



# The State of Staffordshire's Nature

2016 Technical Report



Staffordshire  
Wildlife Trust

Staffordshire  
Ecological  
Record



## Preface

From towering crags to ancient woodlands and heather-clad moorlands to flower-rich meadows, Staffordshire's surprising array of habitats makes it a gloriously diverse county for wildlife.

Born and bred in Stafford, and being the place where I learnt my 'naturalist's trade', has resulted in what I suspect is now a life-long bond with this most underrated of counties. So deep do my roots penetrate into this county's soil that this resulted in me being asked to become Vice-President of Staffordshire Wildlife Trust in 2016.

Ensuring the county continues to punch above its weight in terms of biological diversity is probably the most challenging job for the local conservation community, which is why I'm so delighted with the publication of the 'State of Staffordshire's Nature' report. For 12 months, a dedicated team have been investigating the state of the county's nature, by both looking at differing landscapes, and populations of the key species they hold, such as the otter or the now threatened lapwing.

Inevitably the findings are like a 'curate's egg' - or good in parts. While some conservation initiatives have been an unqualified success, the continued disappearance of prime habitat is a constant worry, resulting in the 'Sword of Damocles' hanging over a number of already threatened species such as the adder, water vole and hazel dormouse to name just a few.

Although vast, the picture needs to be firstly looked at on a county-wide level before any decisions can be made on where the Trust and other organisations must focus both their efforts and limited financial reserves for the maximum effect. I urge anyone who reads this report to take a moment to think how they might be able to either help or continue their support.

If it inspires a few Trust members to either create a wildlife haven in their garden, or encourages farmers to continue working with SWT staff on the best management practices for wildlife, then it will have been worth all the effort. So please read, absorb and feel empowered to help in any way you can - your county needs you!

**Mike Dilger**

Naturalist, TV Presenter and Writer

# Headlines

## Key Figures / Status

- Over 23,582 hectares (8.7%) of Staffordshire is covered by a nature conservation or geological designation, of which 3.2% is designated with Site of Special Scientific Interest (SSSI) status and 4.4% is classed with Local Wildlife Site status.
- Over 9,800 species have been recorded in Staffordshire, including invertebrates, fish, birds, mammals, amphibians, reptiles, fungi and vascular plants. Of these, 501 are classed as Priority Species and 205 are legally protected.
- There are hundreds of individuals and many organisations working passionately to help Staffordshire's wildlife. They contribute their time, money and expertise to benefit wildlife conservation in many different ways such as through volunteering, recording, monitoring and undertaking practical conservation works on the ground.

## Key issues/challenges

- There are many and varied threats to Staffordshire's nature, with loss of habitats affecting all species groups. Habitat condition is also a major concern.
- Just 32% of Staffordshire's geological and nature conservation SSSIs are in a Favourable condition and only 45% of Local Wildlife Sites are under appropriate conservation management.
- Only 5% of Staffordshire's waterbodies are classified as being in Good Overall Status with 46% classed as either in Poor or Bad Overall Status.
- Based on expert knowledge and the best available data we have found that many species in Staffordshire are declining, including water vole, hazel dormouse and a number of invertebrate species, such as the small heath butterfly and white-clawed crayfish.

## Successes

- There are also conservation success stories, with targeted actions leading to increasing populations of species such as otter, polecat and the logjammer hoverfly, showing that positive change is possible.
- Many important species have been recorded in Staffordshire and are faring well in the county, including dingy skipper and great crested newt.
- Staffordshire holds important populations of fish including Atlantic salmon, brown trout and European eel and birds such as nightjar, woodlark and willow tit. Some of Staffordshire's nationally rare plant species include floating water-plantain, yellow bird's-nest and frog orchid.
- As well as its inherent value, wildlife and habitats provide important 'ecosystem services' that benefit us all. The capital value of ecosystems to society in Staffordshire is at least £7.19 billion, with the services provided by the ecosystems worth at least £111 million per year.

## Recommendations / Actions / Opportunities

- To ensure the survival of Staffordshire's wildlife, new habitats need to be created and all our habitats need to be larger, in a better condition, and be better connected within landscapes to facilitate species movement.

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# 1. Introduction

## 1.0.1 Overview

Biodiversity forms an integral part of our everyday lives. Nature inspires and enriches our lives and we depend upon the benefits that it gives us for our own survival. Nature in the UK however, is not faring well (Burns *et al.*, 2013), and within this report we hope to gauge the current state of Staffordshire's nature, highlight its value and make recommendations that will help it to flourish.

Across the UK, increasing demands on our natural environment have led to a significant decline in biodiversity. Staffordshire is no exception, and has suffered losses of habitats and species through increasing pressures such as changes in land use and pollution. 8.7% of Staffordshire is covered by a nature conservation or geological designation, but only 32% of our most important, nationally designated sites (SSSIs) are in Favourable condition. Less than half of Local Wildlife Sites are considered to be in appropriate conservation management. Without collective action we will continue to see the loss of wildlife rich habitats and the decline of species.

