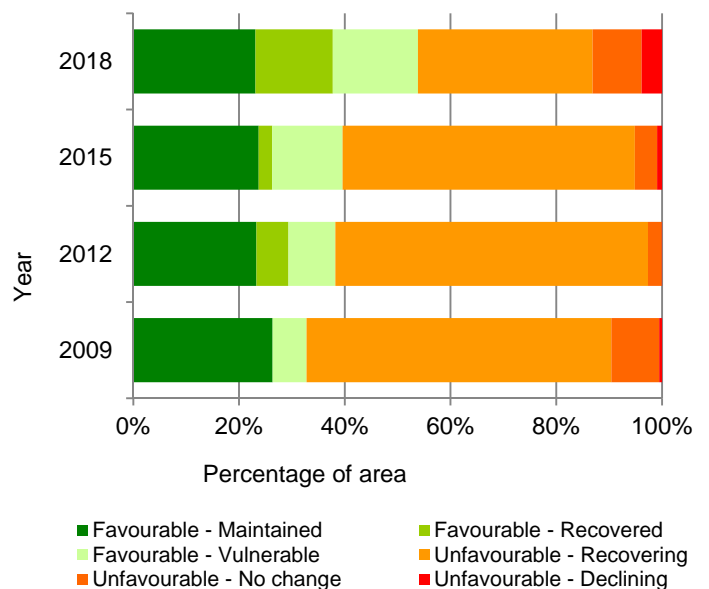


Fig 4b: Condition of features on nature reserves, where known, as a percentage of the total area

It should be noted that in the 2015 report there was an unusually high proportion of unknown land. This was due to the significant expansion (830ha) of the landholding, resulting from taking on West Berkshire and Buckinghamshire Council land. Resources were unavailable to survey all the additional land. Since 2015 staff resources have increased and the monitoring of these nature reserves has been included in the annual monitoring programme; thus enabling their condition to be assessed.

Fig 5 shows the condition trend for the suite of 'indicator' nature reserves (method 2). It can be seen that for these sites the trend is also one of improving condition. The proportion of features in overarching favourable condition has increased from c.30% in 2009 to c.60% in 2018. However it should be noted that the proportion of land which is considered vulnerable and at risk of becoming unfavourable has also increased (<10% in 2009 to c.20% in 2018). The proportion of land considered unfavourable and getting worse while very small at less than 10%, has also increased.

The results from both methods used to assess nature reserve condition over time, show that some nature reserves are in poor condition and are not improving and/or they are getting worse. As a result of the increase in the reserves in poor condition the strategic plan target of 'greater than 95% of nature reserves in favourable or unfavourable recovering condition' has been just missed in 2009 and 2018. However despite this, the data clearly shows that in general the overall trend is one of improving condition.

It is worth highlighting that keeping features in good condition requires significant resources and ongoing site management. When deciding how to spend limited resources maintenance of features in good condition is considered a higher priority than restoring those in poor condition, which can take considerable time and financial resources. Issues and possible solutions to returning sites to favourable condition are discussed in section 2.2.

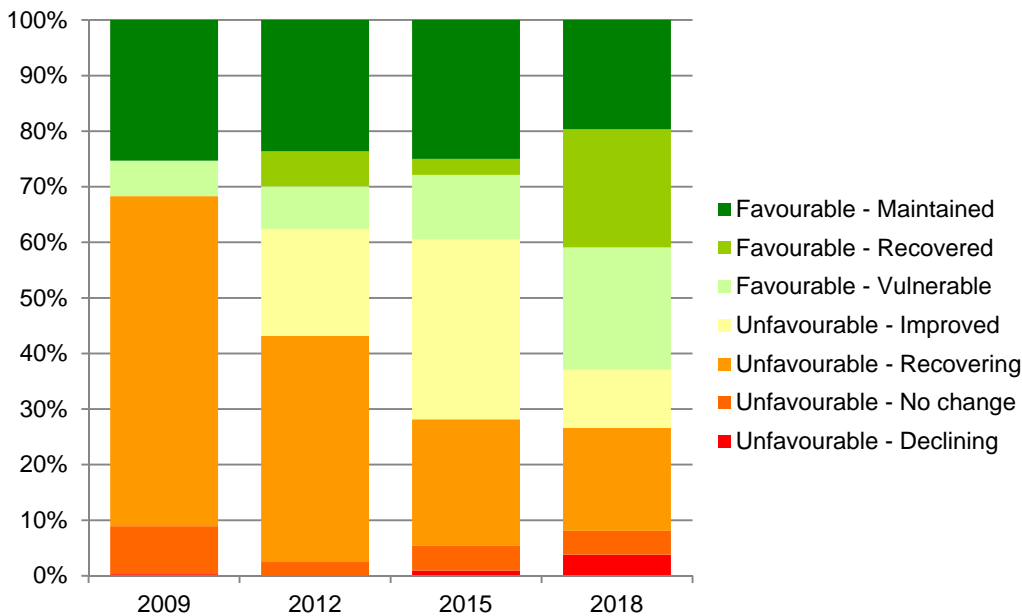


Fig 5: The change in condition of BBOWT 'indicator' nature reserves over time

2.1.3 Feature condition - 2018 snapshot

Fig 6 shows the condition in 2018 of all primary features, across all nature reserves (excluding those which are 'unknown' or secondary features).

The data shows that in 2018, 49% (1000ha) of nature reserves are in favourable status. However, just under half of these favourable areas are defined as being vulnerable, and thus at risk of becoming unfavourable.

37% (782ha) are unfavourable but getting better for wildlife and 14% (291ha) is poor for wildlife and showing no signs of improvement.

When combined, 86% of nature reserves are in favourable or unfavourable recovering condition. This just misses the strategic plan target of greater than 95%.

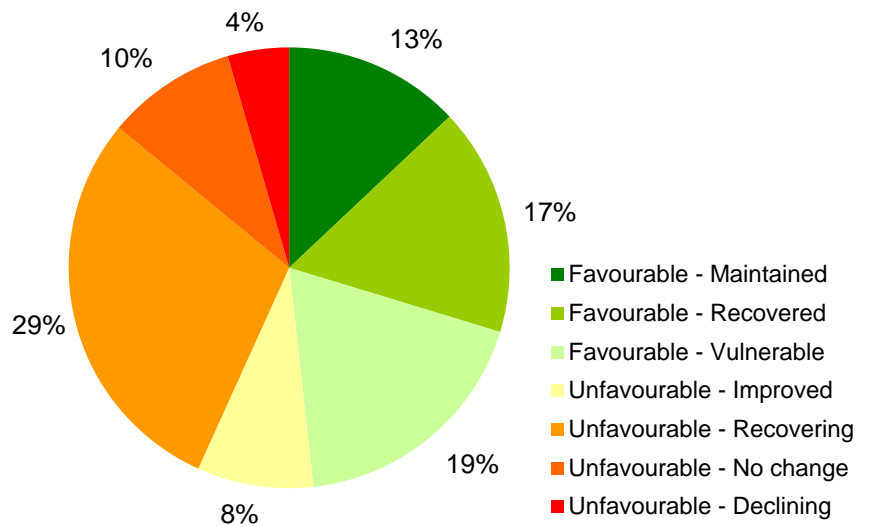


Fig 6: Condition status of all primary features, across all nature reserves, in 2018

2.1.4 Feature condition - breakdown

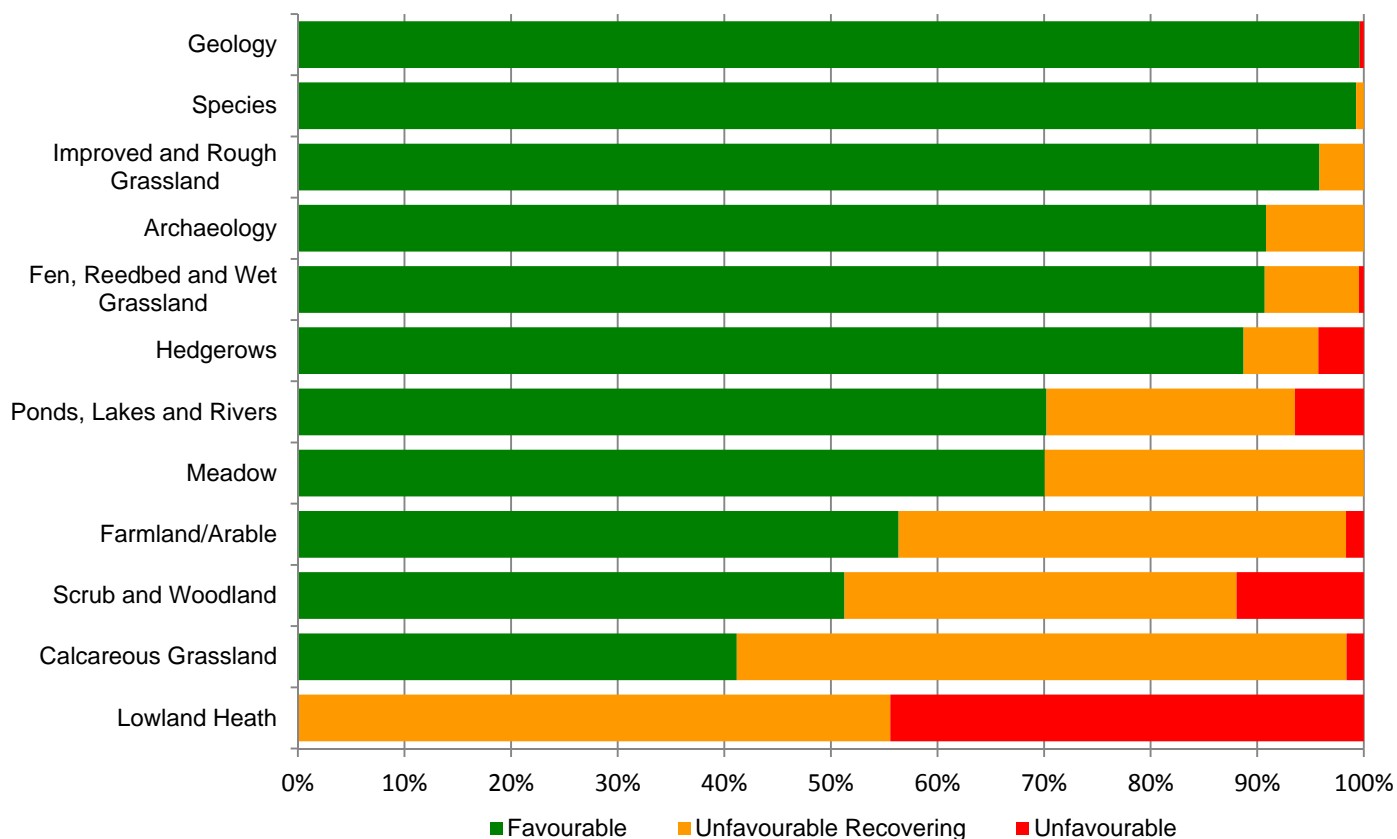


Fig 7: condition of feature groups in rank order, based on proportion in favourable condition

Fig 7 gives a comparison of the 2018 status of the different feature groups found across nature reserves.

It can be seen that 'Geology' and 'Species' have the highest proportion of area in favourable condition. This is perhaps not surprising as these features cover little absolute area and are located on few sites, thus they are easier to maintain in good condition.

Approximately half of the twelve different feature groups are greater than 85% favourable, although this suite does include the non-biological features of 'Geology' and 'Archaeology'. Therefore, only four out of the ten biological features are greater than 85% favourable.

Of the six features with less than 85% in favourable condition it can be seen that calcareous grassland and heathland are in the worst condition, in particular heathland which has no favourable hectares. Remarkably the overarching condition driver for these two features is the same issue, of too high levels of scrub.

The following section provides further detail for each feature in turn. This includes a snapshot of the 2018 condition and condition trends (based on the entire nature reserve portfolio – method 1). Reasons behind the condition trends are briefly discussed. Further issues driving feature condition and potential solutions are discussed in greater detail in section 2.3: Challenges and solutions on reserves.

Where possible, results for BBOWT's nature reserve condition has been compared with national data. It is important to highlight that it can be challenging to draw meaningful species trend comparisons using cross nature reserve data. This is because sites are unique and are affected by a multitude of variables which cannot be easily accounted for in the relatively small dataset they represent.

A number of case studies are also included for each feature to demonstrate a range of individual species and habitat trends at the site level.



Woodland and scrub

Fact File

- 13.7m ha of woodland in the UK, of which 340,000ha is considered to be ancient semi-natural woodland. This is approximately 1.2% of the UK land area
- Key species in Berks/Bucks/Oxon include: hazel dormouse, bluebell, Bechstein's bat, purple emperor, marsh tit
- Key management: cutting rides and glades, coppicing, scalloping ride and woodland edges, deer control, minimal intervention

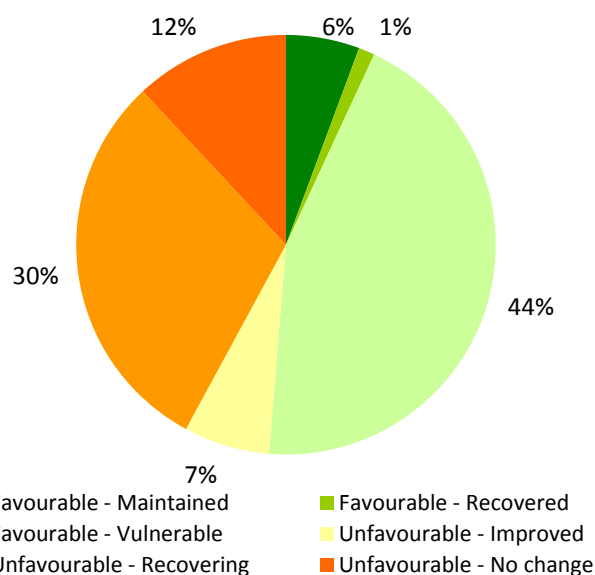


Fig 8: Condition status scrub and woodland

- There are 623ha of woodland and scrub across BBOWT nature reserves
- In 2018 51% of BBOWT woodland and scrub is favourable and 37% is recovering
- 44% of BBOWT woodland and scrub is vulnerable and at risk of becoming unfavourable

Fig 8 shows that the current condition status of nature reserve woodland and scrub is mixed. Approximately half (51%) are in good condition (if very vulnerable) while the remaining 49% are unfavourable, with 37% improving.

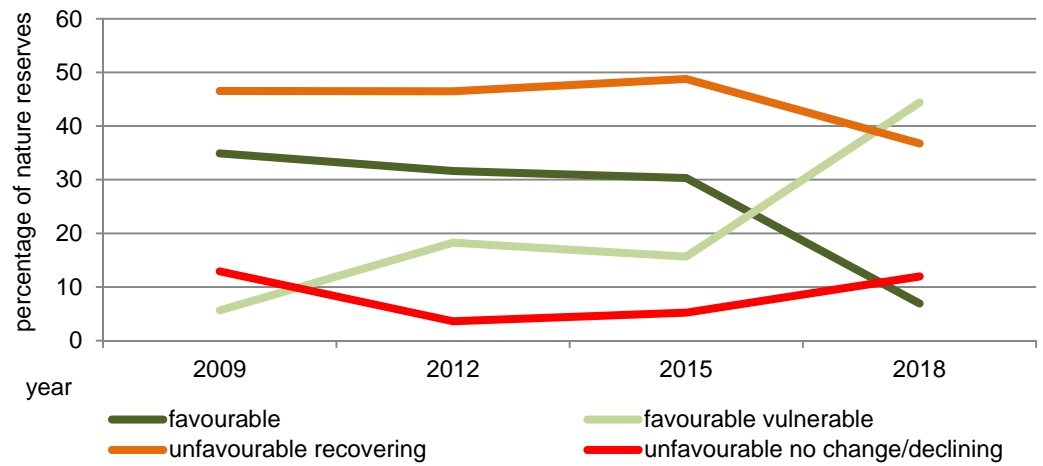


Fig 9: The condition of Woodland & Scrub across all nature reserves, over time

As the largest feature group woodland is located across numerous sites, with the majority of core woodlands found in Buckinghamshire, such as Finemere Wood and Rushbeds Wood. Unfavourable recovering areas include sites such as Little Linford which was extensively clear-felled during the Second World War, and consequently has a very even aged structure, and areas being slowly removed of conifers at Whitecross Green Wood.

Figure 9 shows that the amount of woodland which is vulnerable and therefore likely to become unfavourable, has steadily and significantly increased over the past 10 years (6% to 44%). This movement is primarily in woodlands which were already favourable and are becoming increasingly at risk, rather than those which have just recovered.

The increasing risk is directly related to deer browsing pressure (Fig 10), which negatively impacts on ground flora and suppresses coppice regrowth. In addition to this, over the last 3 years Chalara or ash dieback has also been found across all BBOWT woodlands (see case study 22). To date ash dieback has had a varying level of impact on the Trust's woodland. However the prognosis is poor, with studies from Europe suggesting that only 2 – 5% of the ash population will be unaffected by the disease³. In woodland with a high proportion of ash in the canopy, this disease is likely to have a significant negative impact upon woodland structure and functionality.

Nationally woodland is also under threat. In 2006 only 45% of mixed deciduous woodland SSSIs were classified as favourable. This is also reflected in the trends of some woodland specialist species.

Many woodland specialist birds are in significant decline across BBOWT woodlands, with species, such as spotted flycatcher now a rare visitor. Woodland and scrub butterflies such as silver-washed fritillary and brown hairstreak are faring better, while others such as wood white are on the brink of extinction.

Nationally the trends are not dissimilar, with the UK woodland bird indicator declining by 20% since 1970 and the England woodland butterfly indicator declining by 51% since 1991².

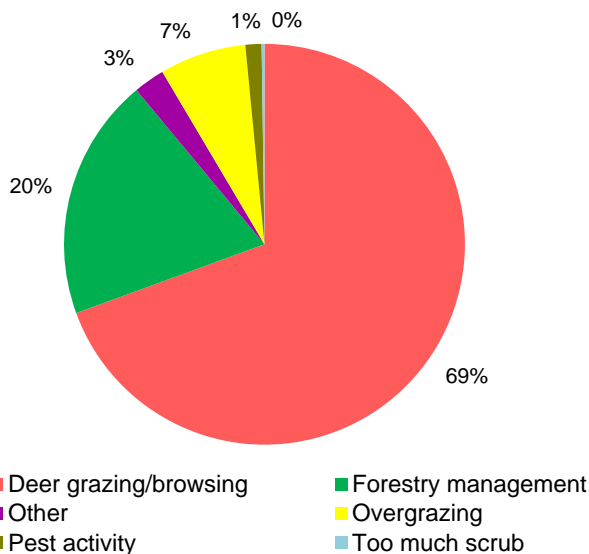


Fig 10: Reasons why woodland and scrub features are unfavourable/favourable vulnerable in 2018

Case Study 1: Coppicing

Warburg Nature Reserve is a remote valley in the Chilterns north of Henley. Much of the reserve is covered in a swathe of mixed deciduous and beech woodland, as well as pockets of chalk grassland. The site warden undertakes an annual rotation of coppice management to improve the structural diversity of the woodland. The creation of open spaces in the woodland increases the abundance and diversity of ground flora which will benefit invertebrate life including butterflies. The management also benefits the reserve's population of hazel dormice and woodland birds which require a dense scrubby understorey for foraging and as a safe location from predators. Several new coppice coupes (each approximately 0.15 hectares in size) have been created each year in a number of the woodland compartments since 2012. Ongoing monitoring of the condition of the woodland clearly demonstrates the improvement in woodland structure and the benefit of this to the ground flora.

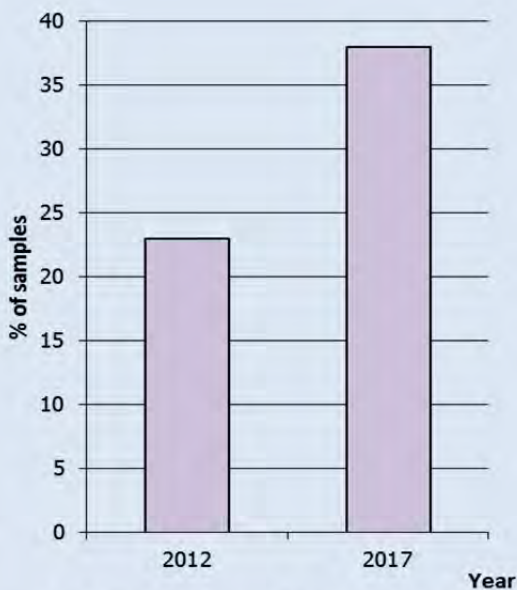


Fig 2: Percentage of samples with violet species

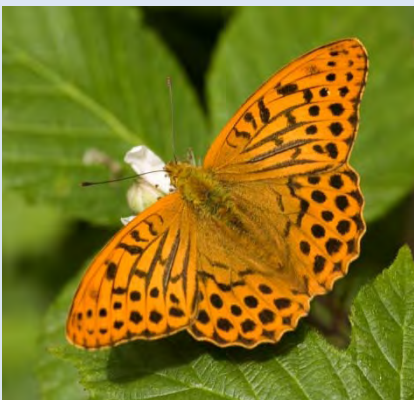


Fig 1 shows that since 2012 there has been an increase in the number

of samples with 20 or more coppice stools, which means there has been an increase in the desired dense understorey. With increased light reaching the woodland floor due to the coppice management, ground flora has responded and a number of species have increased in abundance and distribution as illustrated by violet species which have shown a moderate increase between 2012 and 2017 (see Fig 2).

Violets are an important larval food plant for the silver-washed fritillary butterfly. The annual Butterfly Monitoring Scheme transect survey at Warburg has revealed a clear increase in the silver-washed fritillary population as the species responds to the improved conditions in the woodland as a result of the coppicing work (Fig 3).

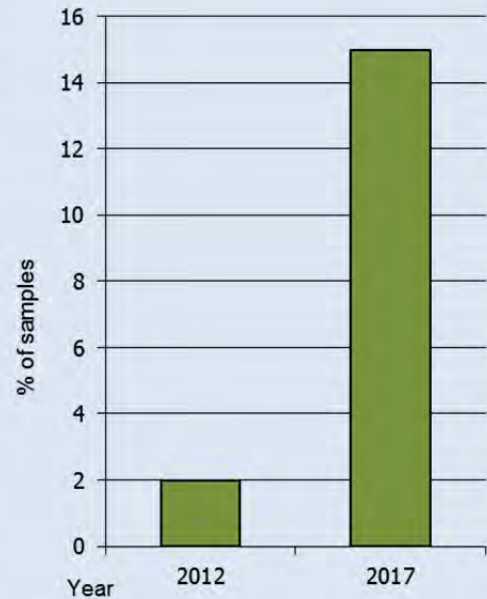


Fig 1: Percentage of samples with 20 or more coppice stools



Fig 3: Silver-washed Fritillary Index Trend

Case study 2: Scrub and nightingales

Hosehill Lake is a Local Nature Reserve managed by BBOWT just south of Theale and is one of several lakes that form the Theale gravel pits complex. Through natural succession the lake's margins have developed a mosaic of woodland, dense scrub and open areas of rough grassland. The areas of overgrown scrub and bramble on the reserve are attractive to a diverse range of nesting warbler species and have been known to support a population of breeding nightingales for a number of years. The annual territory census of the reserve's nightingale population has revealed a sharp decline in breeding numbers and unfortunately no territorial birds were recorded at all in 2018 (Fig 1).

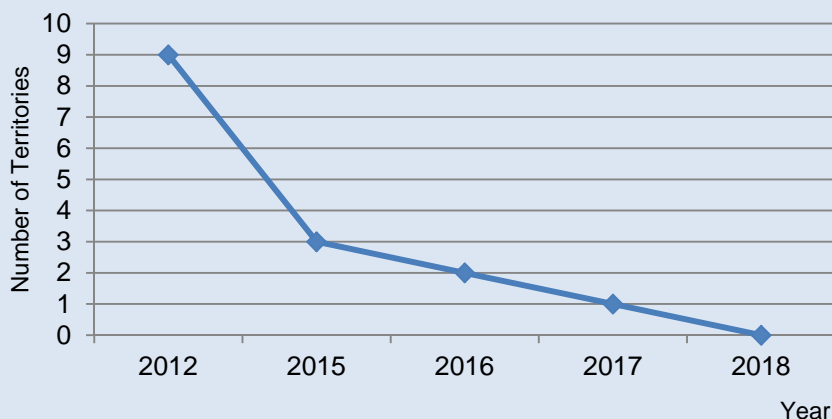


Fig 1: Hosehill Nightingale Territories

The decline in nightingales on the reserve is despite the best efforts of BBOWT staff and volunteers to create favourable breeding and foraging habitat for the species. Work parties have been busy over recent years creating areas of dense scrub and bramble of a range of ages and densities to ensure continuity of this mid-successional habitat.

A 2018 research article⁴ ranked the Theale gravel pits complex as the third 'best' site in the country for nightingales. The complex (which includes Hosehill Lake) is now comfortably considered to be of national significance for the species, so the decline in numbers at Hosehill Lake is especially alarming.

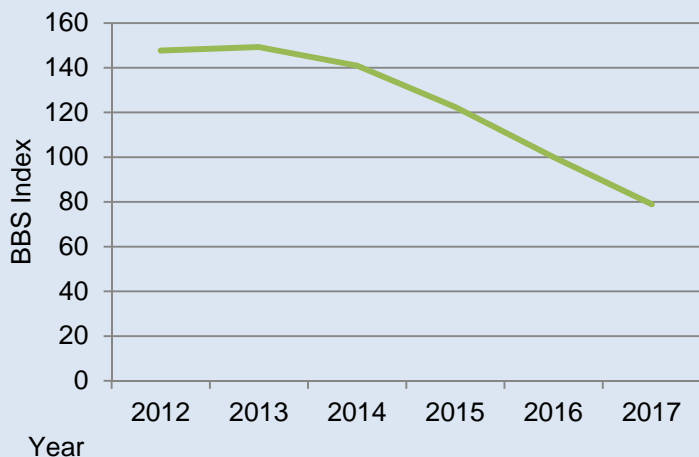


Fig 2: Breeding Bird Survey Index Trend-Nightingales in England

The drop in breeding pairs at Hosehill Lake mirrors the fortunes of the national population which has undergone a 90% decline in the past 50 years according to an ongoing BTO study⁵ (Fig 2). In 2015 nightingale was upgraded from amber to the red list of Birds of Conservation Concern. Much is known about the requirements of breeding nightingales and nowadays habitat management work can be tailored to their exact needs. However, despite the best efforts of conservationists in their breeding grounds, it is thought conditions in their wintering grounds in sub-Saharan Africa are also a large contributing factor to the decline of this migratory species.

Case study 3: Hazel dormouse

BBOWT's Biodiversity Team coordinates hazel dormouse box monitoring schemes on a number of nature reserves. Dormice are a protected species so can only be monitored by surveyors holding a Natural England licence. The survey data collected by BBOWT contributes to the National Dormouse Monitoring Programme coordinated by The Peoples Trust for Endangered Species (PTES). There are around 400 dormouse monitoring sites across the UK.

Dormice are found predominantly in established, semi-natural, traditionally managed woodland and are a flagship-species for that habitat and wider conservation efforts.

Despite ongoing targeted habitat management work (mostly coppicing work) on three BBOWT nature reserves (Bowdown Woods, Chinnor Hill and Little Linford Wood) aimed to benefit the resident dormice populations, monitoring has revealed a decline in all three sites since 2010. In 2018 no dormice were recorded at all three sites.

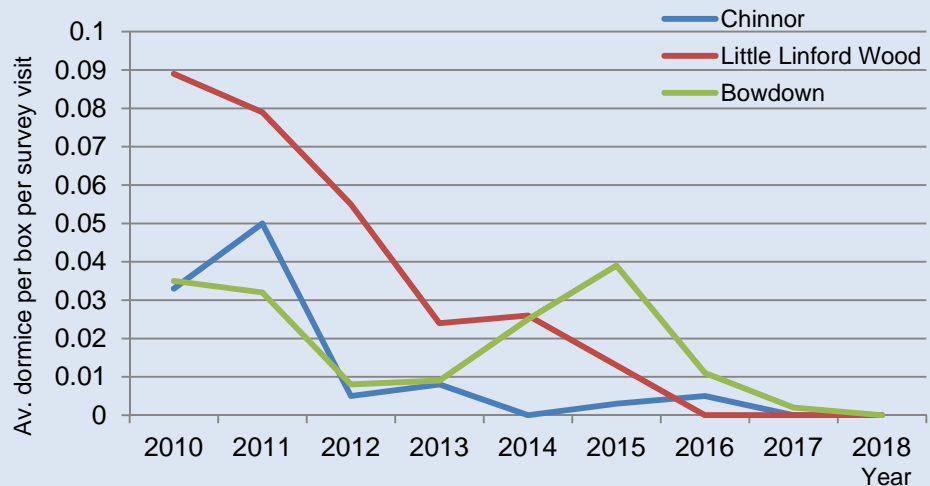


Fig 1: Average dormouse count per box per survey visit on three BBOWT Nature Reserves



Dormouse by Danny Green

The fortunes of the dormice populations on these reserves are mirrored by the national status of the species. It is thought that their national range has shrunk by around a half in the last hundred years. In 1885, dormice were present in 49 English counties; today, they're known in only 32. The long-term decline continues across their range. National monitoring shows the population has fallen in England and Wales by a third since the end of 20th century⁶.