Numerous organisations, landowners, voluntary groups and businesses are already working hard to improve habitats and species populations across Staffordshire and there have been many success stories through habitat creation and restoration schemes, as well as targeted species projects, but there is much more to be done.

In publishing this report, we hope that we are taking a step forward for nature conservation in Staffordshire. By undertaking an in depth assessment of its current state, we can be better informed and equipped to recommend the best and most appropriate action to improve the state of Staffordshire's nature in the future.

## 1.0.2 Aims of the report

In partnership with Staffordshire Ecological Record, Staffordshire Wildlife Trust has teamed up with a number of nature conservation organisations and county wildlife experts. We aim to bring together the best available data and expert knowledge to build upon previous local and national publications, such as other "State of..." reports, to summarise how Staffordshire's nature is faring. We have gathered this information together into two reports, a summary report and this more detailed technical report, to raise the profile of the state of nature conservation in Staffordshire to a wide and influential audience including local authorities, politicians, farmers, planners and businesses.

Within this report we assess the current status of habitats and species across the county and identify the threats they face. We also make a wide range of targeted and general recommendations and provide case studies to give examples of where successes have been achieved. Where information is available we have also assessed how species and habitat trends have changed over time, though comparable historical data is limited and this has influenced the scope of the report.

## 1.1 What wildlife does for us: natural capital & ecosystem services

### 1.1.1. Overview

Natural capital is our stock of natural assets – the rocks, soils, water, air, plants and animals. Natural capital includes all the habitats and species that are explored in this report. We derive a range of services from this natural capital – often called ecosystem services – which make human life possible.

The most obvious ecosystem services are food, water and raw materials such as timber. We can put a clear value on these services as we are used to paying for them. But there are other less obvious ecosystem services that we are just as dependent on. These include the climate regulation and flood alleviation roles played by our woodlands, the storage of carbon in peatlands and the pollination of our crops by insects.

There are also cultural services which are perhaps even less tangible but no less important – the inspiration and wellbeing we draw from being in beautiful natural landscapes, the physical and mental health benefits of exercise in green spaces.



There is considerable evidence of the health benefits delivered by natural habitats and green space, but assigning financial values to these is difficult. The annual cost to health services in Staffordshire of physical inactivity is estimated as £18 million. Nationally the Department of Health suggests that an increase in accessible open spaces could reduce healthcare costs by more than £2 billion per year.

### 1.1.2 Key figures

An ecosystems assessment for Staffordshire and Stoke was published in 2014 which assigned both qualitative and financial values on ecosystem services (Hölzinger & Everand, 2014). The report used accepted methodologies for determining values, but it should be noted that these are not available for many services, so the real value of Staffordshire's ecosystems will be much higher than the figures quoted. Here are some of the key findings, with additional figures shown in Table 1:

- The capital value of ecosystems to society in Staffordshire is at least £7.19 billion.
- The services these ecosystems provide are worth at least £111.89 million per year.
- The value of carbon storage provided by Staffordshire's woodlands is around £1.5 billion and for wetlands is around £600 million.
- Natural flood regulation services provided by habitats in Staffordshire are worth around £14.5 million per year.
- Monthly (or more frequent) use of urban green spaces can be valued at between £112 and £377 annually per person in terms of health benefits.
- An assessment of Staffordshire County Council's six main country parks, Stoke-on-Trent City Council's 28 parks and open spaces, and 26 of Staffordshire Wildlife Trust's nature reserves, found that collectively these sites delivered over £3.3 million of benefits each year, excluding health and amenity benefits.

Table 1. The annual financial value of a selection of ecosystem services in Staffordshire.

Service	Description	Value £ per annum
Provisioning services	Food and bioenergy from arable crops	61.1 million
	Timber and wood fuel from woodland habitats	1.3 million
	Wild food (plants, fungi and game)	1.6 million
	Non-food products e.g. non-commercial firewood, ornamental resources	£2.3 million
Cultural services	Recreational value of woodland	8.9 million
	Recreational value of wetlands	0.7 million
	Recreational value of grasslands, heaths and hedges	3.8 million
	Aesthetic value of broadleaved woodland	7.83 million
Wild species diversity		Over 10 million
Water quality regulation by wetlands		1 million

### 1.1.3 Threats

- Ecosystem services are poorly understood and often not recognised in decision-making.
- The decline in habitats outlined in this report will also mean the decline in the ecosystem services they provide.

### 1.1.4 Recommendations

- Adopt the 'ecosystems approach' across Staffordshire to ensure consideration of impacts and opportunities for ecosystem services in decision-making.
- Undertake further work to assess financial impacts of ecosystem services to better integrate into cost-benefit analysis of proposed schemes and developments.