Unpredictable weather patterns adversely affects foraging and breeding success, as well as winter survival rates. Hazel dormice hibernate over winter. During the rest of the year, when they are active, they undergo periods of 'torpor' if the weather is bad. This sensitivity to weather conditions suggests climate change – with warmer, wetter seasons and more extreme weather events – is likely to affect dormouse population.



Meadow

Fact File

- MG4: 1000ha & MG5: 5000 – 10,000ha nationally, with a 97% decline in the 50 years from mid-1930s to the mid-1980s
- Key species in Berks/Bucks/Oxon include: skylark, curlew, snake's-head fritillary, green-winged orchid, great burnet, forester moth
- Key management: cutting and removing hay crop, aftermath grazing, maintenance of drainage

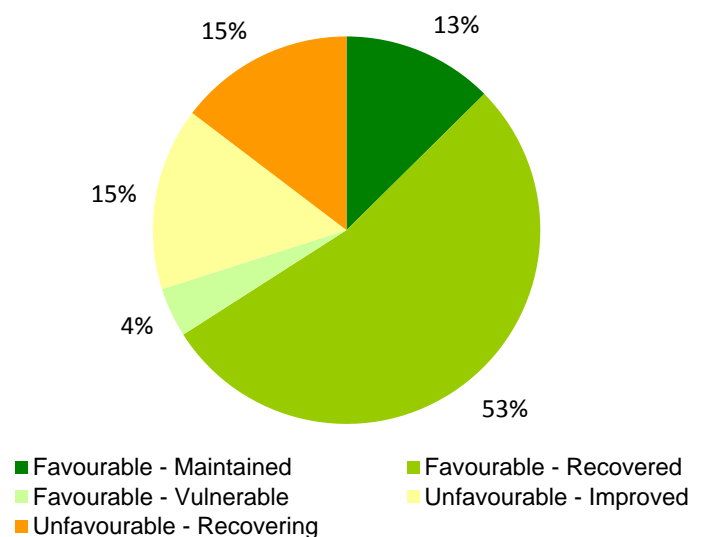


Fig 11: Condition status of Meadows

- There are 502ha of meadow across BBOWT nature reserves
- In 2018 70% of BBOWT meadows are favourable and 30% are recovering
- 53% of BBOWT meadow has 'recovered' post the 2007 summer floods

Meadows across BBOWT nature reserves are generally in good condition with 70% favourable and 30% recovering (Fig 11). Of particular interest is the 53% which has recovered to favourable condition since the previous report in 2015. These recovered features are primarily located at Chimney Meadows and the Upper River Ray which suffered as a result of extensive summer flooding in 2007. Ongoing remedial management over the subsequent 10 years has resulted in these features finally reaching condition, although not quite as good as they were prior to the floods. Further details can be seen in the Chimney case study (no. 4).

Fig 12 clearly shows this post flood recovery. The proportion of recovering meadows remained stable at c. 75% between 2009 and 2015. This dropped down to c. 30% in 2018. This trend is mirrored by the favourable meadows which were c. 20% between 2009 and 2015 and shifted to c.70% in 2018.

Fig 13 shows that by far the most common reason why meadows managed by BBOWT are out of condition is a lack of control over water levels. This is perhaps not surprising given that floodplain meadows are driven by their hydrological regime and as such are particularly sensitive to frequent high or low water levels and summer flooding events.

There is limited national data regarding the condition of meadows, as the State of Nature report has combined all types of grassland and lowland heathland together. When looking at Floodplain Meadows only it is clear that they are currently under threat with only c. 2980ha remaining in England and Wales and 45% of sites designated for MG4 in poor condition⁷.

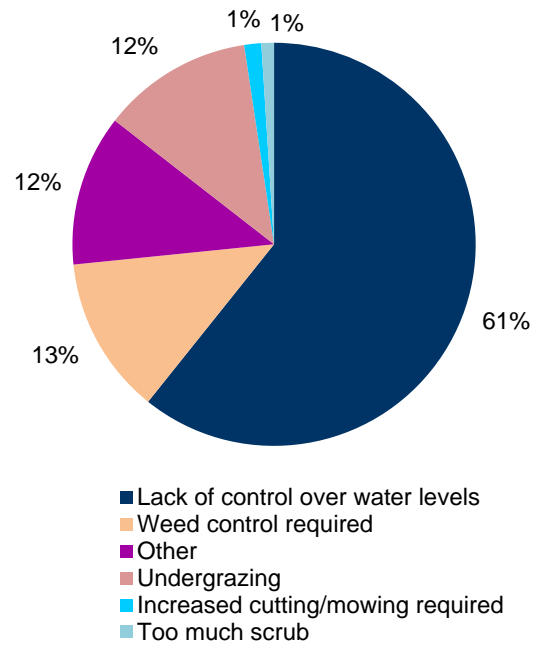


Fig 13: Reasons why meadow features were unfavourable/favourable vulnerable in 2018

The individual status of flora species found within the types of meadows that BBOWT manages varies depending on the species.

For example, green-winged orchids are classified as 'vulnerable', with England holding a significant proportion of the UK population; while other species such as great burnet are classified as 'least concern'⁸.

The snake's-head fritillary is an iconic, rare species associated with floodplain meadows. The fritillary population is strongly linked to flooding events, and the population at Iffley Meadows tends to reflect this, with some evidence that areas with condition decline also show a decline in snake's-head fritillary numbers.

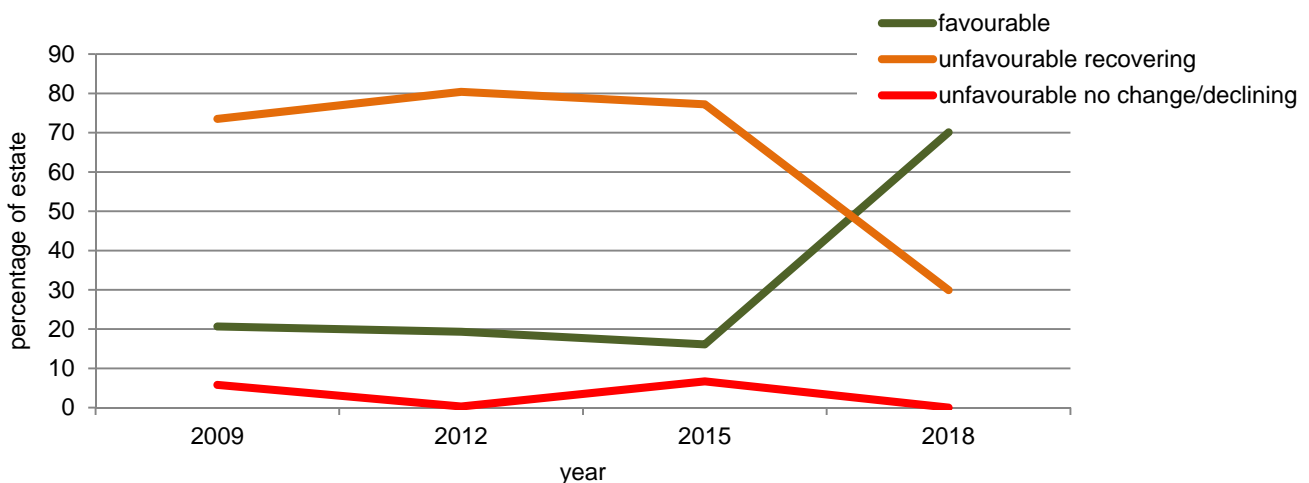


Fig 12: The condition of meadows across all nature reserves over time

Case study 4: Summer flooding recovery

Chimney Meadows is one of BBOWT's largest reserves. The reserve has a range of habitats including wet grassland and includes species-rich hay meadow. The most diverse and interesting hay meadows are found on the National Nature Reserve (NNR) element of the site.

In December 2004, green hay from the NNR was used on the surrounding arable reversion fields to improve species diversity and abundance. Exceptional weather in 2007 and again in 2008 led to extreme flooding events on the lower lying areas of the reserve including the NNR. The flooding in 2007 was the worst in the Thames catchments since 1964. The flooding struck during the summer when most species had set seed, covering affected fields with algal growth and affecting soil chemistry. Access was not possible to the NNR and hence there was no hay cut taken in both years. Aftermath grazing was limited reducing the amount of dead matter removed.

The flooding events and subsequent lack of traditional hay meadow management had an immediate and very obvious impact on the quality of the hay meadow sward of the NNR.

Fortunately, the weather has been more favourable since the successive flooding events of 2007 and 2008, allowing annual hay cuts and aftermath grazing associated with traditional hay meadow management. This has allowed a slow recovery in species diversity and abundance of the NNR.

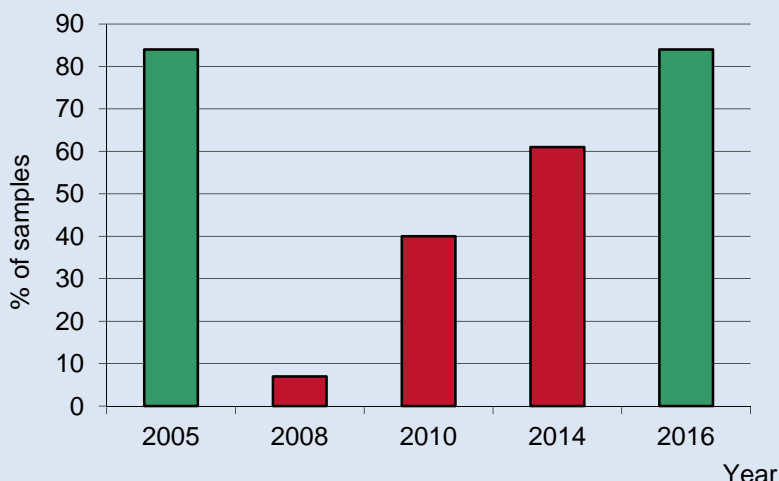


Fig 1: Percentage of samples with >40% herbs in Upper Baingey meadow, NNR

Herb abundance was in favourable condition (green) in 2005 before the flooding of 2007 and 2008. Post-flooding herb abundance remained in unfavourable condition (red) until finally recovering to pre-flooding levels in 2016 (Fig 1). It is hoped the next round of monitoring on the NNR in 2019 will reveal a further improvement in herb abundance.

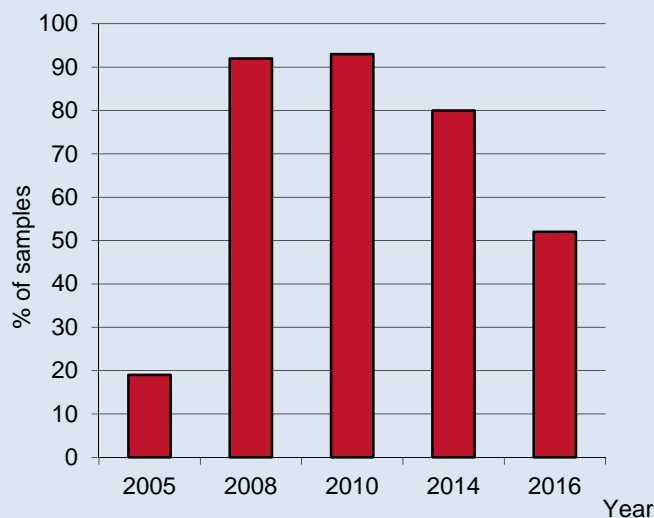


Fig 2: Percentage of samples with >10% wet spp (eg tufted hair grass, rushes, large sedges) in Upper Baingey Meadow,

Species diversity has also slowly improved since 2008. Quaking grass, meadow vetchling, buttercup species, knapweed species and sweet vernal grass have all shown a gradual recovery since the flooding.

With the lack of hay cutting and aftermath grazing in 2007 and 2008, undesirable coarse wet species were able to dominate the sward to the detriment of the more favourable finer herbs and grasses. The reinstatement of the annual hay meadow management, post flooding, has begun to suppress the wet-loving species once again (Fig 2).

Despite better conditions in recent years and the recovery of the meadows, there are still some species which have not reappeared. Both cowslip and crested dogs-tail, two former favourable components of the NNR sward, have not been recorded since the last round of NNR monitoring in 2005. Both species are not tolerant of flooding and may take many years to recolonise.

Case Study 5: Balancing meadows and hedges

BBOWT's Bernwood Meadows was designated a Site of Special Scientific Interest (SSSI) in 1981. The primary feature of the SSSI is the species-rich neutral grassland (approx. 7 ha) consisting mainly of the MG5 community type. The majority of the management work on site is focussed on ensuring the SSSI Conservation Objectives are met. The meadows are maintained by an annual hay cut in mid-July and aftermath grazing by cattle in late summer and autumn.

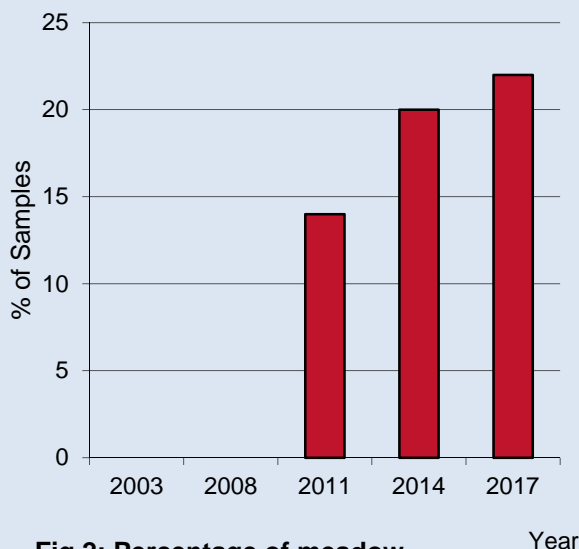


Fig 2: Percentage of meadow samples with scrub recorded (red - unfavourable)

Young blackthorn sucker growth spreading out from the base of the hedgerows is particularly important for brown hairstreak egg laying. The annual brown hairstreak egg count records the majority of eggs in the sucker growth rather than the hedgerows themselves.

Ongoing management of the site has to ensure the hedgerows have abundant sucker growth, but at the same time ensuring that the sucker growth does not encroach into the meadows to the detriment of the rare flora. This is a difficult balancing act, and monitoring is critical in helping ensure that both elements are in good condition.

It is evident from Fig 1 that there has been a recent increase in the amount of blackthorn sucker growth in the hedgerows for brown hairstreak egg laying. In 2016 over 70% of hedgerow samples monitored included sucker growth which was above the acceptable lower limit. However, at the same time the amount of young scrub in the meadows has steadily increase, suggesting the sucker growth is encroaching beyond the hedgerow edges (Fig 2).

Despite the encroachment of young scrub from the hedgerows, the meadows have remained species rich and in favourable condition. Since 2003, more than 90% of monitoring samples have recorded two or more key associated flora species (Fig 3). Future management of the site will need to control the scrub levels in the meadow to ensure there is no drop in quality of the neutral grassland sward, whilst also maintaining high levels of blackthorn sucker growth in the hedgerows for brown hairstreak egg laying.

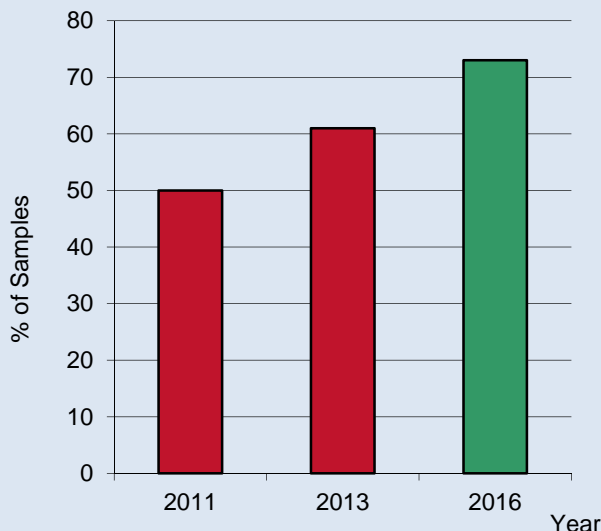


Fig 1: Percentage of hedgerow samples with blackthorn sucker growth present (green - favourable, red - unfavourable)

The meadows are bordered by a network of hedges dominated by blackthorn which support important populations of both brown and black hairstreak butterflies. Rotational coppice management of short sections of hedgerow on an annual basis, ensure that both mature blackthorn (for black hairstreaks) and young blackthorn (for brown hairstreaks) are in abundant supply.

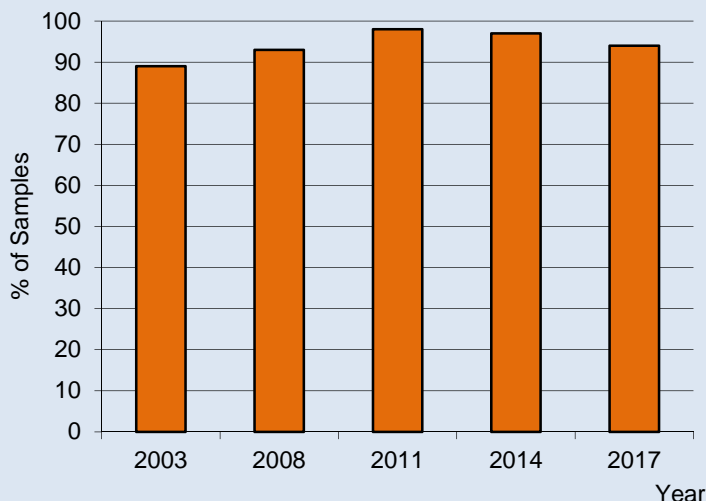


Fig 3: Percentage of meadow samples with at least 2 key associated flora species



Lowland heath

Fact File

- 95,000ha in the UK, which is 20% of the global resource of lowland heath habitat
- Area of heathland in the UK has decreased by 80% since 1800
- Key species in Berks/Bucks/Oxon include: nightjar, woodlark, Dartford warbler, adder, silver-studded blue butterfly
- Key management: scrub control, grazing or heather mowing, bracken control

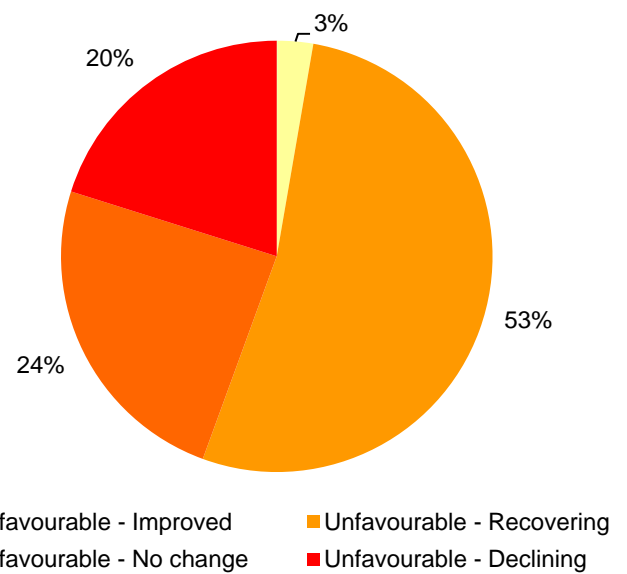


Fig 14: Condition status of BBOWT Lowland Heath

- There are 460ha of lowland heath across BBOWT nature reserves
- In 2018 0% of BBOWT heathland is favourable and 56% is recovering

Lowland heathland across BBOWT's nature reserves is undoubtedly in poor condition and is by far the feature most under pressure. Fig 14 shows that in 2018 no hectares of heathland were assessed as being favourable.

Fig 15 shows that over the last ten years the amount of favourable heathland has always been a very low proportion (c. <15%). Since 2012 the proportion of land which is recovering towards being favourable has declined and the condition of this land has got worse.

There are two main drivers behind heathland features being classified as unfavourable; these are volumes of scrub being too high and overgrazing (Fig 16). Heathland, as a mid-successional habitat, is highly susceptible to invasion by scrub such as silver birch and regenerating pine trees (often a result of land use prior to restoration).

The increase in the proportion of heathland being unfavourable is also driven by the acquisition of new 'out of condition' heathland sites as part of the transfer of West Berkshire Council Land. For example much of Greenham Common is lowland

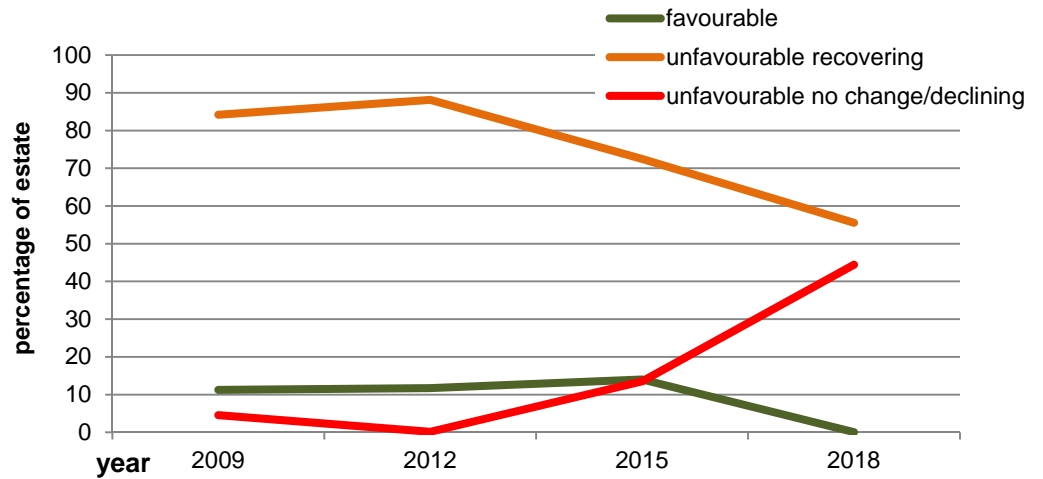


Fig 15: The condition of lowland heath across all nature reserves, over time

heathland. This site has a complex range of issues including the high grazing pressure carried out by Commoners' livestock, who have grazing rights on the site.

The vast majority of BBOWT's heathland is located in Berkshire and surrounded by urban and/or industrial land use. This type of neighbouring land use often creates issues which can make active site management difficult. Additionally, high levels of antisocial behaviour can use up large amounts of staff time, resulting in less available time for proactive conservation work.

Although much effort has been put into addressing issues at Greenham and the other heathland sites there is some way to go before the results will be seen on the ground.

BBOWT heaths are not alone in being in poor condition. Across the UK as a whole, SSSI lowland heath is in poor condition⁹, with only 17% being assessed as in favourable condition and 33% unfavourable no change.

Non-SSSI lowland heathland is in even worse condition. 0% of samples were found to be in favourable condition when assessed against condition targets for SSSIs and species poor heathland¹⁰. When less stringent higher level stewardship scheme targets are applied, the picture does not significantly improve, with only 5% of the dry heathland samples in favourable condition.

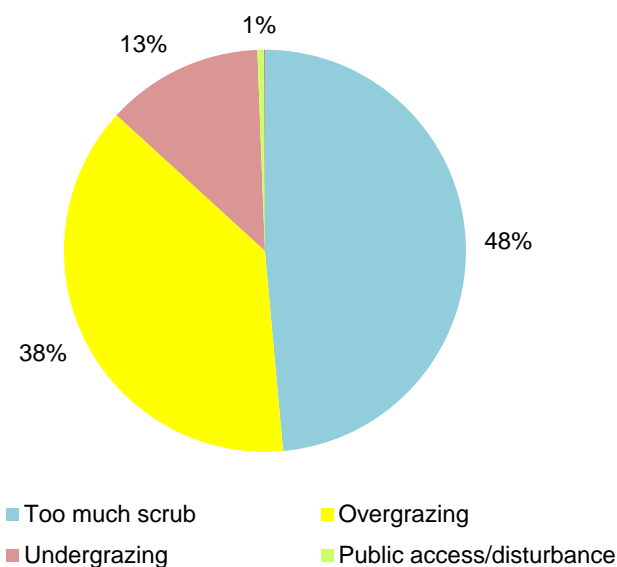


Fig 16: Reasons why Lowland Heath features are unfavourable/favourable vulnerable in 2018

Case study 6: Lichen Heath

BBOWT's Calvert Jubilee, east of Bicester, is a former clay extraction pit (for the brick industry) which has developed a mosaic of habitats rich in wildlife. As well as the lake with reedbeds and large blocks of scrub, a sparse layer of vegetation has developed to the north of the lake which was briefly used as a municipal tip. The natural soil in this area has undergone a complete transformation, having been largely covered by a layer of waste clay (60+ cm) extracted from the clay pit. This 'calow' has not yet had time to weather to support anything other than the sparsest of vegetation known as lichen heath. This area is an interesting example of the colonisation of this type of waste. Bryophytes are an important component of this area with other colonisers present such as barren strawberry, coltsfoot, mouse-ear hawkweed, fairy flax, common centaury and blue fleabane.

The annual butterfly monitoring transect on the reserve has revealed a gradual increase in dark green fritillaries recorded in the area of the lichen heath since the first was recorded in 2013 (Fig 1). Nationally the dark green fritillary population has decreased by 43% between 2012 and 2017, but over the longer term the butterfly is fairing better with a significant increase (160%)¹¹.

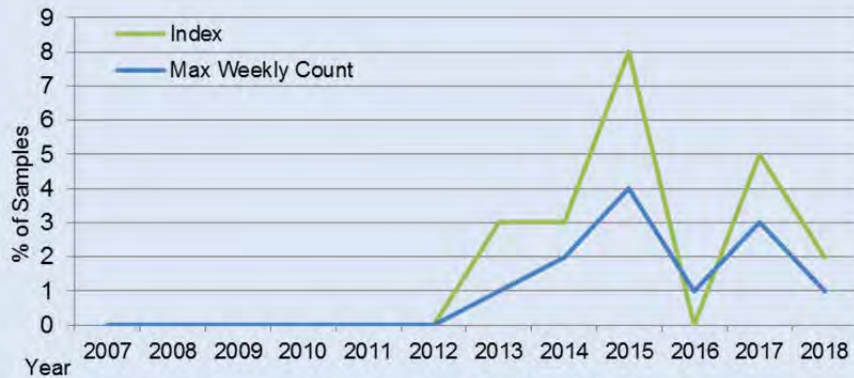


Fig 1: Dark green fritillary Index and Max Weekly Count at Calvert

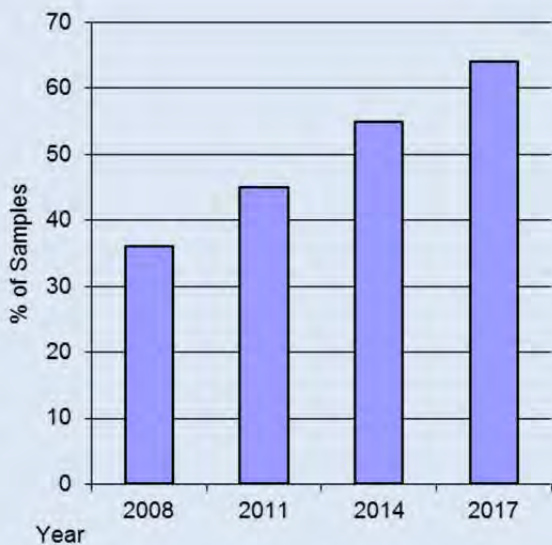


Fig 2: Percentage of samples with hairy violet

The increase in dark green fritillaries can be explained by the increase in the presence of the butterfly's larval food plant, hairy violet, amongst the sparse sward of the lichen heath. Condition assessments of the habitat every three years have revealed a gradual increase in the percentage of monitoring samples with hairy violet present (Fig 2).

The condition assessments have also shown that the amount of bare ground in the lichen heath is reducing, whilst sward height and scrub amounts are increasing through the process of natural succession. The annual management programme for the habitat will have to be quite intensive to maintain the current lichen heath and allow the dark green fritillary population to thrive.

Case study 7: Reptiles at Decoy Heath

Decoy Heath is a small reserve on the Berkshire-Hampshire border with around 3ha of lowland heath. The site is currently isolated from other heaths although they are present in the surrounding landscape, with Padworth Common, Silchester Common and Tadley all nearby, and pockets of heath within the neighbouring conifer plantations. Historically the landscape was dominated by mixed heath and woodland, but since the mid-19th century development and commercial forestry has fragmented and destroyed these habitats.

BBOWT has managed the site since the early 1990s. Although small it has been known since the 1980s as a good site for wildlife associated with heathland, including dragonflies, butterflies, birds and reptiles. The site is unsuitable for grazing, and the focus of management is to check ecological succession through mechanical methods, to maintain the heath and wetland areas.

Reptile monitoring using artificial refugia (mostly corrugated tin sheets) has been carried out for many years, but with varying numbers of sheets and different surveyors, checking at different intervals. Survey effort has been relatively standard since 2011, and the maximum counts from any one visit are shown in Fig 1. The results show low numbers of each species with the trends for adder and common lizard fairly stable. Grass snake numbers have declined over the last 7 years and if this trend continues the future of the species at Decoy Heath will be in doubt. National trends for all “common” reptile species show a decline in populations. The overarching reasons are likely to be continued fragmentation of habitats preventing dispersal and genetic variation, direct loss of habitat (including damage to hibernacula), disturbance from human activity, and increased predation from pheasants.

At Decoy Heath in 2018 there were at least 4 snake deaths (2 adders and 2 grass snakes) caused by deliberate squashing under monitoring tins or bludgeoning. This is a criminal offence, but almost impossible to police. The site is well known for reptiles, and well visited by naturalists and photographers in the spring and summer. Inadvertent disturbance and/or deliberate harming could be devastating to the already small populations on site. As a precaution, the monitoring tins have been removed as they give the casual visitor easy access to the vulnerable snakes. During 2019 the population will be carefully checked using an alternative approach. Hopefully this will be a short-term measure and the killing and disturbance will cease, and tin monitoring can resume in future years.

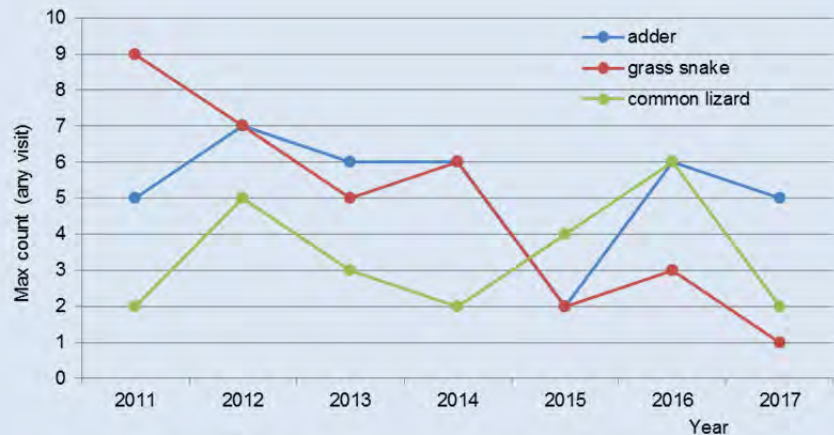


Fig 1: Maximum total count of reptiles from refugia, from any visit, at Decoy Heath



Male adder



Calcareous grassland

Fact File

- Just under 40,000ha in the UK
- Key species in Berks/Bucks/Oxon include:
Adonis blue, chalkhill blue, silver-spotted skipper, military orchid, monkey orchid, juniper.
- Key management:
grazing, scrub control

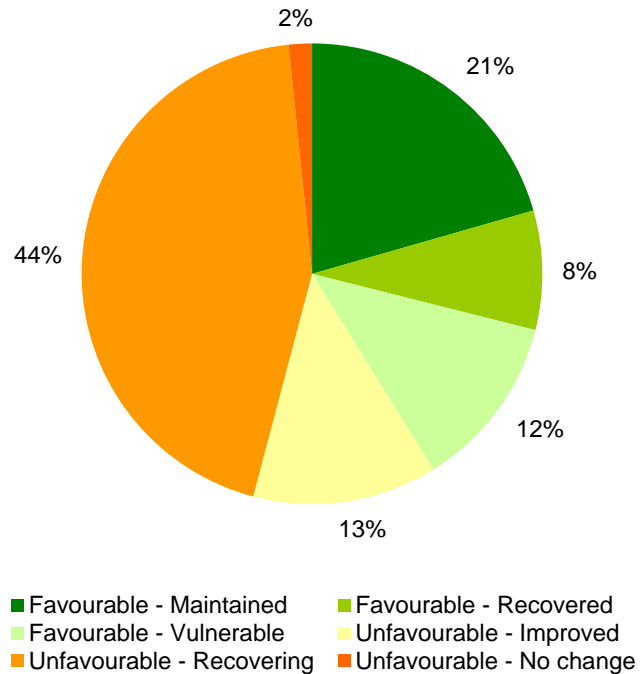


Fig 17: Condition status of BBOWT Calcareous Grassland

- There are 139ha of calcareous grassland across BBOWT nature reserves
- In 2018 41% of BBOWT calcareous grassland is favourable and 57% is recovering

Across BBOWT nature reserves calcareous grassland is struggling to meet condition, with less than half classified as being favourable (Fig 17).

However, it can be seen that over time a reasonable proportion of BBOWT chalk grassland has moved from being unfavourable (Fig 18). In 2009 the ratio of favourable to unfavourable was 20:80% while in 2018 this has shifted to 40:60%.

This reflects increased conservation work on chalk grasslands. In particular the Chalk Grassland Project which ran between Jan 2010 and Dec 2012 can be seen to have had a positive impact upon chalk grassland, with a significant increase in condition during this time period. Since then there has been a slow and slight increase in condition.

The main driver behind calcareous grassland being classified as being in poor condition is when scrub is too abundant (Fig 19). Chalk grassland is very susceptible to invasion by scrub species, especially dogwood and clematis. These plants can be particularly difficult to control as mechanical methods or the use of herbicide are often not appropriate as they could damage any floristically diverse areas under the scrub.

For example the chalk grassland at Bacombe has too high volumes of scrub. In order to try and address this a work party has been established and grazing reintroduced after a period of no grazing just prior to the site coming into BBOWT management control. At Chinnor Hill and Oakley Hill clematis remains a significant problem despite trialling different management strategies including scraping large areas to create open bare chalk.

Nationally chalk grassland SSSIs are also struggling to meet condition with only 29% being classified as in favourable condition status⁹.

As expected there is a mixed picture regarding the fortunes of associated specialist species. Chalk grassland specialist butterflies, such as Adonis blue and silver-spotted skipper, have both significantly increased their population sizes since 1979 (140% and 839% respectively)¹¹. These two species have benefited from the warmer summers the UK is now experiencing as a result of climate change. Conversely, other species such as grizzled skipper are doing less well. This butterfly has declined by

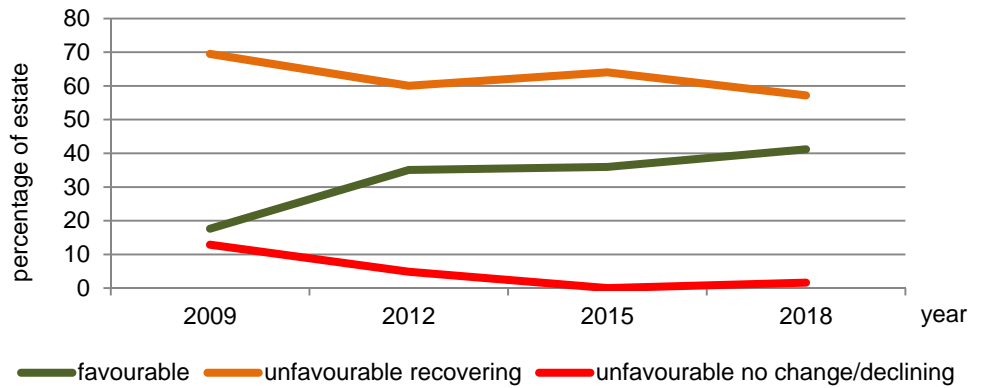


Fig 18: The condition of calcareous grassland across all nature reserves over time

43% since 1979, with the 2016 season being the worst on record¹¹. The reasons behind the decline are unclear.

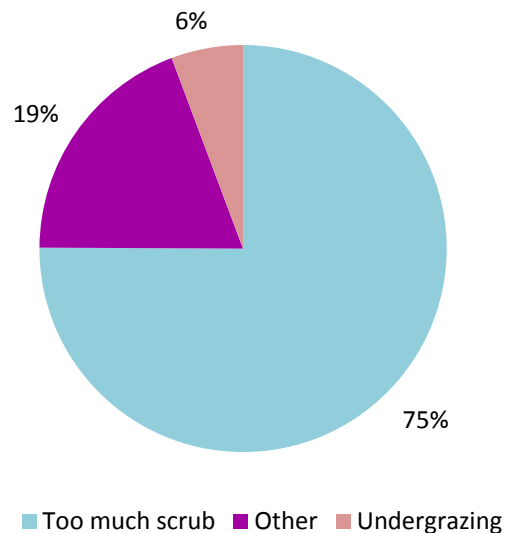


Fig 19: Reasons why Calcareous Grassland features are unfavourable /favourable vulnerable in 2018

Case study 8: Restoring chalk grassland

Covering a large area of the north west of Dancersend nature reserve, the extension stretches over a relatively steep escarpment slope. This area was previously semi-improved calcareous grassland, but in recent years has been subject to a restoration project to create a species-rich habitat.

The aim of the project was to create a habitat similar to the small pockets of chalk grassland on the neighbouring SSSI. It was also hoped the extension would act as an additional refuge for scarce and vulnerable species found within the SSSI.

In 2012 c.9ha of the extension was prepared for restoration with intensive grazing, weed control (e.g. ragwort and creeping thistle) and the creation of scrapes. A seed mix purchased from a commercial seed company (Emorsgate) and seed collected from the neighbouring Dancersend SSSI were sown across the area. Aftercare included further careful grazing and weed control. In addition, a number of key species, including horseshoe vetch and meadow clary, were introduced as plug plants to the newly created scrapes. Four small blocks of scrub (a mix of native species) were also planted in fenced enclosures adjacent to two of the main scrapes in 2013.

BBOWT's Reserves Monitoring Programme has been able to assess the success of the restoration project by monitoring any changes in the condition of the grassland sward as well as the butterfly assemblage on site.

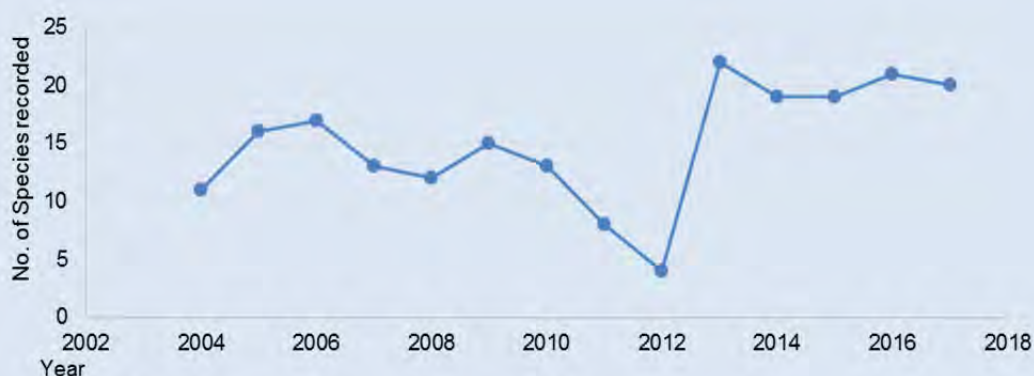


Fig 1: Butterfly Assemblage at Dancersend Extension

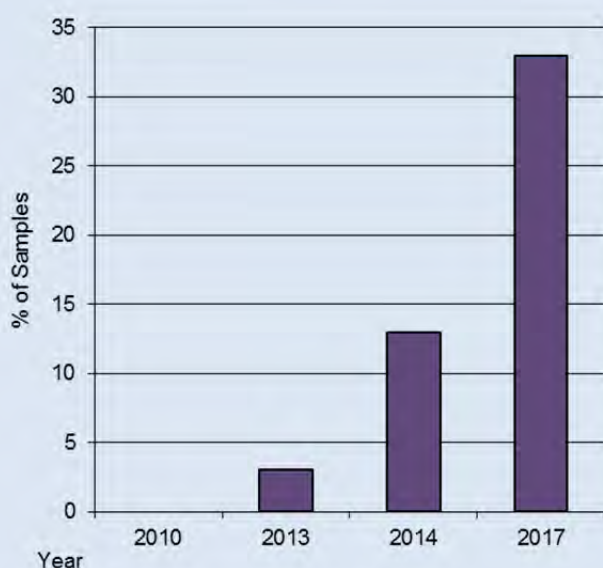


Fig 2: Percentage of samples with wild marjoram in compartment 17

Since restoration work began in 2012, butterfly species diversity has increased from a mean of 13 species (between 2004 and 2011) to an average of 20 species being regularly recorded each year on the butterfly transect (Fig 1).

New species recorded on the transect since 2012 include dingy skipper, green hairstreak, brown argus and dark green fritillary. There are also recent ad hoc records of small blue. The improved butterfly assemblage is as a result of more larval food plants and nectar sources present in the grassland sward. Condition assessments have recorded an increase in key flora species such as wild marjoram (see Fig 2), bird's-foot-trefoil, salad burnet, clustered bellflower, hairy violet and wild basil.

Case study 9: Sward height and butterflies

Warburg Nature Reserve is a remote valley in the Chilterns north of Henley. Much of the reserve is covered in a swathe of mixed deciduous and beech woodland, as well as pockets of chalk grassland. A Butterfly Monitoring Scheme transect has been walked on the reserve every year since 2008, and has helped BBOWT assess the changing fortunes of the butterfly assemblage in relation to ongoing habitat management work. The transect crosses several areas of chalk grassland as well as passing through the surrounding woodland and scrub.

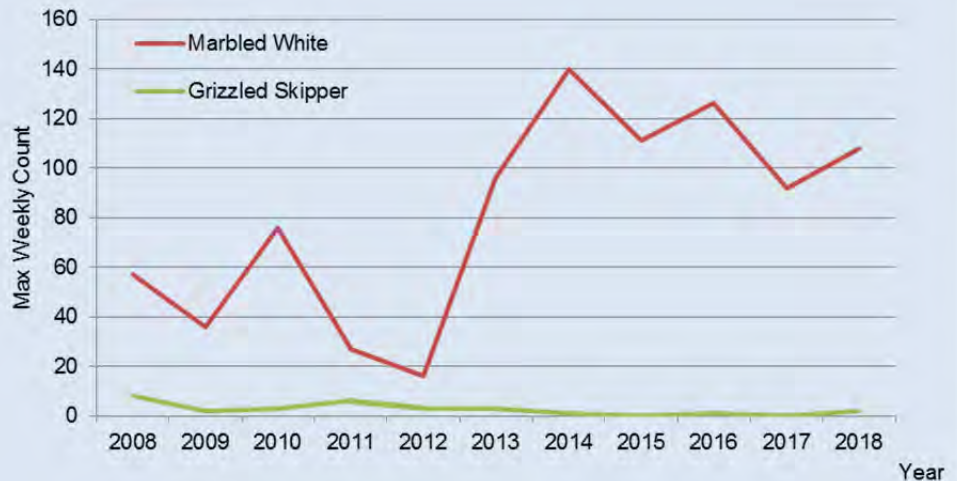


Fig 1: Marbled white & grizzled skipper at Warburg

It is evident from the data collected that two species found in the chalk grassland have had contrasting fortunes in recent years. Whilst grizzled skipper has gradually declined to very low numbers, marbled white numbers have shown a rapid increase since 2012 (Fig 1). This trend also mirrors national data, with grizzled skipper significantly declining in both the short and long-term (-54% between 1976 – 2007) and marbled white populations increasing (50% between 1976 – 2007)¹¹.

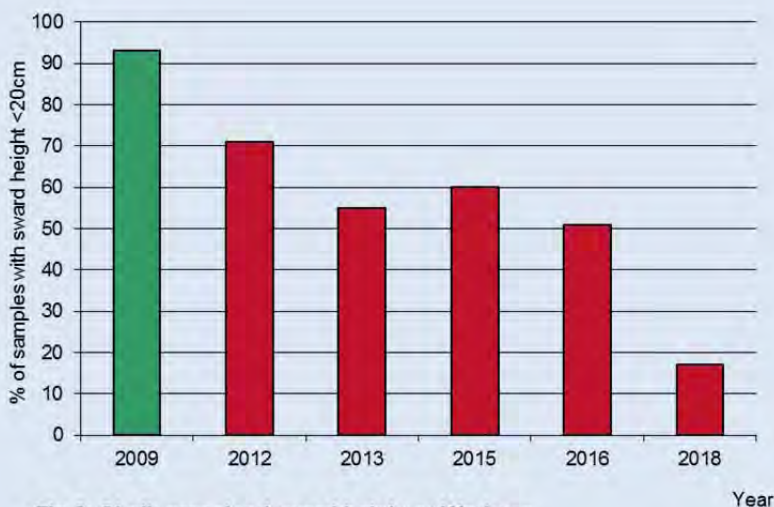


Fig 2: Chalk grassland sward height at Warburg

20cm, in contrast to less than 20% in 2018 (Fig 2). It is evident the taller chalk grassland sward is now more favourable for marbled white than for grizzled skipper.

The change in sward height may relate to the rabbit population at Warburg which was particularly high some years ago, resulting in a heavily browsed sward. In recent years rabbit numbers have declined and grazing input has been more reliant on Trust owned sheep. Ongoing management is focused on trying to achieve a balance between the ideal conditions for both species.

It is known that marbled white butterflies occur on all soils except the most acid, and on almost every unfertilised chalk or limestone hillside. They have benefitted where the sward has been left to grow quite tall as they utilise these areas for roosting. In contrast, grizzled skippers favour grassland swards generally less than 10cm tall with bare patches of ground where the males can bask in the sun. Grizzled skippers are known to lay their eggs on wild strawberry plants which also need a low sward and bare ground to flourish.

Regular condition assessments of the chalk grassland have identified a change in sward height over recent years. In 2009, over 90% of monitored samples recorded a sward height of less than



Ponds, lakes and rivers

Fact File

- The UK has over 300,000km of rivers, 200,000 hectares of lakes and half a million small ponds.
- Key species in Berks/Bucks/Oxon include: breeding and over-wintering wildfowl and waders, breeding terns, water voles and great-crested newts.
- Key management: bankside vegetation work, maintaining islands (incl artificial tern rafts), creating new ponds.

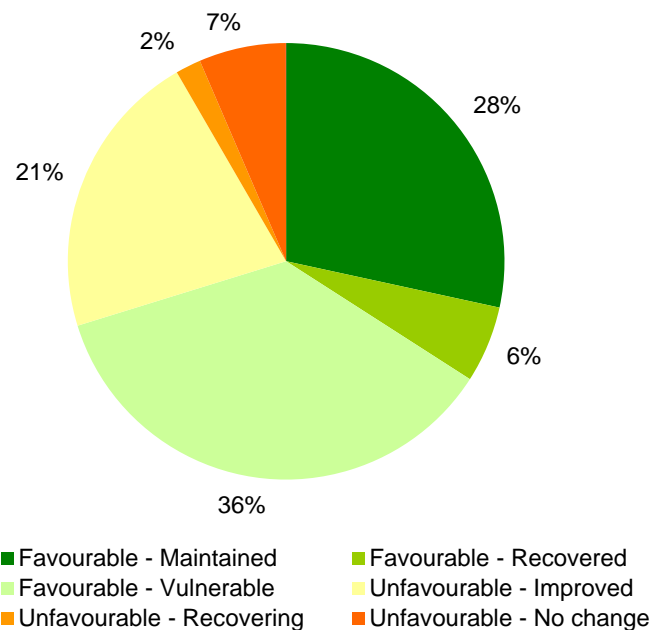


Fig 20: Condition status of BBOWT Ponds, Lakes and Rivers

- There are 121ha of ponds, lakes and rivers across BBOWT nature reserves
- In 2018 70% of BBOWT ponds, lakes and rivers are favourable and 23% are recovering

Overall BBOWT's ponds, lakes and rivers are in reasonable condition, with approximately 70% in favourable condition (Fig 20).

Over the last three years there has been a substantial push towards favourable status, with 21% being classified as favourable-improved condition (ie close to favourable condition) in 2018 (Fig 20). This 21% is derived from a range of features such as the open water and island at Loddon Nature Reserve, and the chalk stream at Letcombe Valley.

At the Loddon a significant amount of work has taken place in recent years to clear scrub and vegetation back from the island, to promote bare ground for nesting birds such as oystercatcher and common terns. Only a single pair of oystercatchers regularly nest on the island and there are no signs of common terns, so despite the work, the feature cannot yet be classified as favourable.

At Letcombe Valley during the winters of 2016 and 2017, flow deflectors were added into the chalk stream with the aim of increasing the rate of flow of water, which will benefit aquatic wildlife such as fish and invertebrates. Additionally, significant amounts of bankside scrub and trees have been removed enabling the sunlight to reach the river banks, thus promoting the growth of marginal vegetation. Lush bankside vegetation is very important for the small and vulnerable population of water voles in the vicinity.

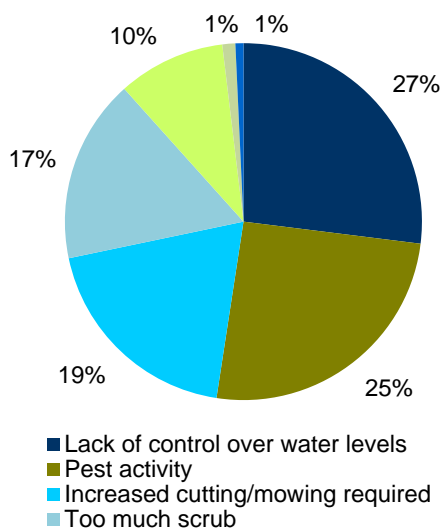


Fig 22: Reasons why ponds, lakes and river features are unfavourable /favourable vulnerable in 2018

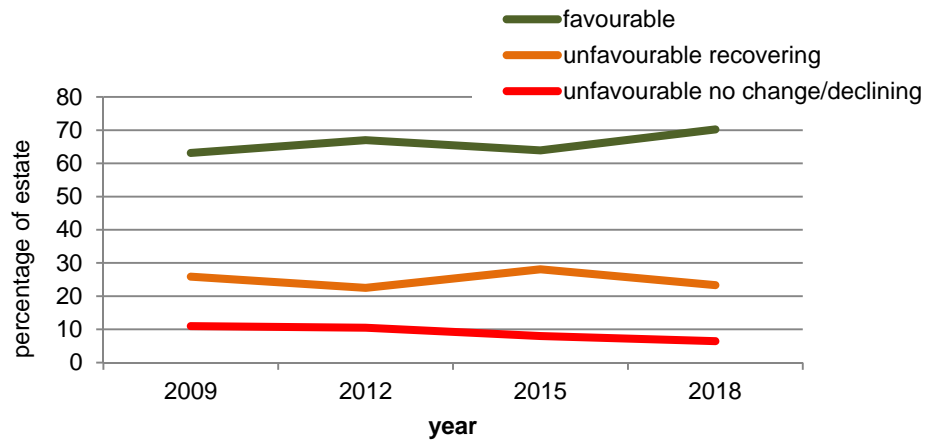


Fig 21: The condition of BBOWT ponds, lakes & rivers, across all nature reserves, over time

The recent movement of land moving towards becoming favourable has yet to influence the long term trend of the proportion of ponds, lakes and rivers actually in favourable condition. Fig 21 shows that this has remained fairly stable since 2009.

Fig 22 shows that the main reasons causing nature reserve features to be considered as unfavourable are lack of control over water levels and pest activity. This is driven by two large open water areas at College Lake and Calvert Jubilee, which are affected by rising water levels and mink predation respectively. For the vast majority of ponds (which make up a relatively small hectareage) the main issue is too high levels of bankside scrub.

Nationally ponds are particularly vulnerable. 50% of ponds have been lost during the 20th century and of those that remain 80% are in a 'poor state'. The picture is no better for lakes and rivers; in England and Wales there are no lowland rivers, and only one lake that is considered undamaged in some way¹².

Ponds, lakes and rivers support a wide range of different species with differing fortunes. Across the UK 2016/17 saw record highs for wetland birds such as black-tailed godwit, cormorant, shoveler and teal, all of which are experiencing long term population increases. However other species, often considered common, such as pochard, mallard, coot and moorhen all show significant population declines^{13,15}. For example the moorhen population has declined by 26% over the last 10 years.

Great crested newts are widespread across lowland Britain and are found in ponds and their associated terrestrial habitats. However, despite the high levels of protection they are afforded (UK and European law) their population has dramatically declined over the last 40 years¹⁴. A reduction in habitat quality and quantity is believed to be the biggest driver behind this decline.

Case study 10: Wetland bird surveys

The Wetland Bird Survey (WeBS) is a British Trust for Ornithology (BTO) survey which monitors non-breeding waterbirds in the UK. The principal aims of WeBS are to identify population sizes, determine trends in numbers and distribution, and identify important sites for waterbirds. National waterbird monitoring began in 1947 and has continued every year since.

A number of BBOWT nature reserves have been monitored as part of the WeBS since as early as the 1960s. These surveys are now co-ordinated by the Trust and the data is shared with BTO and so they continue to contribute to the national dataset.

The results from these surveys provides a wealth of information which can be used to assess the population trends of key species on BBOWT reserves, as well as a comparison with national trends. Figures 1, 2 & 3 display the mean WeBS count trend for three different species at three BBOWT reserves. Also included in a text box in each figure is the national long-term and short-term trend for the three species for comparison^{13,15}.

It is evident that the long-term decline of pochard at Foxcote Reservoir and mallard at College Lake is similar to the national decline of both species.

Despite BBOWT's best efforts in restricting disturbance levels and creating suitable habitats for both species, the continued decline appears to be beyond site management control.

However, the long-term decline of Shoveler at Weston Turville Reservoir is in stark contrast to the national increase of the species. Other species of waterbird have also shown a similar decline at Weston Turville. It is thought that these declines are due to issues in poor water quality and the disturbance caused by recreational use of the site for fishing and sailing, both of which are outside BBOWT direct management control, and efforts to influence the landowner have so far not met with success.

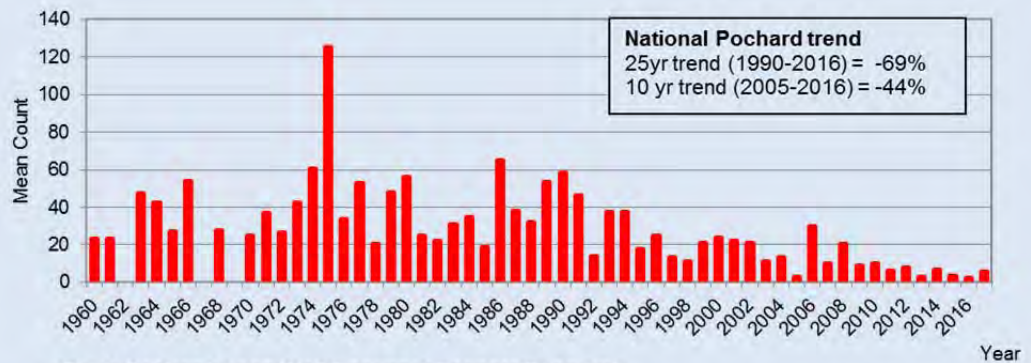


Fig 1: Pochard mean WeBS count at Foxcote Reservoir

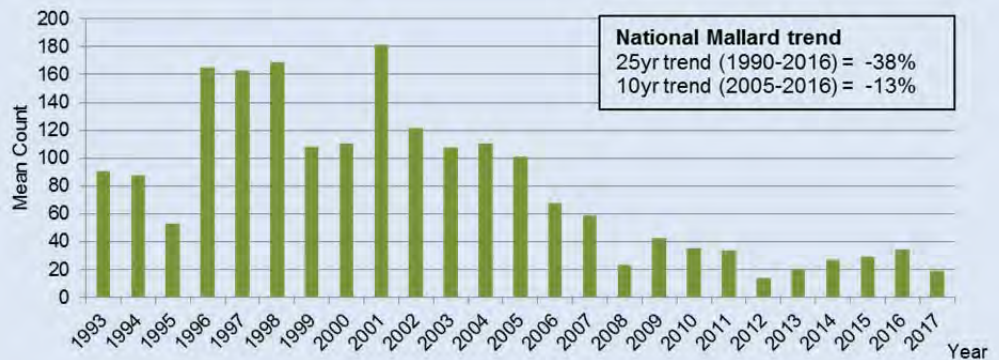


Fig 2: Mallard mean WeBS count at College Lake

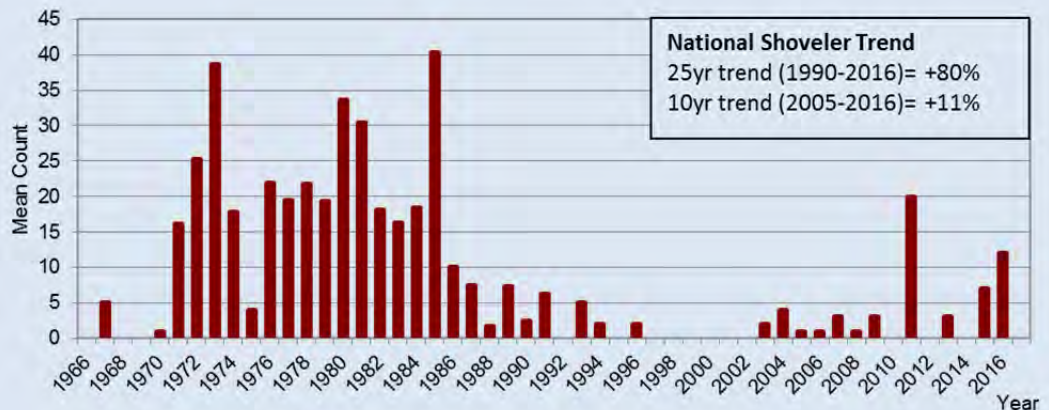


Fig 3: Shoveler Mean WeBS count at Weston Turville Reservoir

Case Study 11: Hosehill island

The local nature reserve at Hosehill Lake has been managed for birds (and other wildlife) since 1988 when the worked-out gravel pit was re-landscaped and handed to the local authority. Features to benefit wildlife were created. These included ponds around the margins, planted reedbeds and wildflower meadows, and a sand martin nest-bank. A large, irregular shaped island of bare shingle was also created in the open water to attract nesting terns and waders.