## CASE STUDIES

Case studies elsewhere in the report relevant to ecosystem services:  
Burton-upon-Trent i-Tree Project (Built environment chapter)

Case Study 1 - Staffordshire Ecosystem Assessment (Authors and contributors: Sarah Bentley)

### 1.2 Geography, geology and climate: the foundations of biodiversity

The diverse landscapes of Staffordshire are a mosaic of different habitats owing their origin to geology, geography and climate, combined with land use and management, with each being special and unique. Once lost, a geological or geomorphological feature cannot easily be restored or re-introduced. The Earth's 4.6 billion year history has been divided into 12 geological time periods and Staffordshire has exposures of rock from half of these periods, dating from the Carboniferous through to the Triassic and from the Paleogene to the Quaternary, helping make it one of the most geodiverse counties in Britain. North Staffordshire geology is dominated by Carboniferous limestones, sandstones and mudstones.

These resistant rocks generate the hilly upland, peak and moorland areas, of which there are 2,000 hectares in Staffordshire, with a generally cooler and wetter climate providing ideal conditions for habitats such as blanket bog, upland heath, acid grassland, rush pasture and wet flushes. Lower-lying, drier and warmer South Staffordshire is generally underlain by softer Permian and Triassic conglomerates, sandstones and mudstones, which help form its rare lowland heathland habitat. The Ice Age also played its part in shaping Staffordshire's landscape. Glacial meltwaters carved deep, wide, flat-bottomed river valleys that form some of Staffordshire's main transport pathways, although many watercourses have since been severely modified from their natural state. Natural resources such as coals, ironstones and clays enabled industrialisation and partly determined settlement patterns within Staffordshire that, together with the transport pathways, make up what we can call the built environment. Transport networks such as canals, railways and roads linking urban and brownfield areas can also be important wildlife corridors and refuges.

#### State of Staffordshire's Nature Report - Case Study Number 1 Staffordshire Ecosystem Assessment



Photo: The Roaches Nature Reserve is popular amongst walkers and rock climbers

## Key messages

Key country parks and nature reserves across Staffordshire and Stoke collectively deliver over £3.3 million of benefits each year, not including health and amenity benefits.

## Overview

Many of Staffordshire's best areas for nature can be found in our parks, nature reserves and green spaces. These areas are not only a home to wildlife but also provide valued recreational space where people can be active or just relax and take in the scenery. In addition to these cultural services, they also deliver carbon storage, flood regulation, production of raw materials and air quality enhancement.

As part of the Staffordshire Ecosystems Assessment, ecosystem services provided by just some of these special places across the county were assessed and financial values calculated where possible. Contact Environmental Advice Team, Staffordshire County Council

## Partners

Natural England, Stoke-on-Trent City Council, Staffordshire Wildlife Trust, Forestry Commission

## Funding

Natural England

## Objectives

To assess the ecosystem services provided by parks, greenspaces and nature reserves in Staffordshire and Stoke

## Approach

The assessment looked at Staffordshire County Council's six main country parks, Stoke on Trent City Council's 28 parks and open spaces and Staffordshire Wildlife Trust's 26 nature reserves.

## Outcomes

Of the small number of services that could be assessed, it found that collectively these sites delivered over £3.3 million of benefits each year. This does not include the significant benefits to health and wellbeing which these sites deliver, particularly as many are located close to high population centres. The real figure will be much higher and demonstrates the significance of these special places to our lives.

## Future work

Work is underway to plug some of the gaps in the evidence base and increase our understanding of the benefits we get from nature. This includes an assessment of the role of urban trees and work to better understand the impact of nature on our health and wellbeing.



Photo: Doxey Marshes Nature Reserve is free and easy to access from Stafford town centre. Photo by Susan Freeman

## 2. Designated Sites

### Designated Sites Headlines

#### Overview

Staffordshire possesses a diverse range of habitats which are offered protection by a number of statutory and non-statutory site designations. The designations are widespread with designation sites present in every local authority area in the county. Staffordshire also has several landscape-scale designations including an Area of Outstanding Natural Beauty and a National Park.

#### Headlines

- 8% of the county is under a national / international statutory or non-statutory nature conservation designation.
- There are 82 designated statutory nature conservation sites and 982 designated non-statutory nature conservation sites (Local Wildlife Sites) in Staffordshire.
- 45% of Local Wildlife Sites are under appropriate conservation management.
- The majority of the area of statutory nature conservation sites is in Unfavourable condition but is improving.
- Roughly 50% of National Nature Reserves in Staffordshire are in Favourable condition.
- Nearly 100% of Geological SSSIs are in Favourable condition.