The island was managed to keep it clear of invading bramble and scrub. From around 2000 clearance work decreased and the island became more scrub, bramble and eventually tree-covered. In 1991 a Wetland Bird Survey (WeBS) was set up at the site to record monthly counts of the different species using, or associated with, the aquatic habitats. The count data for species using the open habitats on the island for nesting shows the correlation with the change in structure and vegetation cover on the island. In the 1990s lapwing, ringed plover, common tern and redshank all nested (in low numbers) on the island. From around 2000 these species ceased to nest and were not recorded at all on the WeBS count for 14 years (with the exception of a small flock of lapwing in the winter of 2005/6).

During the winter of 2014/15 work to open up the north end of the island by clearing bramble and cutting scrub began. This was followed up by regrowth control to create bare shingle patches, and further pushing back the edges of the bramble and scrub towards the southern tip of the island. The WeBS counts show that as a result of the increased availability of suitable nesting habitat, lapwing and redshank are breeding again. An oystercatcher has also made nesting attempts, although the ringed plover has not yet returned (Fig 1).

Additional work to help common terns has taken place, with a new tern raft launched to provide new nesting habitat, combined with refurbishing of the old ones, and a change to the timing of launching the rafts each year to deter black-headed gulls from taking the shingle for nesting. Common tern numbers have also increased positively as a result of this.

The lapwing results are particularly encouraging against a backdrop of lapwing declining by 42% across south-east England between 2006 and 2016.^{13,15}

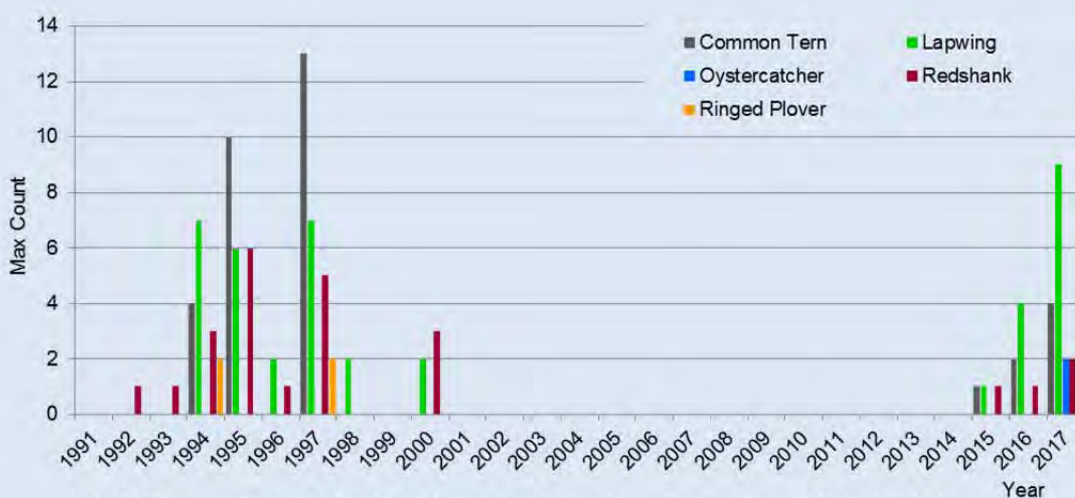


Fig 1: Maximum count of selected species during breeding season at Hosehill Lake LNR (WeBS data)



Fen, reedbed and wet grassland

Fact File

- 5,000ha of reedbed in the UK. The majority of these are small (less than 20ha). There is also less than 1000ha of lowland fen, the majority of which is in East Anglia and Anglesey.
- The key species in Berks/Bucks/Oxon include:
southern damselfly, Desmoulin's whorl snail, breeding warblers and overwintering bittern, and the black bog-rush community.
- Key management:
water level and open water management, scrub control, grazing and rotational cutting in fens, and reed cutting.

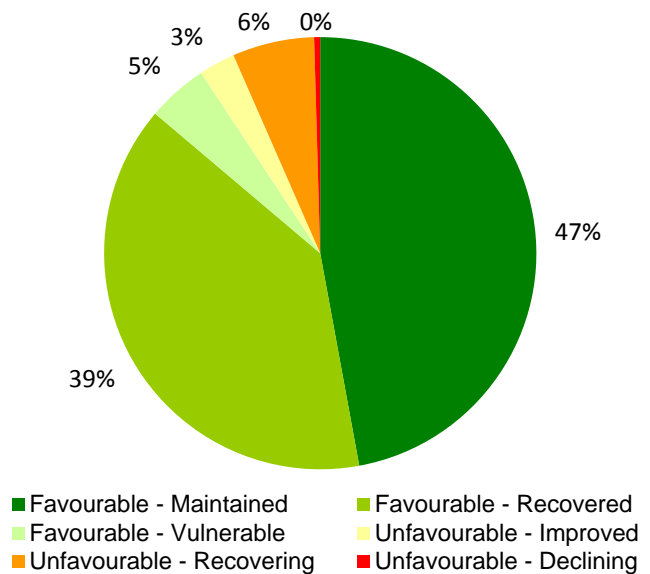


Fig 23: Condition status of fen, reedbed and wet grassland

- There are 87ha of fens, reedbeds and wet grassland across BBOWT nature reserves
- In 2018 91% of BBOWT fens, reedbeds and wet grassland are favourable and 9% are recovering

Fig 23 shows that 39% of fen, reedbed and wet grassland features were classified as favourable-recovered during 2018. That is, there was a significant improvement in the condition of these features over the past three years. It can also be seen from Fig 24 that this improvement in condition has not just been in the short term. Since 2009 there has been a steady increase in the proportion of nature reserve fen, reedbed, and wet grassland assessed as being favourable. There has also been a good decrease in areas considered unfavourable no-change or unfavourable declining (c.15% in 2009 and <1% in 2018).

The recent improvement in the condition of these features is driven by the wet grassland at Chimney Meadows and the fen at Sydlings Copse. At Chimney Meadows a series of scrapes has been created and a wet channel re-instated through the wetland feature. This has helped push the feature back to being favourable and the area now supports large numbers of wintering wildfowl.

At Sydlings Copse the fen has been undergoing restoration management (grazing and scrub control) for over 10 years and although the fen is not as species rich as it once was in the late 1800s, the feature is now in maintenance management.

Improvements between 2012 and 2015 were driven by extensive management at the Cothill Fen sites, (including the establishment of a Friends of Cothill

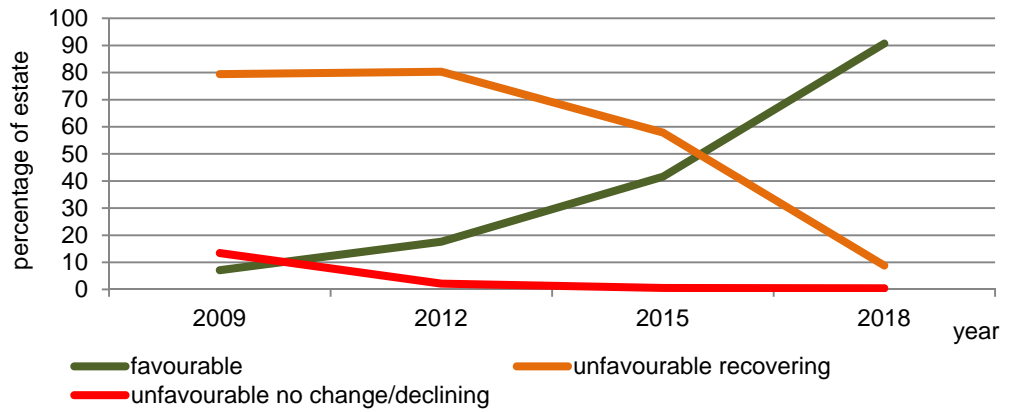


Fig 24: The condition of BBOWT fen, reedbed & wet grassland, across all nature reserves over time

Group). This work created new ponds and open runnels, which have benefited a range of dragonfly species, and improved cutting and grazing regimes have greatly promoted the specialist flora.

For the small percentage of features which are unfavourable or vulnerable the main reasons for this status are, as might be expected, lack of control over water levels (Fig 25). This is a particular issue at Thatcham Reedbeds, where the floristically diverse fen and the rare Desmoulin's whorl snail require very specific water table heights. Much work has taken place to clear out ditches and install new weirs and water control structures. Unfortunately this can only have a limited impact because much of the water reaches the nature reserve via a neighbouring plot of land over which BBOWT has no management control (Case study 21).

Nationally fens and reedbeds are in relatively poor condition with only 41% of SSSI features being classified as favourable in 2006.⁹

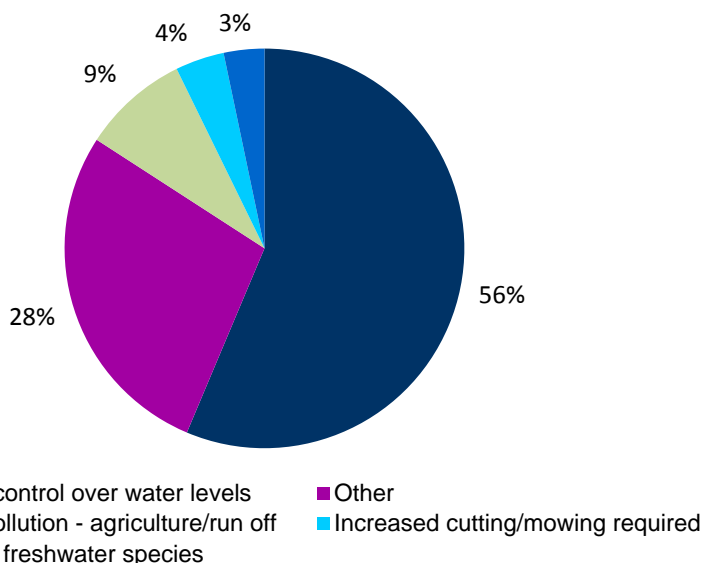


Fig 25: Reasons why Fen, Reedbed and Wet Grassland features are unfavourable/favourable vulnerable in 2018

Wet grasslands provide important overwintering refuges for wildfowl such as golden plover and wigeon, both of which continue to decline (32% and 10% respectively between 05/06 and 15/16).^{13,15} The picture is even worse for breeding waders such as curlew and lapwing. Curlews have declined by 65% between 1970 and 2015 and is curlew is now considered near threatened globally.¹⁶

It is however not all bad news. Some species have done well under targeted management. For example, the breeding bittern population is greatly increasing. In 2017 there were 164 booming males,¹⁶ and BBOWT nature reserves help provide overwinter refuges for this iconic species.

Case study 12: Fen Restoration

Lashford Lane Fen, Parsonage Moor and the Ruskin Reserve, collectively Cothill Fen SSSI and SAC, is the largest remaining calcareous fen in central England. Together with neighbouring Dry Sandford Pit the sites are vital for the survival of local populations of the southern Damselfly, grass-of-Parnassus and the extremely rare black bog-rush plant community. Calcareous fens are wetlands fed by low-nutrient but mineral-rich (calcium) water, where peat accumulates, and a range of specialist plants and invertebrates survive. Calcareous fens in lowland England have suffered huge losses in the last two centuries.

A project to enhance the quality of the Cothill Fen sites ran from 2010 to 2013, and included work to improve grazing infrastructure, remove trees and scrub from peat areas, restore the hydrology, and establish a network of dipwells to monitor groundwater levels. A local group was also set up to work on the sites and maintain the improvements made.

A small but significant area of relict fen was identified at Lashford Lane, and in the winters of 2010 and 2011, a large number of birch and willow trees were removed in conjunction with the diversion of an old drainage ditch to re-wet the area. Cutting and grazing have also been tailored to try and re-establish the fen communities.

In the first survey after tree clearance, cover of key fen species had decreased, as increased light allowed quick growing ruderal species to establish, but in the years that followed key fen indicator species have become much more

widespread, with at least two occurring in 100% of samples by 2017 (Fig 1). Purple moor-grass can be a dominant species in wet habitats, but targeted and timed grazing has steadily reduced its cover, allowing more desirable herbs to come in (Fig 2). Other less desirable plants like hemp agrimony have decreased, whereas others like large coarse sedges and woody scrub have increased slightly. Several desirable fen species such as fen bedstraw, blunt-flowered rush, bog pimpernel and marsh valerian have also increased in frequency, but overall diversity still does not match the better areas of Cothill Fen, so true restoration may be a long-term outcome.

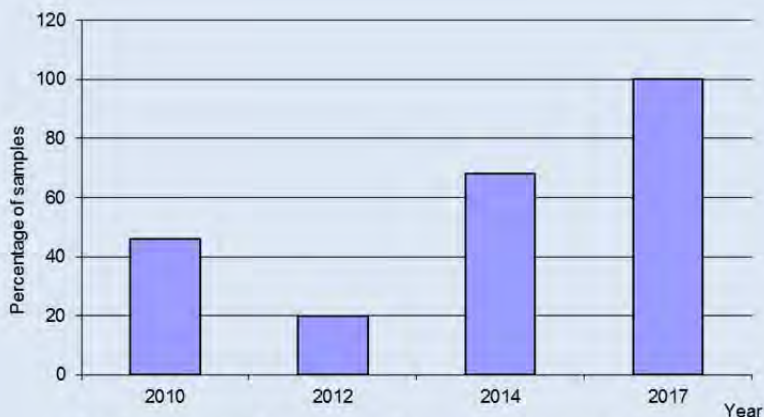


Fig 1: Percentage of samples with at least 2 key species of flora present; Lashford Lane, fen

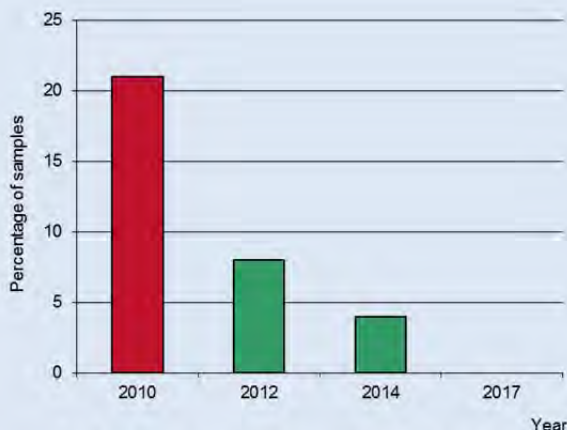


Fig 2: Percentage of samples with more than 20% cover of purple moor-grass; Lashford Lane, fen



Bog pimpernel

Case study 13: Fen dragonflies

Parsonage Moor BBOWT nature reserve is a mix of species-rich calcareous fen and reedbed. The specific type of fen is especially important as it is very rare within the UK. Several factors work together to make this site special: base-rich ombrotrophic groundwater flows have facilitated the development of calcareous fen, which in turn supports rare assemblages of flora and fauna.¹⁷

The site has an important dragonfly assemblage which uses both open water pools and the calcareous stream which runs through the centre of the site. Rare and specialist species include: southern damselfly, keeled skimmer and small red damselfly. Populations of southern damselfly are stable across the UK but the species remains very rare and as such has been identified as a key species for conservation action.

Intensive management work in recent years has resulted in an increase in the numbers of southern damselfly and keeled skimmer recorded on the annual dragonfly transect survey (Fig 1).

Frequent cutting of reed along the central calcareous stream has maintained unshaded open water and promoted marginal vegetation growth essential for ovipositing for the southern damselfly. Encroaching scrub which could shade the stream has also been removed. Welsh Mountain Ponies are used to graze the site in late summer and autumn to further maintain the open nature of the site.

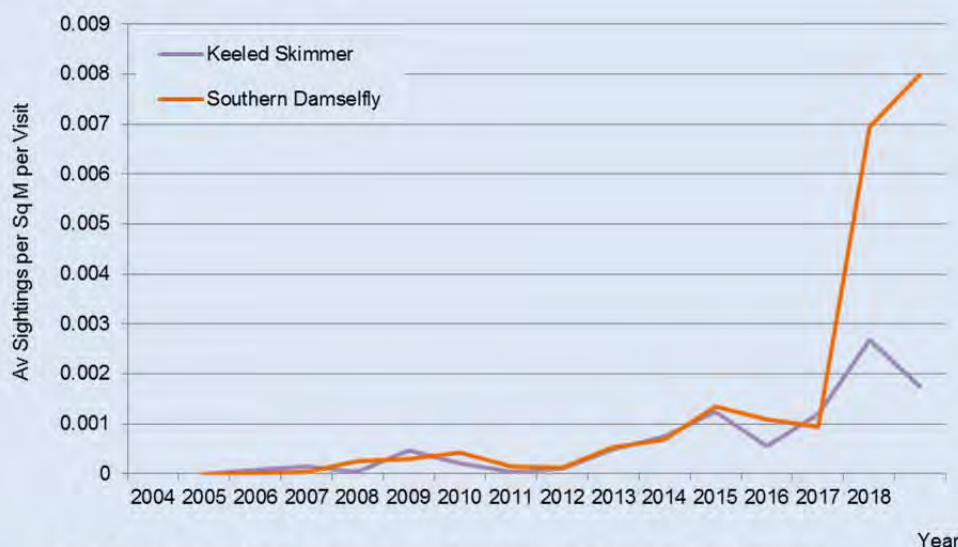


Fig 1: Parsonage Moor Dragonflies - Average Sightings per Sq Metre per Visit

More recently there has been a concern that the site is under threat from water contamination by high levels of nitrate from agricultural inputs within the catchment area, as well as declining water levels. A joint report produced in 2017 by Dr Curt Lamberth¹⁸ for the Freshwater Habitats Trust and BBOWT summarised the findings of an investigation into the origin, effect and mitigation of ground and surface water contamination across the site.

The report confirmed the site is at risk from nitrate contamination and that vegetation communities have already been affected. Groundwater nitrate concentrations within and entering the catchment are up to 12 times higher than would be expected

As a result of the findings of the report, BBOWT have put in place mitigation measures to help maintain water flow and to reduce nitrate concentrations in ground and surface waters originating from the wider catchment. This has included positioning semi-permeable barriers of reed cuttings in channels to reduce the high concentrations of nitrate entering and within the site.

To monitor the impact of the mitigation measures, a new network of dipwells has been established to allow BBOWT staff and volunteers to monitor ground water levels on a monthly basis. Nitrate and phosphate levels are also monitored monthly at six key locations. This long-term eco-hydrological monitoring will allow us to accurately assess any future threat to the site and the success or otherwise of the mitigation measures.



Farmland and arable

Fact File

- There are 17.5Mha of farmland in the UK, which is equivalent to 72% of the land area, and of this 6.1Mha is cropped land.
- The key species in Berks/Bucks/Oxon include: farmland birds, and arable “weeds”.
- Key management: sowing crops, maintaining margins and cover strips, and pasture management e.g. weed control and grazing.

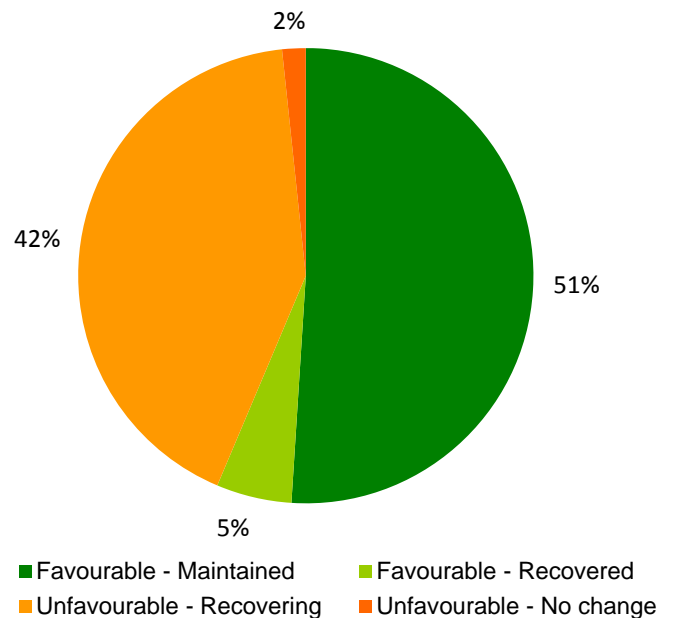


Fig 26: Condition status of Farmland/Arable

- There are 67ha of farmland and arable across BBOWT nature reserves
- In 2018 56% of BBOWT farmland and arable is favourable and 42% is recovering

The areas of arable and farmland which are managed by the Trust are relatively small and are located on four separate sites. The two main sites are Woolley Firs and Wells Farm, the bulk of which are tenanted out to farmers. Other areas include the arable weeds plot and wild bird seed mix at College Lake.

Just over half (56%) of farmland features are in good condition (Fig 26). These features include Wells Farm which supports good populations of farmland birds such as skylark and corn bunting, as well as providing layback for livestock (when it is not conservation grazing elsewhere) and a crop for the tenant farmer.

The features which are struggling to meet wildlife objectives (44%) include the arable margins at Woolley Firs. Due to a range of external factors including the weather, these margins have not

produced the planned nectar sources or overwintering stubbles.

Nationally many farmland bird populations are decreasing. Between 1995 and 2015 corn bunting declined by 34%, skylark by 22% and linnet by 21%.¹⁶

The plight of arable weeds is just as bad. Pheasant's-eye is classified as Endangered in the UK and corncockle is considered on the verge of extinction,¹⁹ in Oxfordshire it was last recorded in the wild in 1992.²⁰

As this feature only comprises a small number of sites a more detailed breakdown of data has not been generated.

Case study 14: Farmland birds

The 2015 BBOWT Conservation Report highlighted the stable or increasing populations of three key farmland bird species at BBOWT's Wells Farm Nature Reserve. Fig 1 highlights the continued healthy populations of the three species in contrast to further national declines.

Management activities at Wells Farm continue to demonstrate a viable working farm can provide suitable conditions for healthy populations of farmland bird species, bucking the national population declines for the three species (see charts below).

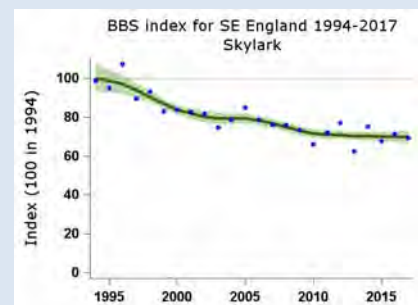
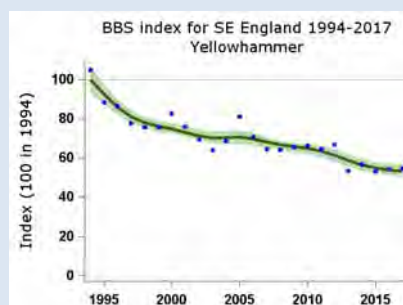
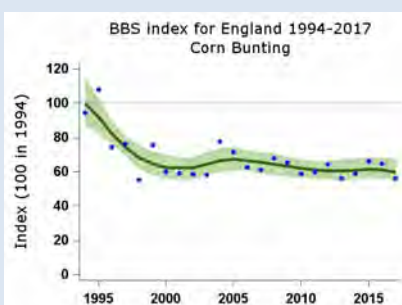
The tenant farmer ensures a variety of conservation measures such as skylark plots, beetle banks, uncropped field margins and conservation headlands are provided each year. In the last few years, 'set-

aside' land at Wells Farm has been re-seeded to grass to be used as layback. In order to compensate for this loss of habitat suitable for farmland birds a new wild bird seed/nectar crop was also established. The potential decline in available habitat was a particular concern for corn bunting and it is good to see that the bird data shows there has not been a negative impact on the population.

In addition, BBOWT staff and volunteers have continued to manage the mosaic of habitats on the reserve. This has included planting new hedgerows as well as laying the existing hedgerows, creating new ponds and pollarding old in-field willow trees.



Fig 1: Wells Farm - Key Farmland Bird Species



Case study 15: Interrupted Brome

Interrupted brome is an annual grass of the free-draining chalky soils found in southern and eastern England, where it was known as a plant of arable margins. It has never been common, and was believed to be extinct in the wild after it was last found in Cambridgeshire in 1972. Interrupted brome is an unusual species – both an endemic and a neophyte; efforts to save it have posed some interesting questions about the conservation of rare plants.

Interrupted brome is very closely related to a very common species, soft brome. It is believed that a genetic mutation in soft brome led to the creation of a new viable, distinct species—namely interrupted brome. The plant was first confirmed from a specimen collected from a site in Cambridgeshire in 1849, and described as a species by Druce as recently as 1889. By the 1930s, only 40 years after it was recognized as

a species, agricultural changes meant that there were only a handful of known sites, and after 1972 it could not be re-found at its last known locality. Seeds had been collected by Cambridge University Botanic Garden, but an attempt to grow them revealed the seed to be inviable and so it was believed the species had been lost altogether. Its survival today is due to a PhD student who had continuously cultivated several brome species as part of their study, and to the discovery of viable seed in a French Laboratory that had been collected from the UK in the 1950s. Viable seed is now safely held by various bodies including Kew's Millennium Seedbank.¹⁶

Attempts to re-introduce interrupted brome to three sites were made between 2003 and 2005 (including at Aston Rowant in 2004), but for differing reasons each attempt failed to produce a population that survived for more than 3 years. Lessons were learnt, and a second round of re-introductions was begun in 2013, initially at the original 2003 introduction site in Cambridgeshire, and later at College Lake. In autumn 2015 seed from plants at the Cambridge University Botanic Garden were hand-broadcast into the arable weed plots at College Lake. The selected area was then lightly disturbed to cover the seeds with a shallow (1cm) depth of soil. Germination was observed that autumn and plants grew and flowered the following spring (2016). Some of the seed produced was collected, and grown-on in nursery plots to provide guaranteed future seed, and some was left on the plants to self-sow. Interrupted brome has germinated and flowered in each year since its initial introduction and seed has been collected each year to be grown in the nursery bed and used to re-seed sections of the main plot. Seed is also freely germinating in plots, where the general management of light disturbance and late summer cutting is clearly supporting this annual grass's life-cycle.

The dilemmas around the conservation of interrupted brome are based on the fact that it is a new species that has died out very quickly, not part of our historic natural flora. So there is the possibility that it could be just be a mutation that is not 'suitable' for the environment and would have naturally disappeared. Also the chances of creating a wild self-sustaining population in the modern agricultural landscape would seem to be slim; and interrupted brome is intolerant of competition, has a very short-lived viable seed, and is susceptible to grazing and herbicides. All of this means it would not survive unless it is specifically managed for, now that conventional agricultural practices are no longer favourable for its survival. Counter to these points, the same could be said for many of the arable 'weeds' society conserves and values today. Also, interrupted brome is an endemic species, so is there not a duty to conserve it and its genes? Interrupted brome's unique status amongst our arable weeds means it acts as a "poster species" raising awareness and interest with the wider public and in the farming community— and College Lake, being a visitor centre and a nature reserve with an existing arable weed plot and the expertise to look after it, is the ideal place to grow it and ensure it remains part of our arable heritage.



Interrupted brome



Improved and rough grassland

Fact File

- There are 11.3Mha of rough and improved grassland and grazing land in the UK.
- Key species in Berks/Bucks/Oxon include:
harvest mice, barn owls, bats
- Key management:
grazing, cutting, weed control, and scrub control

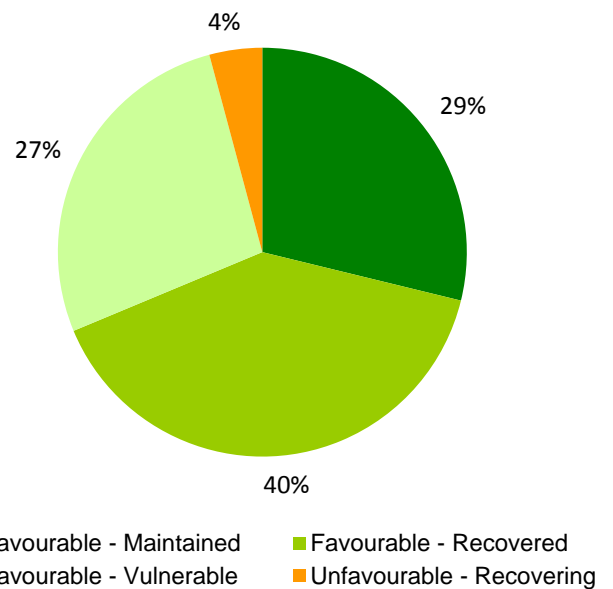


Fig 27: Condition status of Improved and Rough Grassland

- There are 37ha of improved and rough grassland across BBOWT nature reserves
- In 2018 96% of BBOWT improved and rough grassland is favourable and 4% is recovering

This feature is located on a handful of different nature reserves, the largest blocks being found at Moor Copse, Finemere and Chimney Meadows. This grassy feature is by its very nature rough, 'messy' and not floristically diverse. However, this does not mean that it doesn't have wildlife value. This type of habitat is important for a range of species, from invertebrates such as spiders to small mammals and more iconic species like the barn owl. Fig 27 shows that the vast majority of improved and rough grassland features are in good condition (96%). The main issue causing areas to be out of condition is the invasion of scrub, which can start to dominate, and although some scrub is beneficial there is a balance to be struck.

There is almost no national data on this type of habitat as it is not recognised within the SSSI series. Species which use this sort of grassland such as the barn owl are doing well, while other raptors like the kestrel are struggling (38% population decrease between 1995 & 2015).¹⁶

There is no data available for small mammal population trends, but species such as the hedgehog which like this low intensity use landscape are also declining.²²

Due to the small number of sites which comprise this feature group a more detailed breakdown of data has not been generated.

Case study 16: Harvest mice

The harvest mouse monitoring project at Chimney Meadows has just completed its fifth survey season. The project, led by Dr Amanda Lloyd of the Oxon Mammal Group, has helped her to better understand the ecology of the species as well as the distribution and population trends on the reserve.

The dense and tussocky structure provided by the rough grassland at Chimney provides the perfect conditions for small mammals such as harvest mice to nest and forage for food. A network of 'runs' underneath the cover of the tussocks provides protection from aerial predators.

Areas of rough grassland are encouraged to develop at Chimney around the hay meadows to support populations of harvest mice and other small mammals. A combination of grazing and grass cutting with a tractor helps to maintain the tussocky structure of good quality rough grassland.



Fig 1: Number of harvest mice nests in two meadow margins, at Chimney Meadows

In the 2018 survey season, Duxford Old River, a recent addition of land to Chimney Meadows on the south of the Thames, was surveyed revealing the presence of two nests. The low count has been reflected at sites elsewhere and is evidence of a poor year for the species. It is thought the severe weather in late winter and early spring led to high mortality and therefore a poor breeding season.

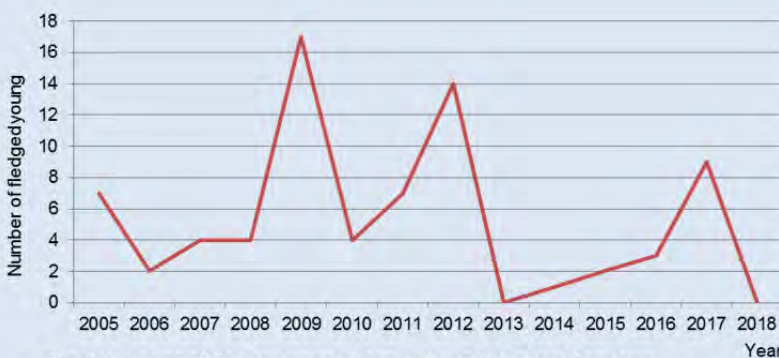


Fig 2: Number of fledged young barn owls at Chimney Meadows

Annual surveys at Chimney have focussed on the monitoring of two rough grassland field margins north of Chimney hamlet to determine population trends over time, as well as checking new locations across the reserve to determine distribution (Fig 1). As would be expected for a small mammal, population levels fluctuate on an annual basis.

Barn Owls are known to be one of the main avian predators of harvest mice and their population closely follows the

boom and bust cycle of small mammal populations, such as the harvest mouse. Annual monitoring of the nesting boxes on the reserve confirms the widely fluctuating fortunes of the species mirroring its prey (Fig 2).



Hedgerows

Fact File

- The last full countryside survey in 2007 recorded 402,000km of managed hedge and a further 150,000km of relict hedgelines.
- The key species in Berks/Bucks/Oxon include: brown and black hairstreak butterflies, farmland birds, bats and hazel dormouse.
- Key management: rotational cutting, laying and coppicing, and protection from livestock and deer.

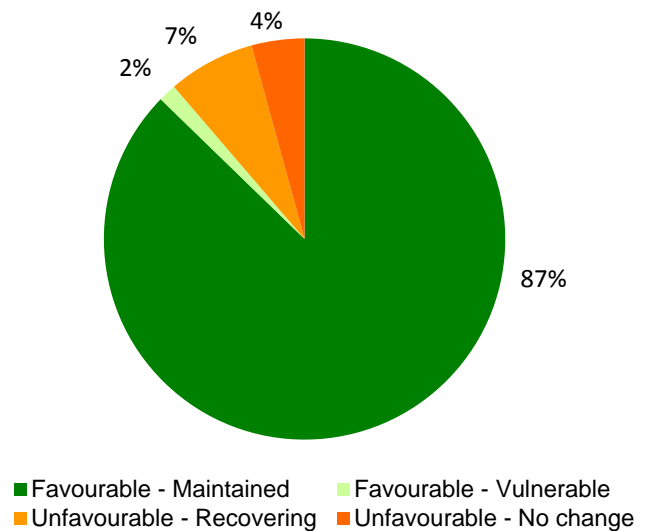


Fig 28: The condition status of hedgerows

- There are 10ha of hedgerow across BBOWT nature reserves
- In 2018 89% of BBOWT hedgerows are favourable and 7% are recovering

Hedgerows are located across a range of nature reserves, the majority of which encompass meadow or rough grassland features, and this interaction between habitats is an important part of a functioning hedge network.

Fig 28 shows that the majority of hedgerows across nature reserves are in good condition. These include the hedges at Bernwood Meadows which are managed on rotation for black and brown hairstreak butterflies, and the hedges at Chimney Meadows which provide important foraging and flight lines for various bat species including pipistrelles and Daubenton's.

Nationally, the length of hedgerows has remained stable over the last decade, but there has been a decline in quality, with 7% decrease in the number of shrub dominated hedgerows and a 9% increase in the number of hedgerows developing into lines of trees or relict hedges. Local hedgerow surveys suggest that only 41% of hedges are in favourable condition.²³

The decline in hedge quality is mirrored within the species that they wholly or partly support. For example, 51 of the 71 widespread and common moth species listed on Biodiversity Action Plan due to their significant population declines have caterpillars which feed in hedgerows and their associated herbaceous margins.

Out of the 19 farmland bird species used by the government to assess the state of farmland wildlife, 16 are associated with hedges and 10 use hedges as their primary habitat.²³ The breeding farmland bird index (which assesses the populations of these key species) has declined by more than half between 1970 and 2017 across the UK. Most of these declines took place in the late 1970s and early 1980s, but there has been a short term decline of 7% since 2011. Although the general trend is of decline, some species have done well during this time period, with goldfinch more than doubling in the long term.¹⁶

Due to the small area covered by this feature group a more detailed breakdown of data has not been generated.

Case Study 17: Birds and Butterflies

Asham Meads nature reserve is a grassland site in the River Ray valley. The main habitats are un-improved ridge and furrow hay meadows, surrounded by mixed species hedgerows dominated by blackthorn and hawthorn. The reserve is in a wildlife-rich area, adjoining Otmoor RSPB reserve to the northwest, and is a few hundred metres from Whitecross Green wood to the east. The surrounding land uses are mixed farming with both arable and pasture, and woodland. In addition to the species-rich hay meadows, the main conservation priorities on the reserve are the black and brown hairstreak butterfly populations associated with the blackthorn hedges, and these are the focus of hedgerow management work. Fig 1 shows the results from the brown hairstreak egg count at Asham Meads, which indicates that the population is stable with a slight decline in the past few years.

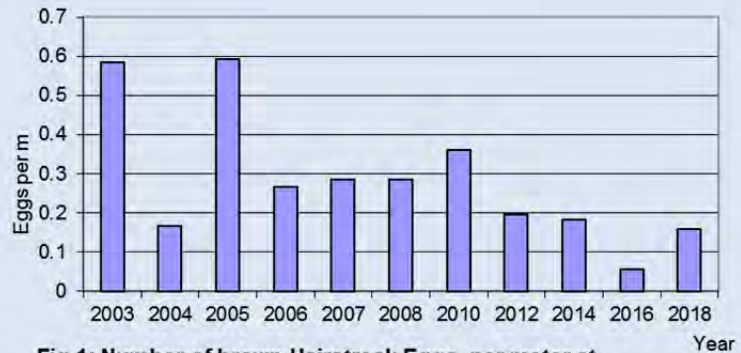


Fig 1: Number of brown Hairstreak Eggs, per meter at Asham Meads

Hedgerows, well-managed on rotation and with mixed species and varied structure, are also valuable nesting habitat for declining farmland birds such as yellowhammer and linnet. Each year, sections of hedgerow are coppiced and/or rough-laid to create a varying age and height structure, and plentiful young, thick sucker growth, that is suitable for brown hairstreaks to use for egg-laying. Regrowth is protected from any deer browsing.

At Asham Meads a monthly transect route is walked, with all bird species recorded. Fig 2 shows the average number of key hedgerow associated birds, recorded over all the survey visits in each year since 2006, when the transect was established. Numbers of the resident species have fluctuated, with cold domestic winters probably accounting for the troughs, but the overall trend for all of these species is of an increase. The possible exception is the bullfinch; numbers have previously been higher, but 2017 still represents a recovery year in-line with the yellowhammer, song thrush and dunnock. Whitethroats are migratory, and whilst this has its own perils potentially affecting numbers, the trend is a steadier but still increasing one. These results suggest that hedgerow management is providing suitable nesting habitat and cover at least for these (and other) bird species, and that they are also able to find suitable foraging habitat in the surrounding areas.

The yellowhammer trends are particularly heartening to see as this species has declined by 23% across south east England between 2006 and 2016. Other species such as dunnock have been stable in this timeframe (1% increase), while bullfinch populations increased by 21%.¹⁶

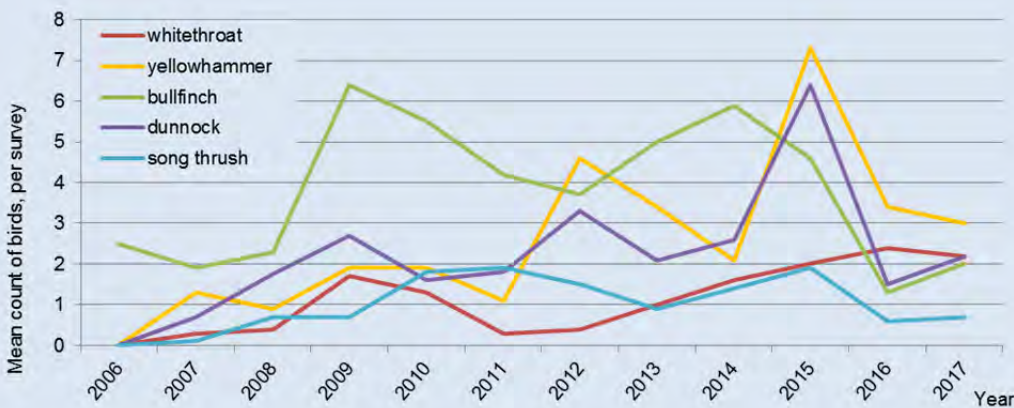


Fig 2: Selected 'hedgerow' birds recorded from transects at Asham Meads



Species

Fact File

Across the UK

- Military orchid is classified as Vulnerable
- Red helleborine is classified as Critical
- Monkey orchid is classified as Vulnerable
- Downy-fruited sedge is classified as Locally Common
- Key management: bespoke for each species but targeted at maintaining the habitat in good condition

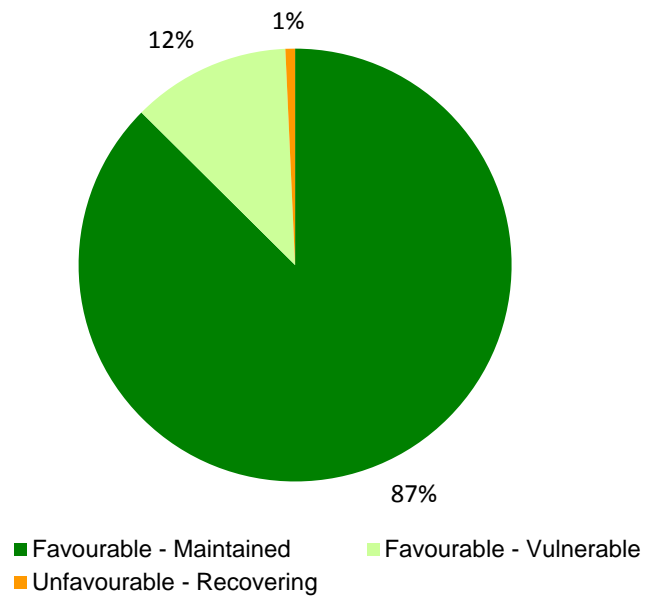


Fig 29: Condition status of 'Species features'

- There are 5 different plant species which make up the 'species feature' and together they cover c.9ha across BBOWT nature reserves
- In 2018 99% of 'species features' are favourable and 1% are recovering

The species feature is comprised of 5 different plant species, all of which are present on SSSI nature reserves, for which the SSSI is either wholly or partly designated for that particular species. Consequently they have been recognised as features in their own right. (Other key species are identified below the top habitat level, as it is the habitat which supports the species).

Fig 29 shows that the vast majority of species features are in favourable condition (99%). This is particularly important as BBOWT is responsible for managing a significant proportion of the UK population of several of these species. Therefore what happens on BBOWT nature reserves affects the national status.

Out of the 5 species, red helleborine, military orchid and monkey orchid are the most critical. These species occur on less than a handful of sites nationally and are recognised as being at risk of extinction within the UK (see Fact File for their status).

Both military and monkey orchids populations are in favourable condition (see case study 18), but red helleborine remains at risk. The population is critically small, often less than 6 plants annually, many of which do not flower. BBOWT is part of a working group that includes Kew Gardens and Natural England, which is investigating the ecological requirements of this species in the UK and trialling different management activities in order to try and ensure the long term survival of this species.

Looking more widely across the entire SSSI series, nationally 52% of flowering plants and ferns (recognised specifically on the SSSI designation) were assessed as being in favourable condition in 2006.⁹

Due to the small area covered by this feature group a further breakdown of data has not been generated.

Case study 18: Military Orchids

2018 was another record-breaking year for the very rare military orchid on BBOWT nature reserves. Dedicated volunteers counted 1,036 flowering plants at Homefield Wood and 619 flowering plants at Swains Wood, confirming the fantastic conservation success story continues (Fig 1).

Once considered widespread in southern England, it was thought extinct by the 1920's. It was rediscovered in the Chilterns in 1947 and is still classified as 'vulnerable' in the UK. As well as the two BBOWT reserves, it is only known from one other site in Suffolk.

Volunteer work parties continue to maintain the grassland and scrub mosaic favoured by the species and both reserves are carefully grazed with sheep to maintain a high quality chalk grassland sward. During the growing season, enthusiastic and committed volunteers spend many hours monitoring individual orchids to record plant health, flowering history and seed set (after hand pollination). Volunteers also protect plants in vulnerable areas from browsing deer as well as visitors to the reserve. On peak weekends during the flowering season, volunteers assist and advise visitors hoping to see and photograph the orchids.

It is very evident that the species continues to flourish due to the careful management by BBOWT volunteers and staff, but it remains a vulnerable species on the very edge of its range in Europe. The Trust will continue to carefully monitor the species to assess the success of ongoing targeted management work and to record the impact of climate change.

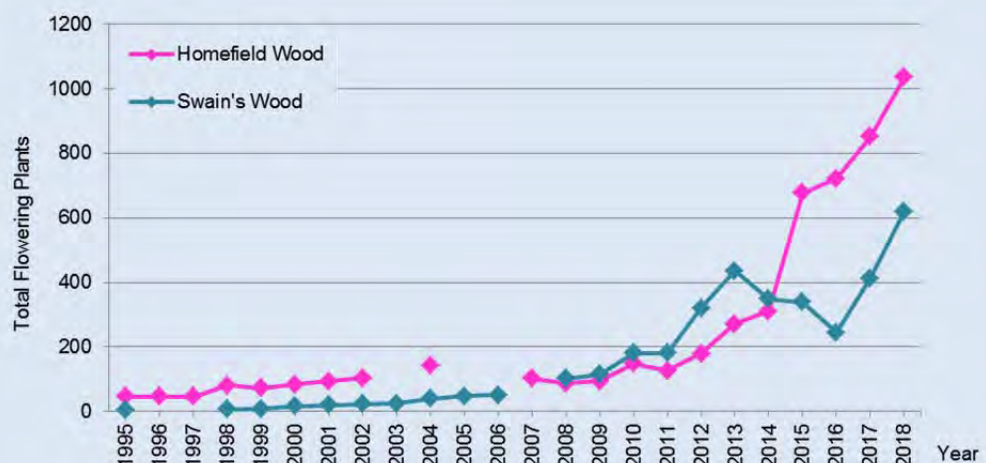


Fig 1: Flowering Military Orchid Count



Geology

Fact File

- Across the UK, there are c. 3000 sites designated for their nationally important earth science
- Designation is for a range of elements including rock sequences, fossils, minerals and ice age landforms/sediments
- Key management: Scrub control to prevent root damage and maintenance of thin grassy vegetation to prevent erosion

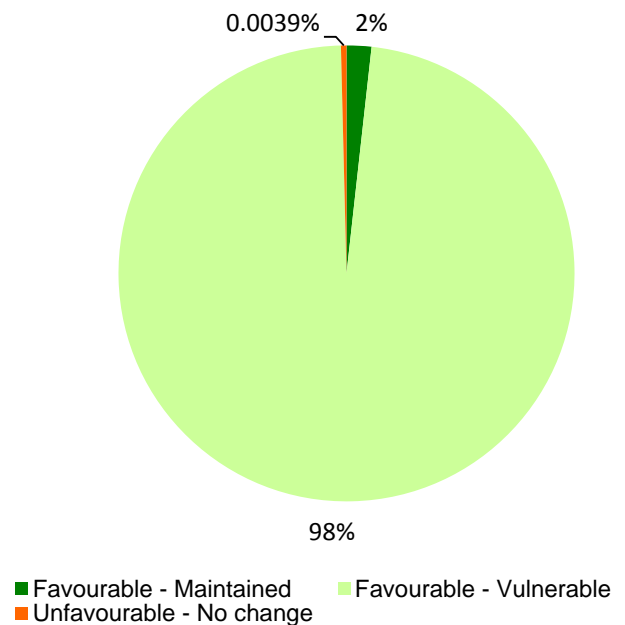


Fig 30: Condition status of geological features

- There are c.11ha of geological features across BBOWT nature reserves
- In 2018 89% of BBOWT geology is favourable and 7% is recovering

Fig 30 shows that very nearly 100% of earth science or geological features across BBOWT nature reserves are in good condition.

These features are located on 4 different reserves and are comprised of rock sequences and ice age landforms and sediments of national importance. This includes the Pleistocene deposits at College Lake in which fossils of a range of inter-glacial fauna such as wolf, brown bear, horse and mammoth have been found.

Management to keep these features in good condition is focused on scrub control and tree removal in order to prevent any root damage of the geology underground.

Nationally geological SSSIs are in good condition with over 80% of the differing earth science interest features being classified as favourable in 2006.⁹



Archaeology

Fact File

- Across England, there are c.20,000 sites designated for being nationally important archaeological sites
- Designation is for a range of categories ranging from prehistoric standing stones and burial mounds, to medieval castles, monasteries and more recent features such as collieries
- Key management: Scrub control to prevent root damage, maintenance of thin grassy vegetation to prevent erosion, and where appropriate physical maintenance of the structures

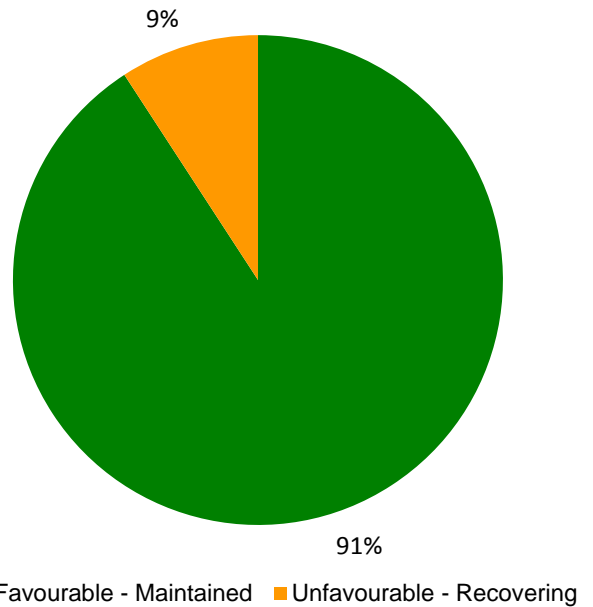


Fig 31: Condition status of Archaeology features

- There are c.5ha of archaeological features across BBOWT nature reserves
- In 2018 91% of BBOWT archaeology is favourable and 9% is recovering

Archaeological features are located at four different sites and include the medieval moated ringwork at Ardley Quarry and the Bronze Age cemetery at Seven Barrows.

Fig 31 shows that the vast majority (91%) of these features are in favourable condition. Nationally the status of scheduled monuments is very similar with c.11% being on the 2018 Heritage at Risk Register; that is 2151 sites out of 19,855 sites.²⁴

The biggest threat nationally is the damage caused by ploughing (33.5% of sites on the risk register). The second biggest threat is the slow and long term damage caused by natural processes such as tree growth, erosion and burrowing animals. It is these sorts of problems that BBOWT has to mitigate for in order to keep archaeological features in favourable condition. For example, the Barrows at Chinnor Hill have been protected by special netting which prevents rabbit burrowing activity.

2.2 Challenges and solutions on reserves

Fig 32 shows the underlying reasons which are causing features, across all nature reserves, to be classified as unfavourable or favourable vulnerable. Reasons which have each contributed to less than 5% of the total nature reserve area have been amalgamated into an 'other' category.

When considering the underlying issues affecting feature condition across all reserves it is important to remember that the results are skewed by features which cover the largest area. Thus, given that woodland covers the greatest area it is therefore of little surprise that deer browsing is the reason why approximately a quarter of features are deemed unfavourable or vulnerable. Nonetheless this assessment gives a useful indication that there are a range of overarching issues affecting feature condition. Some of these issues can be addressed using similar cross-reserve strategies. However, many of them can only be tackled using site-based solutions, because sites are unique.

It should also be highlighted that the approach taken to assess the drivers of feature condition forces the selection of one main reason for a feature being out of condition. In reality features are often out of condition (or vulnerable) as a result of a suite of issues, which often interact and exacerbate each other. For example, a block of ancient woodland may be identified as being vulnerable due to deer browsing. But this problem is made worse by the high volumes of ash in the canopy, likely to be impacted by ash dieback and subsequent suppression of growth of other tree species due to high deer numbers.

This section of the report looks at the different issues highlighted and identifies areas where measures are being implemented to address them. Where possible, additional concerns have been identified including bigger picture problems such as climate change.

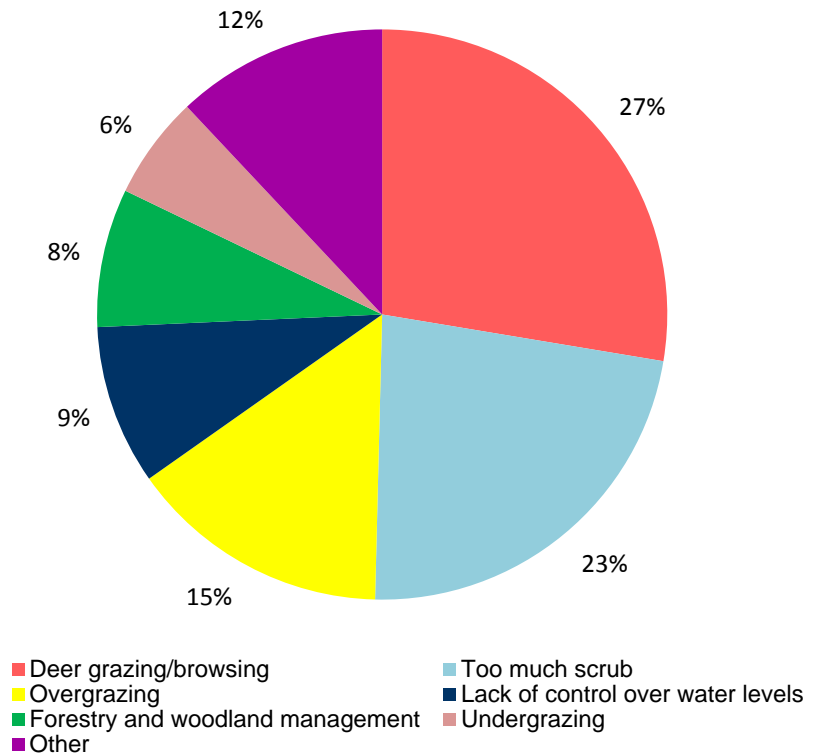


Fig 32: Top reasons why features are unfavourable or vulnerable

At this point it is important to highlight that reserve management required to maintain features in favourable condition takes up a significant amount of resources. Maintenance of features already in good condition is considered a priority over and above restoration of those features which are unfavourable.

Fig 32 shows that the top issues driving features to be unfavourable or vulnerable are: deer browsing, dominating scrub, grazing levels, and lack of control over water levels and woodland management. Many of these issues are similar to those identified in the 2015 report. This is perhaps not surprising given that those which are easy to deal with have already been resolved. Additionally ecology functions on a slow timeframe and issues can take many years before the results of mitigating activity can be seen within the habitat.

2.2.1 Site based challenges

Deer Browsing

27% of features are negatively impacted by deer browsing (Fig 32). This is a slight increase on the 23% identified in 2015.

The deer population is now more abundant and widespread than it has been at any time in the past 1000 years, with deer numbers currently estimated at 2 million. The sheer volume of deer in our countryside means that the fine ecological balance between deer and the habitats they utilise has been broken. Browsing causes a problem in woodlands by directly impacting flora such as bluebells and bramble and ivy. Deer also eat coppice regrowth, seedlings, saplings and planted trees. Over time this reduces woodland structural diversity, and conceivably could eventually lead to the destruction of the woodland itself, with no new trees being able to grow to maturity.

Whilst this is a significant problem across many woodlands it is not a new issue, with conservation work on reserves trying to address deer impacts taking place as early as the 1990s. However, over time the problem has got worse, reflecting an ever increasing deer population in the wider countryside.

The Trust has responded in a wide variety of ways to identify viable and sustainable solutions and tackle this issue.

However, there is not an easy or quick fix, not least because site based solutions will only ever have a limited impact on deer numbers, as populations utilise a much wider landscape than a single site. To date attempts to engage neighbouring landowners have met with limited success.

Dominating scrub

23% of features are negatively impacted by high levels of scrub (Fig 32). This has more than doubled since 2015, when scrub volumes were only affecting 9% of features.

Much conservation management is targeted to halt succession in order to conserve a particular habitat as it is, rather than allowing it to succeed to woodland. Controlling invasive scrub is therefore a major part of conservation activity across many features, but scrub is especially a problem on chalk grassland and heathland features and round the edges of ponds.

The practical techniques needed to control scrub are well understood and include physical removal using volunteer groups or contractors, herbicide treatment and burning. The constraints around

achieving objectives are related to the sheer volumes of scrub involved and the rate at which it can regrow. This is particularly pertinent as climate change has resulted in a longer annual growing period. Increased volumes of nitrogen deposition also promotes more growth, thus making maintaining scrub at appropriate levels increasingly difficult.

The problem is further exacerbated due to the constraints surrounding herbicide use. Unless scrub is treated with herbicide post-removal it will simply coppice and regrow, which often creates a large 'root ball' at ground level. This root ball is almost impossible to remove and slowly destroys the key habitat in which it is growing. However, health and safety constraints over who can use herbicides and an increasing awareness of the health risks of these chemicals makes using them ever more challenging. Alternative options such as gorse burning, use of diggers and 'tree poppers' (which remove small scrub, including the roots) are being investigated and implemented where appropriate.

Over-grazing

15% of features are considered unfavourable as a result of over-grazing (Fig 32). Over-grazing was not identified as an issue during 2015. This is because this problem is related to a range of features all of which are located on one reserve, Greenham Common (which was assessed as 'unknown' in 2015, due to limited resources). Greenham is such a large site that impacts here affect the overall reserve total.

Not only is Greenham a very large site supporting a wide range of habitats but it also has a complex set of external constraints which significantly affect site management. Primarily this is because Greenham is a Common with associated right holders and a Commission which has overall responsibility for what happens on site.

The level of grazing and the timing of grazing (carried out by the graziers – who have a legal right for this activity) is currently not considered ideal for conservation objectives. Consequently the features at Greenham are assessed as unfavourable. Further details, including steps being taken to address this issue are provided in the Greenham case study (no. 20).

Water levels

Lack of control over water levels affects 9% of unfavourable and vulnerable features (Fig 32) in 2015 this issue affected 22% of features.

Water, in terms of quantity, seasonality and quality, is a key component of wetland features, including habitats such as floodplain meadows, fens and reedbeds. As has already been discussed (under Meadows) many of the meadows affected by the 2007 summer flooding have recently recovered to a condition sufficient to state that they are now favourable. It is this shift which is responsible for the decrease in the proportion of features negatively affected by water level control, between 2015 and 2018.

There are six features on different sites which remain affected by the lack of ability to manage water levels. Water issues are particularly difficult to address because water operates at a much broader scale than an individual reserve, and so can be difficult to resolve using techniques limited to the reserve boundaries. The Desmoulin's whorl snail case study (no 21) gives an insight into solutions being trialled at Thatcham reedbeds.

Forestry management

8% of features are affected by a lack of forestry management (Fig 32). In 2015 this was 12%.

This challenge is focused on woodlands and hedgerows. Primarily the issue is highlighted when conservation activities such as ride scalloping and coppicing have been unable to take place due to resource constraints. Additionally this issue also includes features where the Trust is unable to carry out desired work, because the site is leased to the Forestry Commission.

Woodlands and hedgerows require ongoing rotational management in order to ensure the desired structural diversity is present. However, tree felling is a time-consuming and skilled job and it is challenging to find enough resources to achieve the desired annual work programme. Over the years various different strategies have been trialled including using contractors to remove timber to sell for firewood. However to date this has mostly been unsuccessful because nature reserve woodlands are relatively small and isolated and most importantly do not have the infrastructure required to removed felled timber, such a stacking areas and hard-core tracks.

Undergrazing

In 2018 6% of features are unfavourable or vulnerable as a result of undergrazing (Fig 32). In 2015 this issue affected 10% of features.

This issue is located on a range of sites, primarily heathland and chalk grassland features.

This includes a suite of chalk grassland sites where coarse grasses, such as tor grass, have gradually increased, to the detriment of finer grass species and chalk grassland flora, thus reducing the biodiversity value of the feature. These coarse grasses are only palatable to stock in early spring when the leaves are softer. Across these sites a spring graze has been instigated. Initial results were encouraging with some evidence that there was a decline in the undesired grasses. However, the early signs have not continued and the grassland has yet to return to condition.

Issues related to a lack of grazing across other sites here occurred due to external constraints. These have included problems with TB testing and livestock movements, and most critically antisocial behaviour (including physical threats to animals) which has resulted in the Trust currently being unable to graze a large heathland.

Case study 20: Greenham grazing

Greenham and Crookham Commons is a large site (450ha) southeast of Newbury in Berkshire. The reserve combines lowland heath, grassland, wetland and pools and woodlands, and is home to many uncommon species, including Dartford warbler, adder and grayling butterfly, as well as many species of flowering plant, lichens and fungi. The Commons cover the area of the former USAF airbase and site of anti-nuclear weapons peace camps, so there is also considerable historical and cultural interest to preserve and interpret.

The issue of the levels of grazing has been raised in the past. In 2006 BBOWT and Natural England were asked by the Commission to comment on the grazing pressure. The concerns were about over-grazing, causing a high proportion of very short sward with few flowering plants and damaged heather, which in turn resulted in lowering populations of butterflies and other invertebrates, and a decline in cover for adders and nesting habitat for birds like skylark (which has declined steadily since 2009).²⁵ The issue of favourable site condition is not simple, as the Commons are known to be important for a range of small annual plants that do not tolerate competition and require short open disturbed swards, and also a number of grassland fungi that similarly need short turf. Relatively heavy, year-round grazing maintains these conditions, but at the detriment of higher yields of nectar and pollen and structural diversity within the grassland and heathland.

Grazing is an important management tool for maintaining grassland and heathland, removing scrub and keeping the sward open and diverse. The wide-range of species that are present now is partly a result of past management by the MoD, namely intensive regular mowing, and the fact that parts of the site were separated by the airbase fencing. To meet the needs of all the interesting wildlife groups on the site, the majority of which is now a single unit, is proving very difficult, due to conflicts between species needing open habitats and species needing scrub and structure.

At Greenham and Crookham Commons, BBOWT does not have control over the grazing. The grazing is determined by commoners' rights, vested in properties surrounding the Commons. Currently five commoners graze a combination of their own rights and some from other non-grazing commoners. There is also one external grazier leasing a collection of grazing rights. The exercising of commoners' rights is controlled by the Greenham and Crookham Commons Act 2002, which is administered by the Greenham and Crookham Commons Commission, a body of elected commoners and stakeholder appointees. BBOWT are able to liaise with Natural England and the Conservation Management Committee to give opinions about the suitability of the grazing pressure, but not to control numbers or timing of grazing. The graziers, understandably, like to use the common for as long as possible, for as many cattle as possible, and this has led to the need for routine supplementary feeding in the winter and areas of localised poaching and dunging. BBOWT feels that a good balance could be achieved by removing all but a few of the hardiest stock over the winter, avoiding the need for supplementary feeding on the Commons, followed by a gradual building up of numbers through the spring, before achieving the maximum number (approx. 120 head) in August. This should allow more grasses and herbs to flower and set seed, but still achieve a short sward in the autumn and coming into the next spring.



Fig 1: maximum count of cattle numbers each month

Once these differing views became apparent, the Commission asked BBOWT to develop a specific monitoring protocol for assessing the impact of grazing and a regular monthly count of the stock turned out on the Commons. Headage counts have been running since autumn 2013, and show numbers consistently at more than 100 animals all year round up to winter of 2016, and with peaks of nearly 180 cows in some summers (Fig 1). The annual summer peaks come as calves are weaned and begin to graze before being removed in the autumn. There have been barriers to removal of stock when it would otherwise have happened, namely BTb

outbreaks and lack of lay-back grazing off the Commons. Natural England and West Berkshire council are trying to work with the commoners to find additional grazing land. It is likely that changing grazing patterns and stocking density will be a long-term management aim, and will take co-operation of all stakeholders to achieve a balanced and sustainable outcome.

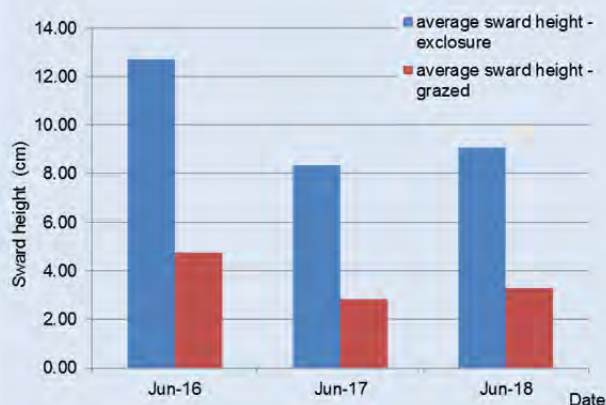


Fig 2: difference in average sward height between enclosure and open grazing unit, in June



Fig 3: Percentage of samples showing indicators of heavy grazing pressure

Grazing pressure is assessed by making annual comparisons of heather structure, and monthly observations during the spring, summer and autumn, of the grass sward, using fenced enclosures as control areas where cattle grazing, but not rabbit nibbling, is excluded. On the grassland areas criteria relating to grazing pressure (namely sward height, structure and flowering success) are recorded, and the values of the potential sward conditions (i.e. within the enclosure) are compared to those in the grazed areas. An example of the results is shown for sward height in June over the three years the monitoring has taken place (Fig 2). Similar comparisons are made between the percentages of flowering plants in sample and the percentage of those that are in flower. As a certain level of grazing is essential to maintain the grassland, a sample is only considered to be overgrazed if it fails to reach 50% of the value of the control. To look at the impact of grazing on the heather and heathland, annual measures of average sward height and growth patterns of the heather are recorded. Again samples are considered to be heavily grazed if the sward height is less than 5cm and more than 50% of the heather is a “carpet” or “topiary” growth form, or if there is broken or damaged heather present (Fig 3). The charts shown here are only examples of the data, but the overall results of these two surveys show a large number of heather samples display heavy grazing pressure, and that the grassland is performing below the limits that have been set as reasonable to ensure a good structure and a good supply of pollen and nectar. The photo shows clearly the impact that grazing is having on the sward.

Natural England produces a report on the status of the populations of several species of the specialist annual plants. This provides approximate data on their status in relation to the grazing regime. Although this is not qualitative it suggests a contraction in range of some species e.g. fine-leaved sandwort and annual knawel; others, like upright chickweed and knotted clover, are still flourishing.²⁶



Pyle hill enclosure, June 2018, clearly showing differences in sward height, structure and flowering (areas grazed to right of image, areas un-grazed to left of image inside enclosure)

Case study 21: Desmoulin's whorl snail

Thatcham Reedbeds is a SSSI and SAC in the Kennet Valley between Newbury and Thatcham. The SSSI is designated for wetland habitats, the birds they hold and the Desmoulin's whorl snail (also known as the Newbury by-pass snail); the SAC is solely designated for the Desmoulin's whorl snail, reflecting its international rarity. BBOWT manages part of the SSSI and SAC, and the reserve sits within a larger wetland area consisting of reedbed, fen, open water and wet woodland as well as angling and amenity lakes.

The Desmoulin's whorl snail is a very small (2mm fully grown) (Fig 1) wetland snail, that feeds on algae that grow on the broad leaf-blades of sweet grasses, and large sedges. It prefers constantly damp ground, but cannot tolerate prolonged flooding, and is found in fens and waterside meadows fed by alkaline water. The snail is found very locally distributed across southern parts of the UK and Ireland, but populations tend to be small, and numbers are low due to its precise habitat requirements, and the loss, by drainage and improvement, of many wetland areas.



Fig 1: Desmoulin's whorl snail

The known population of snails at Thatcham Reedbeds has been surveyed periodically since 1996, by consultants funded by English Nature, Natural England, the Environment Agency and BBOWT. Surveys have looked at both snail

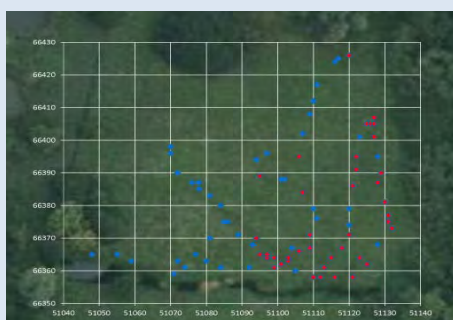


Fig 2a: distribution of Desmoulin's whorl snail in southeast corner of Thatcham Reedbeds, 2012; red – present, blue – absent. (Killeen 2015)

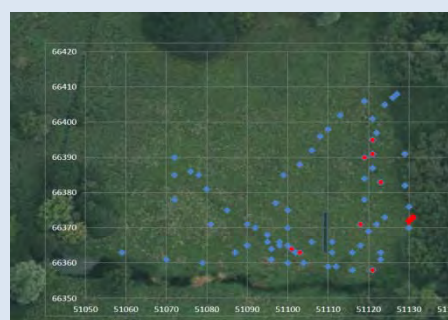


Fig 2b: distribution of Desmoulin's whorl snail in the same area, 2015; showing reduction of positive samples. (Killeen 2015)

populations and the habitat available. The results show that snail numbers have varied and that the locations of sub-populations have moved around the site with repeat surveys sometimes failing to find known populations but new sub-sites being found too.²⁶ Notwithstanding that most of the surveys are not directly comparable; the broad trend is for declining numbers of the snail, with ranges contracting into core areas most likely as a result of drying of the fen habitat (Fig 2a & b).



Fig 3a: Main weir on Middle Ditch, Feb'15, showing eroded by-pass channel (looking upstream)



Fig 3b: Main weir on Middle Ditch, Jan'16, showing completed weir with previously eroded by-pass channel in the foreground (looking across channel)

The site management response requires manipulation of water levels to keep areas damp year round, but without prolonged flooding, and also scrub control to prevent succession. Water levels are not easy to control at Thatcham as BBOWT does not have management

control over all the streams and ditches that feed the wetlands. Two different angling associations, Network Rail, and a private estate all own land and watercourses upstream of the reserve. BBOWT is trying to negotiate a management agreement with the estate to manage the land which will allow the cleaning of ditches and vegetation management to take place.

On taking management control from West Berkshire Council in 2014, two weirs that hold water levels downstream of key snail habitat (seen in Fig 2) were found to be non-functioning, resulting in drying of fen areas during low flow conditions. These weirs were re-built, one in 2016 and one 2017, and now keep fen areas wetter (Fig 3 a & b). Following on from this, in 2017 dipwells were installed across the site and will help track how groundwater levels vary over time. This information will be used to target habitat restoration to hydrologically suitable areas, and suggest where other control structures should be installed, or where old ones prioritised for repair. This will also potentially benefit the reedbeds and wet meadow communities, and the birds and invertebrates that use these areas. Surveys will also continue to feedback on the effectiveness of the management work and to fine tune understanding of the areas the snails are using. Thus enabling tweaking of fen management, including cutting and scrape creation, avoiding damage to existing populations and providing better conditions for those existing snail populations to expand.

2.2.2 Wider challenges

Climate change

Climate change is happening right now. In the UK, temperatures on land have risen by as much as 1⁰c since 1980 and coastal sea surface temperatures by roughly 0.7⁰C over a similar period. The impacts of climate change on biodiversity are reasonably well understood, with effects expected to change as the magnitude of climate change increases. Across the UK there is evidence of species expanding their ranges northwards, including species colonising southern England from continental Europe. There is also evidence of seasonal events happening earlier in the year. It is known that particular habitats such as freshwater ecosystems, are more vulnerable to climate change impacts²⁸. However, the precise details of impacts at the individual site level are difficult to predict.

Despite changing environmental conditions due to climate change, nature reserves are likely to remain good for wildlife. This is partly because nature reserves are managed sympathetically for wildlife, with low nutrient inputs; which in turn creates genetically diverse and species rich habitats, which are known to be more resilient to climate change impacts.

However, this does not mean that the suite of species (both flora and fauna) present on reserves now, will be the same in the future. In fact it is very likely that the mix of species that make up recognisable habitats today, such as meadows or woodlands, will be very different in the future. This does not mean that reserves will not be good for wildlife, they may well be, just for different wildlife.

Climate change cannot be halted at the reserve scale, but it can be managed and to some extent mitigated for. This will include making bold decisions about which wildlife is or is not the priority and being flexible in objective setting. It is essential that decision making is underpinned by best ecological knowledge rather than the desire to continue to support much loved species which may no longer be able to survive. These will be difficult and challenging decisions and are unlikely to happen within this generation.

The practical management of nature reserves may also need to shift. For example, better water storage and control structures are likely to become ever more important during increasingly hot summers, while increasingly long growing seasons will mean reserves will need to be managed more intensively simply to standstill.

However, as public and political knowledge and will to address climate change increases, there may be

opportunities that benefit of wildlife. Biodiversity has an important role in climate change mitigation, for example, through the carbon storage capacity of forests, soil and oceans, and this may become more recognised and financially compensated for in the future.

Ash dieback

Ash dieback is increasingly having a significant impact on wildlife on nature reserves and the management strategies employed. Chalara dieback of ash is a serious disease of ash trees caused by a fungus called *Chalara fraxinea*. The disease causes leaf loss and crown dieback in affected trees, and is usually fatal. It has caused widespread damage to ash populations in continental Europe. The disease can kill young ash trees quite quickly, while older trees can resist it for some time until prolonged exposure or another pest or pathogen attacks them in their weakened state and eventually causes the tree to die.

Given that UK woodlands are comprised of approximately one third ash and predictions are that 90% of ash will succumb to the disease the impact is likely to be both widespread and severe. While in general the impacts of ash dieback are likely to be negative, in some situations the loss of ash may actually result in improved woodland structure. However, this will only happen if deer browsing levels are low enough to enable natural regeneration to survive.

In light of the projected future for ash the Forestry Commission will no longer accept natural regeneration of ash as counting towards the required canopy cover following felling (such as the restoration at Whitecross Green Wood and Finemere Wood). Indeed in many of our ash dominated woodlands there may not be sufficient cover of other species to regenerate and provide canopy cover. Consequently it is likely that on some sites tree planting will be required in order to ensure the long term survival of woodland. This will require more resources in terms of finances and time.

Ash dieback also has significant implications for the health and safety responsibilities of the Trust. Increased volumes of standing dead ash trees, likely to collapse unpredictably, means that there is a greater risk of injury to visitors. This will have knock on impacts requiring increased staff time and financial inputs to address 'dangerous' trees. At least one other Wildlife Trust has decided to approach this matter by felling significant volumes of

ash trees in the vicinity of high risk areas such as car parks. BBOWT is not intending to implement a similar cross-site strategy. Each site will be assessed on a case-by-case basis depending on the severity of the disease, the biodiversity objectives of the site and the health and safety risk (see case study 22).

Nitrogen deposition

There is a wealth of evidence showing that atmospheric nitrogen deposition negatively impacts on biodiversity and consequently poses a significant threat to the conservation status of sensitive habitats and species²⁹. Critical loads for the protection of habitats from nitrogen deposition are exceeded over large areas of Europe and will continue to be exceeded under current projections of nitrogen emissions. Nitrogen deposition impacts two main processes, namely acidification and eutrophication, both on the local and the landscape scale.

Communities most at risk from nitrogen eutrophication are those rich in bryophytes and slow growing, poorly competitive plants. Many native species of plants do not have the capacity to assimilate nitrogen in the presence of increased availability (from nitrogen deposition) and can be outcompeted by plants that can e.g. many coarse grass species. Low growing species such as wild flowers and non-vascular plants are especially at risk. Such species replacements can lead to the loss of specialised communities and ecosystems e.g. under high nitrogen loading heathland will slowly become biodiversity poor grassland.

Clearly the Trust alone cannot influence legislation change to reduce air pollution and even if it could this may not be enough to solve the problem. Research shows that even if the most stringent air pollution control policies are enacted some ecosystems may have been so damaged by chronic nitrogen loading that pollution reduction by itself would not lead to full recovery within a reasonable time frame.

It is likely that the best strategies for dealing with this problem will require a substantial increase in removal of nutrients through more intensive grazing and/or mowing. This is likely to require increased resources. It will also be important to keep up-to-date with the latest scientific understanding of this issue and any potential mitigation solutions for wildlife conservation.

Agri-environmental schemes

Post Brexit there is much uncertainty regarding the actual details of future environmental land management schemes (ELMS). BBOWT is currently helping shape the future scheme design through delivery of a DEFRA Trial and Test pilot scheme, assessing payment for natural capital and how this influences biodiversity gains. It is hoped that a future scheme will provide opportunities for wildlife benefits that the Trust can engage with both on reserves and in the wider countryside. It should be highlighted that if payments are given for natural capital, there will be a need for additional staff training in order to equip people with the skills so that they can apply for the schemes. As ELMS affects both reserves and the wider countryside this is further discussed under section 4.

Anti-social behaviour

One of the Trust's key objectives is about engaging with people and inspiring them about nature. One of the ways in which this achieved is by encouraging people to visit nature reserves and experience nature first-hand.

However, regrettably, in most circumstances high visitor numbers causes problems for the ecological integrity of sites. Visitors, and especially their dogs, can significantly negatively impact upon wildlife, often through disturbance of species such as ground nesting birds like nightjar or curlew and reptiles such as adders. Dogs can also cause problems with grazing animals. Many graziers dislike putting their livestock out on sites with high footfall and it can be very difficult to find anyone happy to graze these sites.

Nature reserves with higher numbers of visitors and/or in urban areas also tend to have higher levels of antisocial behaviour. This includes activities such as the vandalism of fences and gates preventing sites from being grazed or resulting in livestock escaping from site, littering and fly tipping large volumes of waste, immediate neighbours extending their boundaries into nature reserves or 'prettifying' their boundaries with inappropriate planting on the nature reserve, arson, legal suits against the Trust for damage to property, and members of the public building unsafe, unauthorised structures such as tree houses and cycle tracks.

Dealing with these issues can take up a significant amount of staff time and resources. Thus high volumes of visitors directly and indirectly impact on the biological value of sites.

The visitor pressure on reserves will increase as a result of the ongoing significant development planned for the three counties. There are some on-

site measures which can be implemented to help mitigate visitor pressure, for example the employment of 'seasonal wardens' during the ground nesting bird season at Greenham and Snelsmore Commons, funded through S106 money. However, engaging with developers, commenting, and, when appropriate, objecting to development proposals, as well as influencing local strategic

development plans remains a very important element of the work the Trust does, in not only protecting wildlife on nature reserves, but also in the wider countryside. Increasingly evidence of the impact that people have on nature reserves will be required in order to help influence the planning process.

Case Study 22: Ash Dieback

Ash dieback disease is the common name given to a serious threat to ash trees in the whole of the UK. The disease was first observed in Eastern Europe in 1991, and has spread steadily west and north. It was confirmed in the UK in 2012 and now affects trees across all countries and counties of the UK. A fungus, spread by windblown spores, infects leaf fronds and then causes withering of the leaves, followed by bark lesions and crown die-back. The infection can spread through tree's transport system leading to lesions on trunk, which in turn makes the tree susceptible to secondary attack, commonly from honey fungus. The vast majority of trees either succumb to the combined effects of the fungal infection and crown die-back, or the secondary infections. Observations from European woods suggest that 95% of ash trees are killed within 10-15 years of infection, and many die far quicker. A small percentage of ash (1-5%) show some tolerance to the fungal infection, and, whilst still showing symptoms to varying degrees, they appear to be able to survive, grow leaves and set seed each year (at least so far).



Felled ash, showing signs of disease



Fig 1: Potential impact of ash dieback at Rushbeds (high impact)

BBOWT has some fine mixed deciduous woodland reserves where ash trees are a major component of the canopy, and many reserves with at least some ash trees present. Dieback was first observed on BBOWT reserves in 2014. A survey was begun in 2016 to look at our major woodland reserves with the aim of modelling the potential impact of the disease on the future structure of the woods. Fieldwork involved visiting sample areas of the woods and recording the amount of ash both in the canopy and understorey (ie future canopy trees), and comparing that with the other species present. Then, assuming that all ash will die, maps were

created of the potential impact of the disease, which in turn helps to inform the appropriate level of response. Impact maps have been generated for seventeen sites (the majority of which are in Bucks), and these show varying levels of future impact (see Fig 1 & 2 for examples).

Health and Safety is an overriding concern and ash dieback is creating, and will continue to create, a lot more potentially hazardous trees. BBOWT's normal tree safety audit process will identify hazards and the need for remedial action, but it is anticipated that there will be an increase in the amount of safety felling required. Away from the tree safety priority areas, the general principle is to leave ash standing, rather than carry out thinning or clearing operations. This will give any trees with some tolerance the chance to be identified and to set seed, hopefully passing that tolerance on. It will also give species reliant on ash as long as possible to adapt, whilst benefitting the range of species associated with decaying wood.

There will inevitably be an impact on the structure of the woodland habitat, with increases in the number of canopy gaps and the amount of light reaching the woodland floor. The response to this change will be guided by the amount of ash in the canopy. Where ash is a minority component, canopy gaps are likely to be closed by crown-spread from neighbouring trees. Where ash is more dominant the impacts will be more pronounced. There are woodlands where increased light levels leading to a flush in ground flora and bramble and scrub regeneration would be considered positive, for example at Yoesden where uniform woodland has grown up on what was once scrubby chalk grassland. At sites like Rushbeds Wood where the impact is likely to be severe and the integrity of the woodland is important, interventions like planting with alternative species may be necessary; it may also mean an increase in deer control is required to protect planting and natural regeneration alike. The impact of the disease at other woodland reserves is more variable, with all sites likely to have areas of high impact, but in most cases these areas are only parts of the whole wood. In this case the response will be to allow that part of the wood to open up and regenerate naturally, taking the opportunity for enhanced structural diversity. All areas will continue to be assessed, through the Reserves Monitoring Programme, to ensure viable regeneration is present and that deer browsing pressure is not jeopardising the future of the habitat.

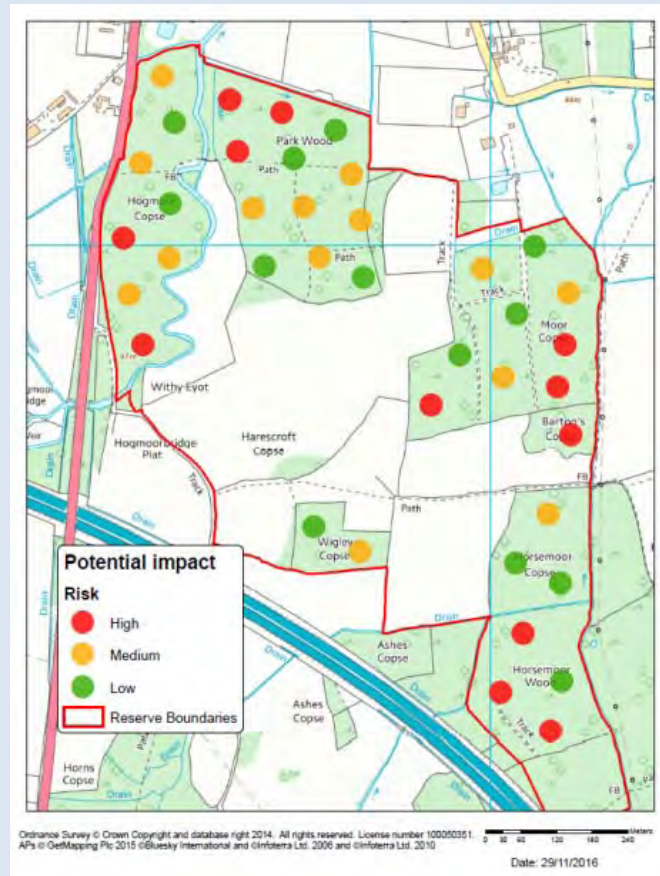


Fig 2: Potential impact of ash dieback at Moorcopse (high to medium impact)

3. Wider countryside – ‘More, Bigger, Better and Joined’

Alongside work on enhancing and protecting biodiversity on nature reserves the Trust carries out a range of activities outside nature reserve boundaries in what is considered the ‘wider countryside’. The focus of this work is aimed at achieving the Lawton objectives of:

More – land under conservation management

Bigger – areas of land managed for conservation by influencing nature reserve neighbours

Better – by focusing site management to achieve good condition status for wildlife

Joined – by creating ecological networks between core sites through improved wildlife management activities in ‘gaps’

These objectives are primarily achieved by influencing external stakeholders such as landowners and decision makers. This section of the report provides overarching statistics summarising progress. A range of case studies also provide further details of the many and varied ways in which the objectives are achieved.

3.1 Wider countryside - overview

Conservation work to achieve wildlife gains in the wider countryside is primarily focused on influencing external stakeholders. These stakeholders are comprised of two core groups: landowners and decision makers. For example, the Trust might provide advice to a farmer about how to improve their land for wildlife and help them apply for agri-environmental scheme funding to achieve this; or the Trust might comment on the allocation of land ear-marked for development to ensure that wildlife hotspots are avoided.

Different strategies are necessary in order to help mitigate for the numerous challenges negatively impacting biodiversity across the three counties.

To date the Trust does not measure actual biodiversity outcomes achieved as a result of the wider countryside work it has undertaken; for example, improvements in the number of pollinators using an arable margin or the functional ecological connectivity of the landscape. Instead work outputs, such as the number of landowners contacted is recorded.

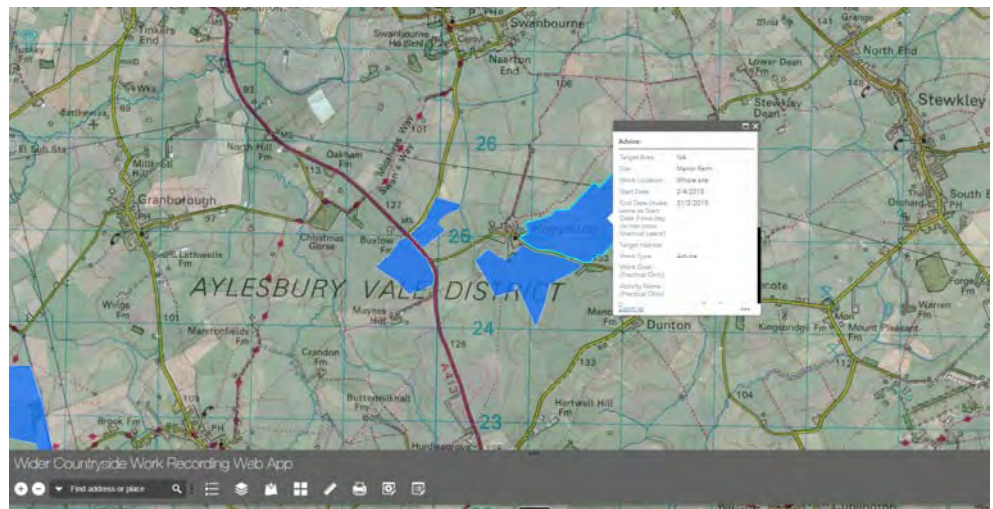


Fig 33: GIS mapping of wider landscape work

The exception to this is the HLF-funded five year West Berkshire Linking the Landscape project. This project, which has just come to an end, measured actual wildlife improvements as a result of actions implemented. Further details regarding this project can be found under the West Berks case study (No. 24).

Table 2: Number of hectares and number of landowners influenced by BBOWT wider landscape work

Financial Year	Area under positive management (ha)	Area of land on which advice was provided (ha)	Number of landowners reached
2016 – 2017	Not measured	Not measured	200
2017 – 2018	99	3531	293
2018 (up to end Q2 2018)	102.5	1148	219

Table 2 shows between 2016 and 2018 the number of landowners who have been contacted, the number of hectares which have had advice provided and hectares which have had wildlife positive management activities.

To date, the way in which this data has been collected has been somewhat piecemeal and has lacked a clear unified strategy as to what should be recorded and how. Recording issues have included for example, whether the entire area of a farm should be recorded if the primary focus was the arable margins round two fields, and how to record landowner visits which take place over a series of years, and therefore could result in the statistics on

hectares influenced being several times higher than the actual land that advice was provided upon. In order to try to address this problem, in 2018 a GIS layer was created to formalise what is recorded, thus enabling easy cross-Trust reporting of different activities. This information will also help to build up institutional memory about what activities the Trust has carried out and where. Fig 33 shows an example of mapping work in the wider landscape.

In addition to improving mapping and data collection a new landowner layer has been created. This brings together all of the Trust’s information on who owns land and where, thus reducing the likelihood of two members of staff contacting the same landowner without knowing they have already had contact from someone else. This is especially important if the landowner has stipulated how they would like to be communicated with.

3.2 Influencing landowners

Due to the lack of wildlife outcome data, it is not possible to provide biodiversity condition assessments in the same way as that provided for nature reserves.

As such, this section of the report includes a range of case studies which provide information on the conservation work carried out.

Case study 24: West Berks Linking the Landscape (WBLL)

The five year, HLF-funded, West Berkshire Linking the Landscape Project came to an end in June 2018. The project had three main aims, all of which were achieved:

- Inspire local people through events, activities, training
- Implement vital, targeted practical conservation measures
- Devise and deliver an innovative landscape-scale monitoring and surveying scheme

The second two points will be elaborated on below, but the first objective of community engagement was also met by both the survey and practical aspects of the project, as well as through specific activities such as engaging with schools.

Practical Management Work

The WBLL project set out to improve habitats for wildlife across the Living Landscape area, by engaging local residents. The project engaged with seven landowners, including local farmers, estates and a golf course. The work involved writing and delivering management plans for landowners to improve and restore habitat. Staff, volunteers and trainees helped in the recovery of 9.5ha of privately-owned habitat, ranging from improvement of lakeside habitat for waders, to management of a private SSSI reedbed (Fig 1). Volunteer time contribution was a significant factor in the success of the work undertaken, with a total of 3,584 days by volunteers and 1,542 days by our team of trainees over the span of the project.



Fig 1: Reedbed cutting at Woolhampton Reedbeds SSSI

Another part of the project's work was to assist the Land Management Team in delivering conservation gains on BBOWT reserves in the project area. Those reserves are Greenham & Crookham Commons, Bowdown Woods, Two Rivers Way, Thatcham Reedbeds and Audrey's Meadow. The WBLL team of staff and volunteers completed 42.5ha of work on reserves, increasing the capacity for work on our West Berkshire reserves and, in turn, increasing their value to wildlife.

A final positive achievement for the practical aspect was the improvement of access for the public to reserves. A total of 15km of track was maintained or enhanced both on our reserves and in the wider landscape.

Survey Work

The aim of the survey work was twofold: to assess the biodiversity health of the West Berks Living Landscape area and also to trial the methods employed to do this.

In order to undertake this work a large number of volunteers was required. A team of 30 volunteers, along with staff, external consultants and trainees completed 3,223 individual survey visits on private and BBOWT-owned land and spent well over 1,000 days collecting data. These visits covered a full spectrum of species surveys: bat, bird, butterfly, dragonfly, dormouse, herptile and pollinators. Along with the species surveys (based off national monitoring scheme methodologies), there were habitat condition surveys. These surveys, as would be expected, looked at botanical and structural indicators to assess habitat health (Fig 2).

The project also helped facilitate contact between volunteers and local and national monitoring groups, such as the local bat and mammal groups and the Riverfly Monitoring Scheme (Fig 3). Five trainees also gained their great crested newt survey licenses through the project.

The surveys took a before and an after snapshot comparing areas in conservation management and those without. Both reedbed and arable habitats show an improvement in areas managed for conservation versus those which were unmanaged. However, for the majority of habitats there is no clear relationship and indeed the heathland samples appear to have declined during the study period (Fig 4). A possible reason for this lack of a positive relationship is that net gains of conservation work may have a lag time. As there was only one year separating the first and second surveys due to the short life of the project, habitats that are slower to show signs of recovery (e.g. heathland) are not yet accurately portrayed.

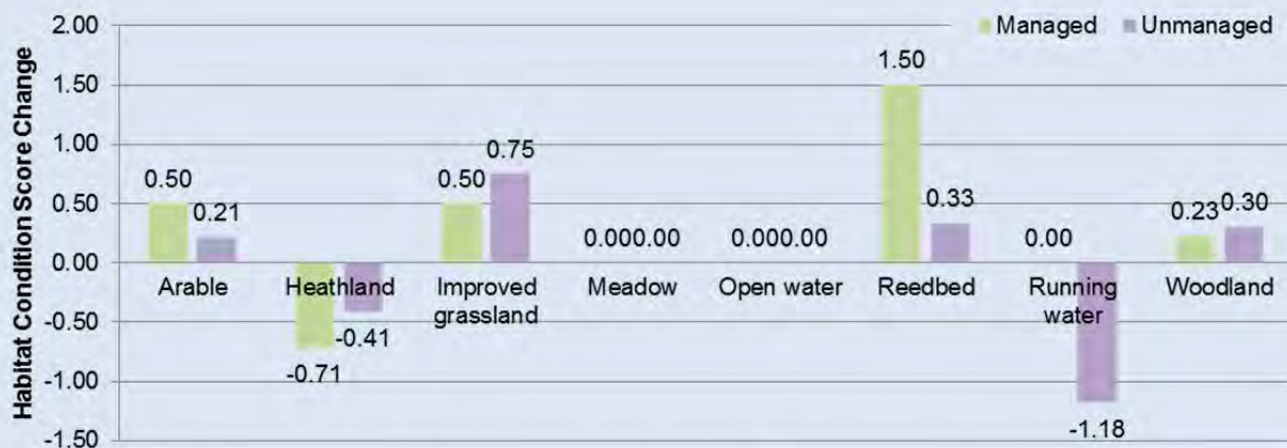


Fig 4: Habitat Condition Assessment score change in managed and unmanaged habitats



Fig 3: The team completing a Riverfly Survey on a privately-owned section of the River Kennet



Fig 2: The team teach a group of volunteers how to complete a Habitat Condition Assessment of Heathland

Case Study 25: Hedgerow Havens

Through the newly created Hedgerow Havens Project, BBOWT and partner Aylesbury Vale District Council (AVDC) have been looking to work with local landowners and managers in the area to the north of Aylesbury. Funded through a Section 106 agreement from the Berryfields Major Development Area the project is able to award grants, and provide practical assistance and advice to landowners and managers who are happy to adopt wildlife friendly management on their land. Conservation target species for the area include: farmland birds such as tree sparrow and corn bunting, brown hares, badger and barn owl.

Watermead

The first major project to get underway is at Watermead and carried out in conjunction with Watermead's Parish Council who have been supportive and enthusiastic throughout the process. The projects target area covers 14 different parishes, all of which were contacted in the early weeks of the project. Watermead was the first council to respond with an initial meeting organised in June followed by a presentation by the Hedgerow Havens Officer to the full council later in the month. Following a further site visit to establish areas of opportunity a small patch of land approximately one acre was selected for further works.



Raking up at Watermead

The grassland which borders the River Thames on one side and crematorium on the other had previously been used for amenity purposes but had at that point been left uncut for two years and in that time become dominated by cock's-foot grass and docks. Since this patch of land is within the floodplain and does on occasion flood it was decided that this area would benefit greatly from being restored to a floristically rich floodplain meadow community and having a diverse hedge planted.

Following the site visit a full habitat creation plan along with a management plan for the first five years was drawn up and an agreement signed by BBOWT, AVDC and the parish council stating that the patch of land would continue to be managed for its merits to wildlife over the next 25 years at least. Works started in October 2018, with removal of the docks. Following this the local roving volunteer group; the Vale Countryside Volunteers were enlisted to carry out a 'cut-and-remove' of the grass, and plant 135m of species rich hedge, containing 12 distinct species along with two black poplar subsp. *betulifolia* standards.

The preparation of the ground will continue in 2019 with two 'cut-and-removes' planned before seeding with a wildflower mix akin to the National Vegetation Classification MG4 *Alopecurus pratensis* – *Sanguisorba officinalis* floodplain meadow community. In 2020 the basal leaves and root systems will develop and it is hoped that by 2021 the meadow will start to come into its own, creating a stunning bloom in the summer months.

This project is of great importance to the Hedgerow Havens as a whole, as it lays the ground work for other meadow based projects to be carried out. Others currently in the planning phase or starting to take off include the floristic enhancement of road verges and field margins.

The Waddesdon Greenway

From summer to winter 2018 the Hedgerow Havens project has teamed up with the charity 'Greenways and Cyclerroutes' to create an ecologically friendly and connected route along a 3.5km cycleway connecting Aylesbury and Waddesdon. The Waddesdon Greenway runs parallel to the A41 along the fringe of a mixture of arable and pasture fields.

Contact was made with Caroline Levett from Greenways and Cyclerroutes in June 2018, leading to a meeting and site visit in the same month. Through various grants the charity had money set aside for a considerable amount of hedge planting and other ecological benefits. Through Hedgerow Havens, BBOWT was able to provide advice on a wildlife friendly hedge mix, with just one caveat; due to the hedge being next to a cycle route, shrubs with thorns were out of the picture, meaning the two standard hedging plants favoured, blackthorn and hawthorn could not be used. To fill this gap a mixture of dogwood and hazel were favoured in drier areas, with alder dominating in wetter areas. Additionally a further seven species were included in the mix.

Along either side of the path there is approximately 2m of verge. These were sown with wildflower seed in August 2018, with a mix recommended by the Hedgerow Havens Officer due to its closeness to the National Vegetation Classification MG5 *Cynosurus cristatus* – *Centaurea nigra* community which tends to be the most well suited meadow community to soils in the area. Almost the entire 3.5km of the track were seeded on each side by local volunteers. If added together this equates to as much as 1.4ha of new MG5 grassland.

From Thursday 29 November to Sunday 2 December volunteer days to plant the 1.2km of hedging were organised by Greenways and Cycleroutes with assistance from BBOWT. Over the weekend more than 6,000 hedging plants, along with 53 trees were planted by volunteers from Greenways and Cycleroutes, BBOWT, Waddesdon Manor, the RAF and McCormick. In total there were 164 days of work carried out over the weekend, a fantastic effort.

Going forward the Hedgerow Havens Officer will be putting together a management plan for the new hedge and wildflower margins, which can continue to be implemented for at least the next 10 years whilst the funding awarded to the greenway remains in place. There are also lots of opportunities for local volunteers to get involved again through replanting of lost shrubs and (almost definitely) lots of weeding in the new wildflower areas!



Volunteers planting hedges on the Waddesdon Greenway

Case study 26: Oxfordshire Wildlife Sites (OWS)

Oxfordshire has benefitted from a Local Wildlife Sites (LWS) project for 20 years. LWS are sites which are recognised as having high biodiversity value. Unlike SSSIs they do not have any statutory legal protection, but National Planning Policy Framework guidance directs that their presence should be taken into account during any planning decisions. LWS are an invaluable tool in helping to protect wildlife across our wider landscape.

The Oxfordshire Wildlife Sites Project aims to survey, designate and monitor the condition of the county's LWSs and provide conservation advice and support to their landowners and managers. The project is a partnership between BBOWT and the Thames Valley Environmental Records Centre (TVERC). It is largely funded by, and operates in close partnership with, Oxfordshire's individual Local Authorities. Contact with landowners regarding survey permissions and results, and provision of free advice on land management is provided by BBOWT whilst surveying and data management is carried out by the TVERC.

In Oxfordshire there are currently 384 LWS and 87 proposed new LWS or extensions, totalling 7698 ha (2.95% of the county). These figures are adjusted slightly most years following the project Selection Panel's annual review of sites surveyed. The project operates a rolling programme of surveying sites where existing survey data is over 10 years old and also any newly proposed sites/extensions, to assess whether these meet the selection criteria. These criteria are based on the 'Ratcliffe approach' which was a framework drawn up in 1977 as a guide for the selection of biological SSSIs published by the Nature Conservancy Council (since succeeded as Natural England). BBOWT input into development of a new version of the selection criteria which came into use from 2018.

Over the last three years the project has surveyed c.130 Local Wildlife Sites and provided management advice visits to the landowners and managers of 38 sites, covering more than 900 ha. This advice is often in the form of on-site visits with accompanying written management briefs. The Project Officers also provide ad hoc advice and respond to landowner queries on a regular basis outside of the rolling programme. Where resources allow the OWS Project also covers advice for other key sites adjoining/impacting existing LWS.

In 2016/17 a successful pilot project concluded, in which with BBOWT led wildlife on restoration projects at three LWS providing more substantive support to owners in terms of grant applications, practical inputs and project oversight.

Hitchcopse South Sandpit LWS

Originally designated as a Local Wildlife Site in 2015, Hitchcopse South Sandpit, also known as Cothill Pit, harbours a wide diversity and large populations of butterflies, hymenoptera and day-flying insects supported in part by the profusion of flowering plants there. The site provides a huge nectar source for a wide range of invertebrates which have been well monitored over the years by local experts.

A former sand quarry, Hitchcopse South Sandpit lies in a geologically and wildlife rich area amongst a number of SSSIs: Cothill Fen; Dry Sandford Pit; and Frilford Heath, Ponds and Fens, which all include recolonised ground left bare after quarrying ceased in the 1980s. Covering an area of 7.29 ha, the site was designated on account of its UK BAP Priority Habitat 'Open Mosaic on Previously Developed Land'. This habitat category is defined by a known history of disturbance or soil removal, with a number of early successional vegetation communities, forming a mosaic across the site and areas of loose and bare substrate, sometimes including ponds. The site also contains elements of lowland dry acidic grassland and calcareous grassland, both also priority habitats.

The site has a varied topography but with a lower centre, forming a bowl shape. The sheltered and warm environment this provides, plus the low nutrient levels, are important elements contributing to the botanical richness on site. Species records for the site include a number of rare plants and invertebrates such as common cudweed, mat-grass fescue, silver hair-grass and abundant field scabious, plus the notable two-coloured mason bee and red-listed small blue butterfly.



**BBOWT cattle grazing Local Wildlife Site
Hitchcopse South Sandpit**

Previously under threat of development, in 2016 BBOWT was delighted to see the site acquired by a new owner wishing to see it protected for the long-term. In the preceding few years the site and its surrounds had become heavily used by dog walkers, sometimes up to 200 a day, despite there being no public right of way. This level of disturbance had a significant negative effect on the wildlife and sheep-worrying in the owner's neighbouring farmland had become a real problem. With support from BBOWT and the Oxfordshire Wildlife Sites Project the owner installed fencing allowing for both conservation grazing and better control of access. Since 2017 six BBOWT-owned Dexter cattle are on site for roughly three months during the winter and then removed before the growing season begins. This extensive, sensitive, grazing regime now keeps the sward and some of the bare sandy areas open, providing space for seed to fall and germinate which in turn maintains the botanical variety.

Following the installation of the new fences there was some initial resentment from dog-walkers who had become used to accessing the site freely although, in general, local people welcomed it. With previous experience of such situations, BBOWT staff helped support the landowner with the community engagement on this aspect to explain the rationale for limiting access. A strong ongoing relationship with the landowner has resulted.

Case study 27: Wild Banbury

The Wild Banbury project is now in its third year. It is modelled on Wild Oxford, being a partnership project with Banbury Town Council focussing on the management of Council-owned sites as well as offering a number of community engagement events throughout the year. The two project sites are Spiceball Park (a large park close to the town centre, also the site of a river restoration project in 2015, described in the last Conservation Report) and the Hanwell Brook Wetland, a small site on the outskirts of Banbury. These sites were chosen for their semi-natural habitats and high potential for wildlife. In the case of Spiceball Park, there is also high footfall which has helped raise the profile of BBOWT and Wild Banbury with local people. Installing new, branded signage at both sites has reinforced this.



Tree felling at Spiceball

A new volunteer group has been established and meets regularly to tackle a variety of tasks, including scything, tree planting and coppicing. Several infrastructure projects have been undertaken, such as creating a new path through a woodland using felled materials, and restoring a neglected pond through bank reprofiling and extensive planting. The group typically numbers around 6-8 volunteers per session, but at the time of writing, 46 people have volunteered for the project at least once and there is a mailing list of nearly 150 people. The number of volunteer hours is carefully recorded and shows an in-kind contribution of over £11,500 so far. The project has also benefitted from occasional visits from the Oxfordshire Field Team and Mid-Week Team volunteers, who have assisted with tasks such as felling in the woodland and large-scale plug planting to increase diversity.

Contractors were brought in to dig and line three new ponds to create additional freshwater habitat on both sites. The ponds are slowly establishing in spite of drought conditions experienced in 2018. Due to the urban nature of these sites, steps are being taken to try to reduce the number of dogs (and quad bikes) accessing the ponds.

A number of successful events have been held in Spiceball Park for both families and adults, involving a range of partners. The Wild Parks & Gardens event in 2018 included stalls and activities from the Environment Agency, Thames Water, Banbury Community Action Group, Cherwell Swifts and volunteer anglers from the Canal & River Trust. A comprehensive programme of walks in partnership with Banbury Museum has been established, and a number of ecological training events including Bumblebee Identification and Bird Identification for Beginners have been run. The project includes an education element and activities have been carried out with two primary schools so far, with further work planned with a secondary school and a college group. A trip to Sutton Courtenay Environmental Education Centre for a multicultural community group in a deprived area of Banbury was also funded through the project. The project is grateful to Heritage Lottery Fund, Grundon Waste Management, Banbury Town Council and Cherwell District Council for funding, and future funding sources are being sort so that the project can continue beyond 2019.

Case study 28: Jordans Farm Partnership

The Wildlife Trusts have entered into a new partnership with Jordans Cereals, who have a long history of wildlife-friendly farming. Now their 42 farms, totalling 44,500 acres, will build on that heritage with advice from experts at their local Wildlife Trust, making a landscape-scale contribution to wildlife and communities. There are two Jordans growers in the BBO area who have both been consulted in the development of a five-year plan to achieve 10% wildlife habitat on their farms, with 5% specifically tailored for pollinators, other insects and farmland birds.

One of the farms is Manor Farm in Hoggaston, Buckinghamshire, where the farmer and his family have sown wildflower margins to attract insects and 'bumblebird' plants to provide shelter and food for insects, birds and small mammals through the winter. Several kilometres of new hedgerows give additional shelter and food. Among the wildlife benefitting from these sustainable farming practices are brown hares and farmland birds: skylarks, yellowhammer, tree sparrows and lesser whitethroat, all species that are under threat due to the intensification of farming.

Jordans farms also comply with LEAF marque (Linking Environment and Farming) which means they may participate in Open Farm Sunday every year. BBOWT have taken the opportunity to attend and promote the wildlife management to several hundred visitors to the farm.

The other site is Vines Farm at Kidmore End, South Oxfordshire. The farm manager here has embraced wildlife management alongside his predominantly arable fields which lie among patches of ancient woodland in the Chiltern landscape. He is working to provide habitat for pollinators, foraging bats, plus skylarks, barn owls and farmland birds.

The project assures buyers of Jordans products, such as muesli, that the farmers producing the oats and other grains in the cereal are acting to restore wildlife on their land. The Wildlife Trust logo now appears on every packet sold in the supermarkets.



Jordan's farm family

Case study 29: Mammal project

Water Voles

BBOWT's Water Vole Recovery Project, the longest standing local project in the UK dedicated to water vole conservation, has continued to work to conserve water vole populations in the three counties. In partnership with the Environment Agency, the Canal & River Trust and Thames Water, the project has been monitoring water voles, working to identify and deliver habitat enhancements and influencing local landowners to manage sites sympathetically for water voles and implement mink control.

Around 40 trained volunteers have assisted each year with surveys for water vole activity, surveying on average 183 km of watercourse annually over the past 3 years. The results have shown a continued expansion of water vole sites, with an overall increase in water vole Local

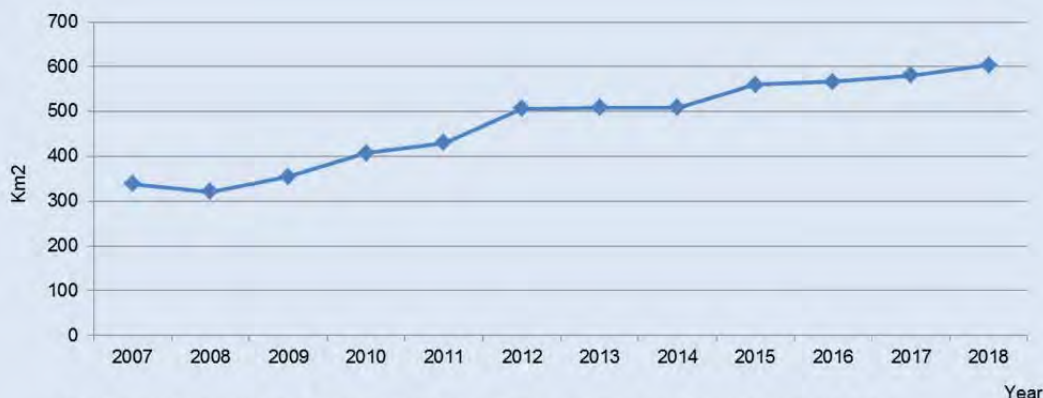


Fig 1: Extent of Water Vole Local Key Areas (km²) in Berks, Bucks and Oxon 2007-2018

Key Areas of 71 % since 2007 (Fig 1). As well as increasing their overall range, several local water vole populations have linked up to form larger meta-populations which improves their chances of survival in the long-term.

Mink are an introduced predator that can decimate water vole populations. The project advocates the use of mink rafts developed by the Game and Wildlife Conservancy Trust to monitor and trap mink. Mink control is carried out by working with landowners, providing equipment and trapping advice. Rafts are installed at 1 km intervals in and around known water vole sites. This ensures that any mink travelling along the watercourse are quickly detected and the water vole populations are protected from predation. The project is currently co-ordinating 201 mink rafts and traps across the three counties, dispatching 301 mink over the past 3 years.

Lower River Misbourne Enhancement Project

In 2015 the Water Vole Recovery Project was approached by the Environment Agency to help develop and deliver a programme of habitat enhancement work on the lower River Misbourne. The River Misbourne is a chalk stream in south Bucks which is failing to meet the target of 'good ecological status' under the Water Framework Directive. With water voles recorded on the upper river and also on nearby watercourses downstream, it was clear that the lower river could provide an important link between existing water vole populations if the habitat was favourable.

With the Environment Agency providing funding, this was an exciting opportunity for the project to lead on enhancement work to benefit water voles and other wildlife over 1 km of river beyond nature reserves. Working with local landowners including Buckinghamshire County Council, the charity Groundwork South, Boyers Gravel (an extraction company), the Anoopam Mission (a spiritual and charitable organisation) and Uxbridge Rovers Angling Club. A programme of tree and scrub clearance to improve light levels and encourage the development of aquatic and marginal vegetation was carried out. The resulting timber and brash was then used to introduce flow diversity and new habitats into the uniform river channel. This work was delivered by the Wild Trout Trust who, over a two-week period, led work parties consisting of staff and volunteers from all the project partners, training them in the techniques of creating brushwood berms and pinning trees in place to act as flow deflectors. This was then complimented by channel bed re-profiling using the 'dig and dump' technique. This was carried out by contractors using a small excavator to create deep pools and shallow riffles in the river bed. A backwater was created to provide additional valuable habitat for wildlife away from the main river channel. Areas of the river banks had been heavily eroded by walkers and dogs and so 'dead hedges' were created from the timber and brash gained during the initial tree works to prevent access to eroded banks and to allow them to recover and regenerate.

However, it was important that people are still able to access and enjoy the river and so an 'access beach' was created outside the visitors' centre and café at Denham Country Park. This is a 20m stretch of river bank which was re-profiled to form a gentle slope, rounded gravel was then laid down to provide a safe environment in

which people could enter the river whilst the more environmentally-sensitive areas were protected. With many visitors and school groups regularly visiting the Country Park, the beach provides a valuable long-term recreational and educational resource where families picnic, children paddle in the water and river-dipping and junk-model boat racing takes place. The project received national recognition when it came runner-up in the 'Natural Environment' category of the Canal & River Trust's Living Waterways Awards 2018.



Enhancement works on the lower River Misbourne

Badger TB vaccinations

The Mammal Project manages and delivers a programme of badger vaccinations with the aims of reducing the risk of grazing cattle contracting bovine Tuberculosis (bTB) and to help to demonstrate vaccination as a viable alternative to culling badgers in the prevention of the spread of the disease. Badgers are believed to be the most significant wildlife reservoir of bovine Tuberculosis (bTB) and are known to be able to transmit bTB to cattle. None of the key scientific evidence supports badger culling as a viable option for controlling the disease. Vaccinations on the other hand have proven effective in reducing incidence of the disease in the wild badger population and could play a pivotal role in its control.

DEFRA launched its Badger Edge Vaccination Scheme (BEVS) in September 2014, offering match funding for vaccination programmes in areas where the disease is at greatest risk of spreading. This gave the Trust an excellent opportunity to extend vaccination work into Berkshire with the aim of creating a buffer of healthy badgers to help contain the disease and halt its spread eastwards. The project successfully secured £45k funding from DEFRA to implement a vaccination scheme in a 15km² project area east of Newbury, covering Greenham and Crookham Commons and Thatcham Reedbeds, as well as West Berkshire Council sites and private farmland.

In 2015 staff continued to trap and vaccinated badgers on priority nature reserves in Oxfordshire and also began the new vaccination programme in West Berkshire. Administering the vaccine to a trapped badger is generally quite straight forward, the tricky part of the process is persuading badgers to enter the traps and then flip a heavy rock to trigger the trap mechanism. Luckily badgers are particularly fond of peanuts and during a three week 'pre-baiting' period they learn to move the rock for the reward of a stash of peanuts buried beneath. Traps are then set to capture for two consecutive nights and checked each morning at first light. Any badgers trapped are vaccinated through the cage mesh and marked with a fur clip before being released unharmed. The scheme requires a long-term commitment from BBOWT as the pre-baiting, trapping and vaccination process should be repeated at each sett annually for a minimum of 5 years.

Unfortunately, due to an international shortage of the badger BCG vaccine, (which is the same vaccine given to humans but at 10 times the dose), vaccination ceased during 2016. Only one BCG vaccine is licenced for use in the UK and due to problems during the manufacturing process, the producers were unable to meet the demand

for supply. DEFRA took the decision not to fund any vaccination work that year and BEVS agreements were ended.

In 2017, in conjunction with Derbyshire Wildlife Trust, BBOWT led the way in sourcing and importing an alternative BCG vaccine so that the vaccination programme could continue. The Mammal Project Officer successfully obtained a Special Treatment Certificate from the Veterinary Medicines Directorate which allowed the use of the imported vaccine on a temporary basis. The government's Animal and Plant Health Agency advised that a one-year break would not adversely impact the vaccination scheme and so, with BBOWT providing full funding, vaccination schemes continued throughout 2017.



Vaccinating badgers

By Rob Appleby

In 2018 DEFRA launched new funding in the form of BEVS 2, and the Mammal Project successfully secured £66k to continue and expand the vaccination work in West Berkshire over the next four years. DEFRA took the decision to endorse the use of the alternative imported vaccine, co-ordinating supply to the vaccination schemes they funded. In 2018 a total of 55 badgers were trapped and vaccinated.

Advocacy work is an important element of the project and this includes responding to consultations on rolling out a badger culling locally and lobbying MPs to support badger vaccinations as an alternative. The project also supported research by the University of Surrey, which involved collecting road-killed badger carcasses for a DEFRA-funded study to map the incidence of TB in the local badger population.

With significant experience and expertise in managing and delivering badger vaccinations programmes, the Mammal Project is now well-placed to lead on and co-ordinate badger vaccinations locally. As such, the project has been able to offer advice and support to local badger groups looking to set up new schemes and plans in the near future to work in partnership to facilitate the roll out of badger vaccinations across the three counties.

Case study 30: Upper Thames Living Landscape

Lowland meadows are one of the target habitats for the Upper Thames Living Landscape. In 2018, BBOWT was contacted by the Floodplain Meadows Partnership which was offering funding to support the creation of floodplain meadows. Following liaison with Natural England a landowner within the Upper Thames Living Landscape Area was identified as being interested in diversifying their existing meadow.

BBOWT's Upper Thames Living Landscape Manager undertook coordination of the work on behalf of the various parties as the site was close to Chimney Meadows. Following a meeting with the landowner it was established that the land was suitable for restoration and that Chimney Meadows could provide the green hay to diversify the meadow. The logistics of green hay spreading as a method to move wildflower seed from one place to another were discussed, along with the need to prepare the land first and the different methods of doing so.

BBOWT selected the most botanically suitable field at Chimney Meadows as the donor site for the green hay, and liaised with Natural England for approval as the field in question was part of the National Nature Reserve.

It was also necessary to liaise with grazier who normally took the hay crop from the donor field, to check that he was happy with the proposal, to devise a method that ensured his portion of the standing hay crop was not damaged when taking a proportion of the field for the green hay, and to allocate him an alternative area to replace the hay crop that he would be losing.

The landowner undertook the ground preparation required on the restoration field and also the transportation of the green hay from Chimney Meadows. However, BBOWT cut the green hay as the landowner did not have a mower. After cutting, the green hay was made into large loosely packed round bales ready for transportation to the restoration site, where it was put through a straw chopper in order to easily spread it across the site.

The work took place on 17th July 2018, however, given the hot summer, the ground was very hard and dry and it was difficult to prepare the field satisfactorily. The work was delayed initially as there was meant to be rain in the forecast (not that this then happened). Despite this and a few mechanical hitches, as planned the area was cut, baled, carted and spread within the day. It is hoped that BBOWT will be able to return and see the meadow next summer to assess the success of everyone's endeavours.



Cutting the green hay

Case study 31: East Berkshire Living Landscape

Woolley Firs is at the heart of the developing East Berkshire Living Landscape. During 2018 the site has been a focus for activities aimed at engaging local communities in the development of this new Living Landscape area. Woolley Firs site has several buildings with known bat roosts, a small arboretum and farmland within a High Level Stewardship agreement. The site is well connected to SSSI woodlands being on the edge of Maidenhead Thicket and within close proximity to Windsor Great Park and Bisham Woods. Together these features provide good quality foraging, commuting and roosting opportunities for a wide range of bat species.

The site was registered for the National Bat Monitoring Project (NBMP) with the Bat Conservation Trust, and staff, the local bat group and neighbours took part in emergence and box surveys. These surveys enhanced local knowledge and contributed data to the national scheme. The discovery of roosting barbastelle bats on site during these surveys, as well as the known species of brown long-eared and soprano pipistrelle, led to more surveys over the summer and important information for site management planning.

The (western) barbastelle was first recorded at Woolley Firs in June 2018. It is one of the UK's rarest mammals³⁰ and despite some recent discoveries there are very few known breeding sites for this species in the UK³¹. The barbastelle is considered a priority species for national conservation measures and it is one of the bat species of highest conservation concern in Berkshire. This species has a predominantly southern distribution across England and Wales although colonies are sparsely distributed and absent from many areas. Population declines across most of its European range have also resulted in the barbastelle being afforded legal protection above most other European bat species under EU law, and its presence can result in a site being designated a Special Area of Conservation under the Natura 2000 protected sites network. The IUCN (International Union for Conservation of Nature) Red List³² categorises the barbastelle as 'near threatened' with a fragmenting and declining population across most of its international range, primarily caused by habitat loss.

Studies of barbastelle populations in England have shown that this species requires ancient broadleaf woodland (often with a high proportion of oak) with naturally damaged and decaying trees for roosting and riparian habitat, meadows (including those on floodplains), woodland, mature hedgerows, field margins and tree lines for feeding. Barbastelle bats feed almost exclusively on moths. They prefer to commute between habitats via naturally covered and dark, linear woodland rides and landscape features. For a breeding population to survive and remain stable, both suitable roosting sites and productive foraging grounds are required, connected by dark corridors. Barbastelle can travel long distances to foraging sites, with some individuals travelling over 20 km from roost to foraging area, consequently utilising large ranges with relatively small core foraging areas; however, most individuals typically travel shorter distances (8.4km).



Soprano pipistrelle (male)

Once part of the royal hunting forest of Windsor, ancient trees and the species they support are important features of the East Berkshire Living Landscape. Windsor Great Park dominates the eastern edge with its internationally important ancient and veteran oak trees. One aspect of future work in the area will involve a partnership the Berkshire & South Buckinghamshire Bat Group, continuing work started in West Berkshire to develop a Berkshire Bat Atlas to determine important areas for bats. This will help concentrate conservation efforts such as bat box schemes, habitat management and further surveying to find out landscape patterns and important wildlife corridors for bats in the Living Landscape.

The bat project is one element of the wider East Berks Living Landscape project, which is currently in development. The project hopes to bring together existing groups, such as Wild Maidenhead, National Trust, parish councils and the Crown Estate to facilitate better data collection across the wider landscape as well as providing land management advice.

3.3 Influencing decision makers

One of the key threats to wildlife in Berks, Bucks and Oxon comes from development, with housing and infrastructure development being a key pressure in the South East. Development pressures have reached unprecedented levels across the three counties and an important part of reversing biodiversity loss is to prevent the attrition of the biodiversity that still remains outside of protected areas. Built development often leads to the loss of mature, often high-quality habitats and their replacement with lesser quality, suburban habitats. Dealing with this pressure on unprotected habitats (and sometimes on protected habitats) is the responsibility of the three Senior Biodiversity and Planning Officers (SBPOs). This role seeks to make Berks, Bucks and Oxon better for wildlife through working with and influencing other organisations and decision makers.

Awareness of the decline in biodiversity is increasing and built development is now required to provide some wildlife benefits resulting in developments being less impactful than they have ever been in the past. But it is important to be realistic about what biodiversity gains can be achieved. Built developments can be 'greened' and designed sensitively, thereby allowing certain wildlife to thrive such as some bat species, swifts, house martins and hedgehogs, however, other species that require the open countryside will be lost, such as farm and woodland birds and light-sensitive bats. Biodiversity offsetting can assist in the restoration of some degraded or intensively farmed habitats, which, if provided in the right place, can help to increase ecological connectivity across the three counties. However, the sheer land-take of developments and their indirect impacts on the wider surrounding countryside (e.g. recreational pressure, transport, water supply etc.) represent a real challenge to achieving ecological gain beyond maintaining the overall ecological status quo.

The Trust's engagement with the planning system is therefore, aimed first and foremost at not just preventing the loss and harm of existing habitats, but also to seek opportunities for coordinated strategic approaches that will help to protect and enhance habitats and ecological connectivity for species. Critically the role of the SBPOs also includes working strategically with local authorities, other NGOs and other stakeholders such as the Natural Environment Partnership (NEP) in Buckinghamshire, the two local record centres BMERC and TVERC, local authorities, Natural England, the Environment Agency and other NGOs. This is a long term process, with the benefits of the

work being done now, only being realised in the years to come.

The Trust also advocates for greener developments in a variety of ways, including directly with the developers. The value of this can be seen relatively quickly but it remains to be seen how effective this is in benefiting wildlife in the long term.

The National Planning Policy Framework was revised in July 2018. The framework sets out the national policy that local development plans have to comply with. The guidance has tightened up on the emphasis for biodiversity net gain (rather than no net loss). Additionally there is also emphasis on this being measurable, and thus local authorities will be encouraged to use a metric to measure biodiversity. It should be noted that this remains just a policy rather than a mandatory requirement.

Strategic work across the three counties has included engaging in the great crested newt district licensing approach developed by Nature Space, taking part in Natural England's (NE) stakeholder consultations on Biodiversity Net Gain and related to that, the Biodiversity Metric.

All local authorities in the three counties are in the process of developing and adopting local plans for development and infrastructure in their districts. Comments on these plans, both prior to and during public consultation stages, addressing strategic housing allocations, and green and blue infrastructure policies have been made by BBOWT. Comment are also made on strategic plans such as minerals and waste plans, selected neighbourhood plans, and large infrastructure schemes such as Heathrow, High Speed 2, East-West Rail, the Oxford-Cambridge Expressway and the Oxford Flood Relief Channel.

The provision of planning advice available on the BBOWT website is also currently under review and it is hoped that the new documents will help reduce volume of generic, small scale enquires that staff currently have to deal with.

Case study 32: Berkshire - strategic planning for biodiversity

Berkshire is a county which has huge development pressures, but is nonetheless rich in biodiversity. House building targets are set just shy of 4,000 homes per annum across Berkshire's six unitary authorities. Site allocations are usually relatively small, in the range of dozens to hundreds of houses, and are therefore numerous and invariably located on or near to high quality, long established habitats such as ancient woodlands, lowland meadow, or some of the c.850 designated nature conservation sites in the county.

Planning Applications

Every year 30-50 planning applications are commented upon. A recent review of the impact of these responses revealed that BBOWT's stance on planning consultations aligned with the final outcome wholly or partly in 75% of cases. That is, the reasons for objection or recommended conditions were included as reasons for planning refusal or as planning conditions, respectively.

This result may simply be because local authorities have an inherently good appreciation of ecological issues, naturally aligning with BBOWT's views, thereby making additional ecological comments on planning applications redundant. However, this is highly unlikely for four reasons. First, over the past three years Berkshire unitaries have been losing their ecology officers, leaving a dearth of in-house ecological expertise. Second, BBOWT's engagement with major planning cases often requires rebuttals to and from the applicant in order to achieve a resolution, suggesting that great weight is given to BBOWT views in decision making. Third, consultant ecologists acting for local authorities tend to focus on protected species, but less so on the requirement for "net biodiversity gain" in the form of habitat enhancements. BBOWT comments on this issue have put "net gain" on the agenda, particularly in West Berkshire. Fourth, in some cases BBOWT's comments have been the only source of evidence-based ecological response received by the local authority, due to a failure to buy-in consultant advice in all relevant cases. The Trust can, therefore, be confident that our independent public comments on planning applications:

- 1) gives BBOWT a platform on which to emphasise the need for net biodiversity gain;
- 2) gives us an opportunity to publicly demonstrate our evidence-based approach to wildlife conservation;
- 3) makes a difference to development's impacts on wildlife in Berkshire.

Even where BBOWT's stance has not aligned with the outcome, our engagement with planning cases can help to achieve points one and two above.

Of the completed recent planning cases reviewed as part of this study, BBOWT's engagement in the process has had a beneficial impact on land in Berkshire totalling 450ha².

Brookhouse Farm and JPP Land Ltd

BBOWT objected to an opportunistic planning application at this site in 2015 which proposed to build 40 houses on a traditional orchard near the village of Burghfield, Reading. The application was withdrawn, but reappeared a year later with the orchard having been completely felled in the interim. This appeared to be deliberate destruction of rare and threatened priority habitat. A loophole in tree felling legislation allows orchards to be felled without licence, and although the pre-emptive clearance of the trees seemed to be intended to facilitate planning approval, proving this is challenging. We gave advice to the Planning Officer working on the case and the application was refused planning permission. Ecological impact was a key reason for refusal. Another year on, and the application has returned once again, illustrating the tenacity of developers. The Trust have again objected to this latest application.

Theale Lake and Berfeld Ltd

BBOWT objected to proposals to build 225 dwellings, including some floating houses, on Theale Lake Local Wildlife Site, a gravel pit lake next door to Hosehill Lake nature reserve. The complex of lakes in this area is known to be one of the top three sites in the country for breeding nightingales⁴. The application was refused planning permission by West Berkshire Council, with the impact on nightingales given as one of the reasons for refusal. The decision is currently being appealed, with ecology as one of the pivotal issues, and the public inquiry is set for January 2019.

Strategic Planning

Through a working group composed of local authority ecology officers, consultants, strategic planning officers, the local records centre and BBOWT, the Trust has been integral to early discussions around whether and how to initiate district-level licencing for great crested newt mitigation and a review of how a locally-specific biodiversity impact assessment tool and offsetting could work in Berkshire. On behalf of this group, BBOWT responded to the Draft National Planning Policy Framework consultation in 2018. The Trust also has a seat on the partnership board for protecting the Thames Basin Heaths from the increasing pressures of urban development.

Case study 33: Buckinghamshire - strategic planning for biodiversity

Biodiversity accounting

Levels of development in Buckinghamshire in terms of housing and infrastructure continue to increase. BBOWT is working closely with the Buckinghamshire and Milton Keynes Natural Environment Partnership (the "NEP", which is the government recognised Local Nature Partnership) to put in place a mechanism which aims to not only reduce the negative impact of development, but also results in biodiversity being in a better place after the development than before. This would be a big step forward from the current situation in which net loss in biodiversity is unfortunately the norm for many developments. In a county that lies at the heart of the Oxford-Cambridge Growth Corridor and that will likely contribute a substantial proportion of the 1 million new homes earmarked for that corridor by 2050 then getting such a mechanism in place is vital. The biodiversity accounting metric would assess the existing wildlife pre-development and the expected wildlife post-development. The metric would be expected to show more wildlife post-development. In many cases a net gain should be achievable on site. In some circumstances planning departments could approve a cash payment to be made which could be used to enable habitat creation.

Local Plans

BBOWT have continued to play a very active role in influencing Local Plans. The Trust is pushing for Local Plans to include appropriate protections for existing wildlife, a requirement for development to achieve a net gain in biodiversity, and an expectation of high standards on biodiversity in built development. BBOWT has responded throughout the Local Plan process and worked closely with partner organisations including the Local Nature Partnership. Although the plans are not finalised and adopted, so far wording included is acceptable in terms of what has been asked for.

Development planning

The Trust continues to work with a planning volunteer who comes in on a weekly basis to go through weekly lists of planning applications for all the local authorities in Buckinghamshire and Milton Keynes. Applications that are either a cause for serious concern, or that create opportunities for substantial habitat creation, are then selected for some form of response. Due to this invaluable assistance, in the three years from April 2015 to March 2018 a remarkable 35,531 applications were screened. Of these, 196 were responded to. The interventions resulted in a variety of gains for wildlife. In some cases this was by causing very damaging applications to become less so. In other cases applications that were not of great concern, but nevertheless where there was room for improvement, were encouraged to create additional habitat.

Examples of positive outcomes linked to BBOWT engagement with the application include:

- the creation of 19ha of lowland meadow habitat in Milton Keynes;
- the expected creation of nature reserves, substantial areas of lowland meadow, and potentially over 40ha of offsite breeding and wintering bird habitat connected to two large developments adjacent to Aylesbury;
- the turning down of two applications, one in Milton Keynes and another in Aylesbury Vale, that were of great concern due to them being adjacent to key waterbodies of vital importance to birds and other wildlife.



Wild flowers thriving in a housing estate

By Katrina Martin/2020Vision

Infrastructure projects

Buckinghamshire is host to numerous proposed infrastructure projects and BBOWT has played a significant part influencing the potential wildlife impact of these:

Oxford-Cambridge Growth Corridor and Expressway - Whilst these are separate projects BBOWT has recognised that the route chosen for the Expressway is likely to influence the location of the 1 million new homes proposed to be built by 2050 in the corridor between Oxford and Cambridge. The Trust has therefore invested considerable effort into influencing the Expressway route and the biodiversity principles that will be followed, through numerous meetings with Highways England, responding to a major consultation, media and advocacy work, and a legal challenge in relation to the methodology for the route choice. BBOWT has also been busy influencing the growth corridor, working with key partners to create a vision that places environment alongside economy as a key outcome of the growth corridor.

East-West Rail - BBOWT has responded to consultations and met on many occasions with EW Rail and with partner organisations to try to get the best outcomes for wildlife from the construction of this rail line from Oxford to Bedford (and ultimately Cambridge and beyond). Interventions have yielded considerable results.

HS2 – BBOWT's engagement has also significantly improved prospects for wildlife as a result of the HS2 scheme which is now approved and under construction.

Partnerships

BBOWT continues to play a key role within the Buckinghamshire and Milton Keynes Natural Environment Partnership (NEP) - a Local Nature Partnership. Work where BBOWT has played a major role in instigating or supporting work include:

- The creation of Green Infrastructure (GI) principles, referenced in draft Local Plans, that set out expectations of developments including in relation to long-term management of habitat created as part of development;
- The continuation of survey work by BMERC to assess if Biological Notification Sites meet Local Wildlife Site standards and the beginning of work providing management support to landowners of selected LWSs;
- The creation of an Environmental Directory for Buckinghamshire to assist conservation groups in linking with and learning from each other and to assist volunteers in finding conservation groups;
- The continuation of a key NEP project, Bucks Buzzing, encouraging the public to take action to create habitats for insects and other wildlife;
- Leading the Biodiversity Sub-Group of the NEP which is responsible for the Biodiversity Action Plan, the 2020 habitat creation targets, and encouraging Lead Partners to support work in the Biodiversity Opportunity Areas.
- Supporting the creation of GI Opportunity Maps setting out key areas for GI creation in the county.

Case study 34: - Oxfordshire strategic planning for biodiversity

Strategic Planning

Like the other two counties, Oxfordshire is subject to unprecedented development pressure with 100,000+ new homes being proposed by 2031. This requirement for housing is part of the Oxfordshire Housing and Growth Deal agreement with the Government, which also requires the six Oxfordshire Councils to produce a Joint Statutory Spatial Plan (JSSP) covering a broad range of social, environmental and economic issues affecting the county up to 2050.

In Oxfordshire all local planning authorities have been (or are still in the process of) preparing their Local Plans and BBOWT has provided comments to various Local Plan consultations as well as the County Council's Mineral & Waste Plan and Infrastructure Plan consultations. In addition to the 'normal' consultation requirements there has been an additional round of engagement due to Oxford City's unmet housing needs which required the adjoining district councils to find additional land for housing near Oxford. This has led to all Oxfordshire district councils having to allocate additional sites for development, mostly choosing sites near or in easy reach of Oxford.

When commenting on Strategic Plans, the Trust has focussed in particular on the wording for biodiversity and green infrastructure policies to ensure that these are effective in assessing impacts of developments on biodiversity. This included wording that requires developments to achieve a demonstrable net gain in biodiversity. As part of the consultation process the Trust also commented on proposed strategic site allocations to ensure that existing wildlife interest and opportunities for enhancements are adequately taken into account.

As part of the various Local Plan processes BBOWT has attended two Local Plan examinations in public to raise concerns about potential impacts on designated sites and wildlife caused by major site allocations, in particular with regard to the Cotswolds Garden Village at Eynsham (2,200 homes initially; West Oxfordshire District) and the Dalton Barracks site allocation (1,200 – 4,500 homes; Vale of White Horse District), the latter of which is adjacent to Dry Sandford Pit SSSI nature reserve. BBOWT's involvement did not stop the allocations but concerns raised have been noted and the Trust is now engaging with the relevant Councils and developers in assisting with the preparation of Area Action Plans (AAP) for these sites.

As part of the Cotswolds Garden Village at Eynsham the Trust is working with the West Oxfordshire District Council and Gloucestershire Wildlife Trust to trial the Building with Nature benchmark buildingwithnature.org.uk, which has been developed by Gloucestershire Wildlife Trust to achieve better green infrastructure in new developments.



Nectar source road margins
By Paul Hobson

BBOWT is also engaging with the Environment Agency (EA) over the Oxford Flood Alleviation Scheme, a major development project that comprises the creation of a two stage channel around the western side of Oxford in order to alleviate flooding in parts of the city.

Planning applications

Unlike Berkshire, Oxfordshire development pressure includes a high number of large planning applications (several 100s or even 1000s of homes), many of which comprise greenfield sites. The Trust simply does not have the resources to comment on everything but tends to focus on a few major developments that could either cause significant adverse ecological impact, adversely affect one of our reserves, or which offer the greatest opportunities for achieving environmental gains.

Examples of engagement include:

- Working with developers and Cherwell District Council to maximise wildlife benefits, within developments at southeast Bicester (Wretchwick Green) and at the Upper Heyford airfield. At Wretchwick Green this has included influencing the layout in a way that a nature conservation area will be created between the two adjacent Local Wildlife Sites (LWSs) providing a green infrastructure link that maintains and enhances the ecological connectivity between these two locally designated sites.
- Objecting to a development proposed for Upper Heyford on grounds of direct and indirect impacts on the Upper Heyford Local Wildlife Site. Being a strategic allocation site it is unfortunately unlikely that development will be refused and the SBPO is engaging with the developer and the Council to negotiate a net biodiversity gain through habitat compensation to address loss of priority grasslands and impacts on species such as great crested newt, invertebrates and ground nesting birds.

Gavray Drive

The development proposed for Gavray Drive is a good example of how through sustained long-term engagement, it is possible to positively influence the planning process for biodiversity outcomes.

In 2018 the Trust attended a public planning inquiry to help defend Gavray Meadows Local Wildlife Site (LWS) in Bicester against impacts from nearby development. Attending public inquiries does not happen very often as planning appeals are very staff time intensive. However, the Trust has had a long involvement with Gavray Meadows LWS (including an appeal in 2006) so it was considered important to continue defending the Local Wildlife Site and its meanwhile neglected lowland grassland habitats against adverse impacts.

Gavray Meadows LWS forms part of the 'Bicester 13' site allocation, which Cherwell District Council has earmarked for 300 units. The very detailed policy does not only outline requirements for housing and infrastructure but also requires the development to fund the management of the LWS. The application subject to the appeal sought to develop only the less-constrained western part of the site with 180 units postponing the planning and delivery of the management of the LWS and the outstanding 120 units to a future undefined date.

BBOWT was not in principle against an appropriate level of development on the western part of the Bicester 13 site but objected to the scheme on grounds that no management plan of the LWS was put forward as part of the application. We appeared as a Rule 6 party at the inquiry arguing two main points:

- a) the site allocation needs to be considered and planned comprehensively before it can be broken up into smaller development phases; and
- b) housing immediately adjacent to the LWS will result in a degradation of the LWS due to increased recreational pressure in the absence of appropriate management.

The outcome was a thoroughly positive decision with the inspector finding our evidence 'compelling' and accepting many of our arguments including that:

- the development will result in adverse impacts on the LWS in the absence of management;
- the Biodiversity Impact Calculators (BIC) is only a tool and cannot provide a comprehensive answer on biodiversity impacts;
- marginal habitat increases as demonstrated by Biodiversity Impact Calculators (BIC) are unlikely to be sufficient to achieve a net gain especially if these are proposed to be achieved as part of multi-functional open spaces that are subject to recreational pressure and lack appropriate long-term management.

The Trust believes that this decision is not only an excellent outcome to the appeal but that it might also be useful in negotiations with developers on other sites and as a reference for future appeals³³.

Case Study 35: Advocacy

Berks, Bucks and Oxon cover 21 parliamentary constituencies, 2 county councils and 16 district councils. The Trust works hard to ensure that all decision makers, especially MPs, MEPs and councillors, understand the value of nature, so its protection and recovery is at the forefront of their minds when making decisions. Regular contact is made with MPs and face to face meetings have been secured with all 21 of these in our area. The Trust has long standing relationships with some, while we have only recently met others for the first time. This contact has enabled discussions regarding concerns relating to the Withdrawal Bill, changes to the National Planning Policy Framework and Local Wildlife sites, and more local issues such as the proposed Oxford to Cambridge Expressway.

Ongoing contact is also provided through a twice yearly newsletter, Nature Matters, which is sent to all MPs, councillors, local political parties and other local decision makers. Additionally to date, ten talks for local political parties have been held. These talks introduce the Trust's work and help identify mechanisms for future partnership working.

In July 2018, the Prime Minister announced that the Government would introduce the first Environment Bill in over 20 years. BBOWT is currently in discussion with local MPs about this and the Agriculture Bill, with a view to making the most of this opportunity to secure world leading legislation for generations to come. A start has been made to engage with members of the House of Lords in preparation for legislation reaching this stage.



Andy Gunn (Wild Oxford Project Officer) talking about management of Rivermead, to Anneliese Dodds MP

The Trust is actively seeking to increase contact with county and district councillors. In the run up to local elections 2018 a “pledge for nature” for candidates to sign was produced. This resulted in over 60 pledges and some excellent information with which to build future relationships. Work is currently being undertaken on a new pledge for local elections in 2019.

In April 2018, a public meeting in Bicester was organised on the subject of the proposed Oxford to Cambridge Expressway with speakers from all the main political parties. This was attended by over 100 people.

The Wildlife Trusts central team support BBOWT by providing evidence and central coordination of national issue-based lobbying. BBOWT also works alongside Greener UK, a coalition of 13 NGOs representing 7.9 million members. This coalition campaigns at a national level for environmental protections to be safeguarded and enhanced.

3.4 Challenges and solutions in the wider countryside

Achieving wildlife gains within the wider countryside comes with its own set of challenges, many of which are difficult to solve, not least because this type of work is highly dependent on the goodwill and interest of other people and the legal framework by which development is regulated.

Key issues and risks include:

- Inspiring landowners to make changes. This is only likely to happen if the landowner is already interested in wildlife and/or there is no net loss of income. Landowners are also often 'put off' by complex management agreements e.g. flailing hedge sections instead of cutting everything at once, and by 'trial and error' approaches whereby monitoring each year leads to changes in management the following year.
- Landowners changing their minds, which results in loss of any biodiversity gains. This is always a risk when there is no direct control over the land and increasingly likely with uncertainty over future agri-environmental scheme incomes.
- Perception of conservationists. Landowners, experienced in delivering complex farming systems often perceive conservation practitioners as being 'fluffy' and having little or no understanding of how an economically viable farm functions. This can be a significant barrier, particularly when pro-actively approaching farmers.
- Difficulty in delivering a strategic approach. Landowner work is more often than not influenced by who is interested and this makes it difficult to meet strategic, spatial objectives.
- Lack of clarity surrounding off-setting. There is some confusion within the planning system regarding the details of biodiversity off-setting and thus ensuring that biodiversity 'net-gain' is achieved. There is also very limited follow up by planning authorities to make sure that ecological planning requirements are delivered.
- Increasing lack of resources in government agencies and local authorities. This makes it difficult to have joined up conversations about specific parcels of land. Increasingly local authorities lack in-house ecological expertise and this can result in lack of ecological

comments on planning applications and strategic planning for ecology.

- Changes in staff. A review carried out by Natural England to assess the effectiveness of Higher Level Stewardship agreements³⁴ found that the role of advice was crucial in establishing good quality, effective agreements, but that changes in staff negatively impacted upon this. On average 17% of agreements changed their NE adviser each year, and this was a significant barrier.

These challenges can be difficult to overcome in the short term, especially when the Trust has limited control over a shifting political backdrop which has significant influence on how external stakeholders feel about and act for biodiversity.

Developing long term, stable relationships which build trust and understanding between both parties is essential in underpinning any agreement, be it between BBOWT and a landowner, or a local authority, or a government agency.

Developing staff skills and understanding of farming systems will also help foster good quality relationships based on mutual trust and understanding.

There is also value in considering the implementation of pilots or demonstration projects in partnership with a developer, in order to assess actual on the ground wildlife benefits as a result of advice provided during the planning stage. This would need to be monitored thoroughly and evaluated honestly and results published in a public-access journal in order to share learning widely. This sort of information would be critical in helping shape how the Trust engages with developers.

Development remains one of the biggest threats to Berks, Bucks and Oxon and long term engagement strategies may also help to effect positive change. For example Local Planning Authorities are currently adopting their 15 year Local Plans and are already thinking in broad terms about where houses etc should go after this. Being able and ready to engage with this process with a clear long term strategy will help shape a better future for wildlife in the three counties.

4. Alternative solutions

In addition to the issues and solutions identified previously there are some alternative, novel solutions which could be considered for implementation. The ideas presented below are by no means exhaustive and could be considered as separate or complementary options on the same piece of land. These options influence wildlife opportunities on existing and new nature reserves and within the wider countryside.

'Rewilding'

Within recent years the concept of 'rewilding' has gained popularity within the conservation community. However, this term means a wide range of differing things to different people, from the introduction of lynx to a more relaxed approach to conservation management. It is, therefore, essential at the very early stages of any 'rewilding' project to define what the aims are and how they will be achieved.

In its essence rewilding is a very different approach to traditional conservation management. Instead of targeting management to achieve a very specific set of predefined objectives such as increasing a population of snake's-head fritillaries, rewilding is focused on the restoration of functioning ecosystems, where nature can 'take care of itself'. This can only take place at the large scale and *may* involve the reinstatement of species which are missing from a functioning ecosystem³⁵.

While rewilding is very different to traditional reserve management it should not be seen to be in conflict with this style of management or as an 'either/or' type option. Both strategies benefit wildlife in different ways, indeed if the objectives are for a species rich hay meadow community then continuation of traditional, thousands of years old management techniques is essential. It is better to consider rewilding as an alternative, complimentary option for the conservationist to employ when appropriate.

In order for rewilding to be achieved it needs to take place at the large, landscape scale and thus can be considered as either wider landscape work, or focused on a very large nature reserve. Either way management control through long term landowner agreements or landownership will be essential for success.

Offsetting

Development, for example house building, is required to ensure that there is not net loss of biodiversity. This is achieved by developers following the 'mitigation hierarchy' which ideally

avoids biodiversity losses and if this is not possible to minimise them and then to compensate for the loss. This compensation is referred to as 'biodiversity off-setting'. The process for calculating off-sets and the details of the implementation of the procedure within the planning process is complex and in some cases controversial. This is touched on in section 3.3: Influencing decision makers, here the potential for engaging with the funding provided through the off-setting process is considered.

Developers are occasionally interested in finding land upon which they can carry out off-setting activities, for example through the new great crested newt licencing system, and there is potential that this may increase in the future. The Trust's current portfolio of land does not lend itself to engaging with off-setting because the land is already wildlife rich and therefore cannot be considered to off-set the destruction of wildlife elsewhere. However, if wildlife poor land was purchased, for example intensive farmland, then it would have the potential to have wildlife gains financed through off-setting money, rather than core income. The risks associated with this strategy include the uncertainty surrounding governmental off-setting requirements and the potential for public confusion over the Trust engaging with a process which is controversial. Detailed assessment of the benefits and disadvantages of this approach would be beneficial before considering any further action.

Natural Capital and ELMS

Following the departure of the UK from Europe the Government has made it very clear that the new British Agricultural Policy will be focused on 'public money for public goods'.

The aim of the new Environmental Land Management Scheme (ELMS) is likely to be focused on natural capital benefits. This is a significant shift from the emphasis in current schemes. Natural Capital includes improvements in air quality, climate change mitigation, cultural benefits and increased biodiversity. It should be highlighted that while biodiversity is only one element on a longer list of targeted benefits it is hoped that other areas such as soil health and natural flooding control may also bring biodiversity benefits. However this is not a given. There is also currently very little detail on what these schemes might actually look like and how they would be implemented.

In order to engage with any future ELMS (on reserves or wider countryside) staff are highly likely to need additional training as assessing natural capital is not a current skills set.

BOWT is about to start implementing an ELMS trial in partnership with three other Wildlife Trusts, on behalf of DEFRA to assess how a natural capital based approach might work. At this stage the trial is likely to involve writing 'whole farm plans' for a group of neighbouring farmers and measuring natural capital outcomes before and after implementation of the plans.



Chiltern gentian – found only in the Chilterns in the UK, status 'vulnerable', populations maintained through 'traditional' conservation management



A beaver dam on the River Otter, perhaps a more common sight in a 'rewilded' future?

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Appendix 1 – How feature condition is assessed