#### Key threats

- A large proportion of national and international statutory nature conservation sites are in Unfavourable condition.
- There is a lack of formally agreed targets for Local Wildlife Sites entering appropriate conservation management.
- Uncertainty regarding the future of agricultural /environmental subsidies for landowners could potentially be a major threat to designated nature conservation sites in the future.
- Development pressures, particularly for sites in urban/urban fringe areas.
- Diffuse and point source pollution, particularly in riparian habitats threatening their condition and permanence.

#### Successes

- The proportion of Local Wildlife Sites under appropriate conservation management has continued to increase, from 25% in 2008 to 40% in 2011 to 45% in 2015.
- Despite a high proportion of sites being in Unfavourable condition, the majority of the area is Recovering in its condition.
- Mitigation for development is contributing to good outcomes for designated sites where habitat is being lost.

#### Recommendations

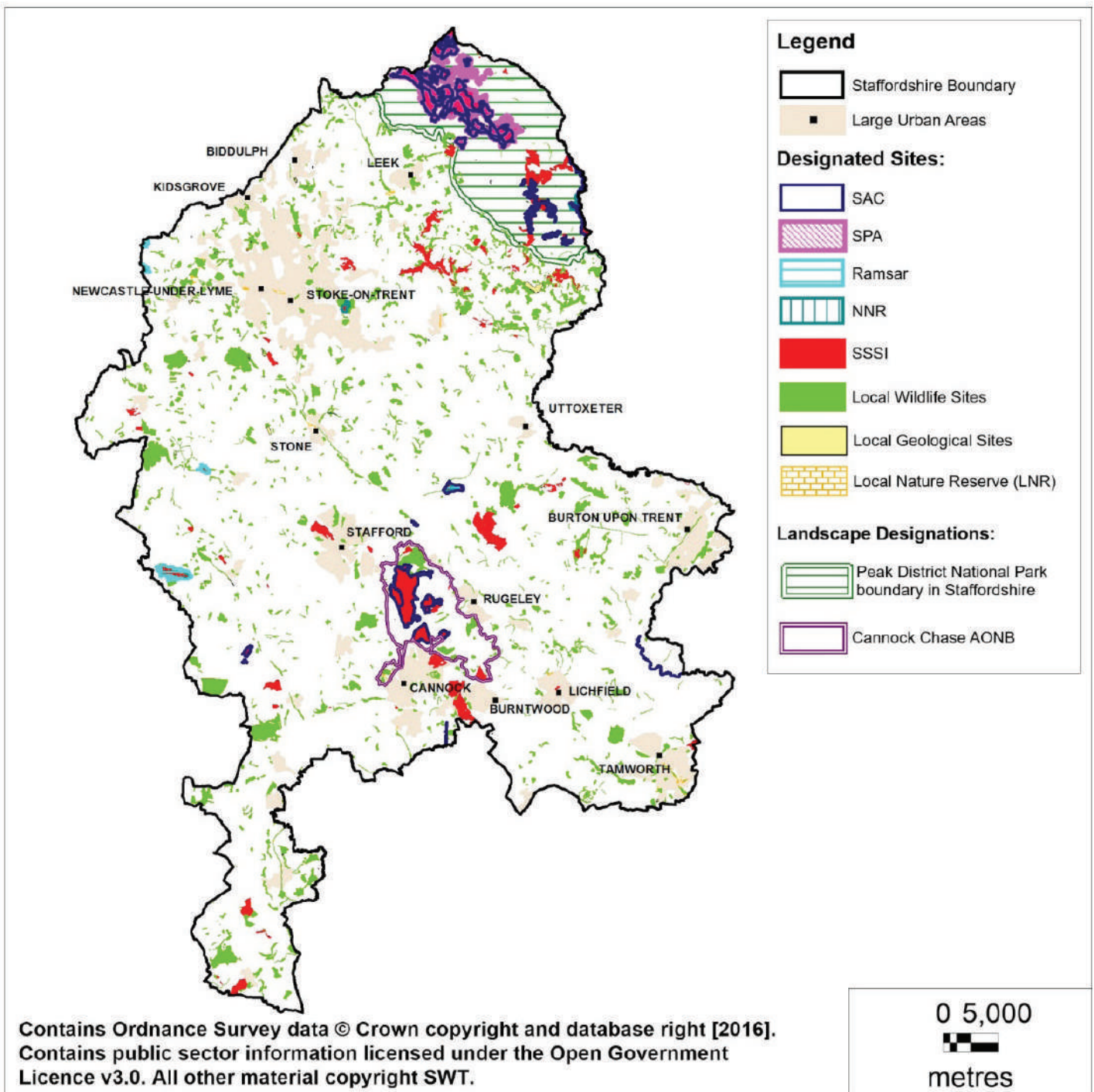
- Ensure that monitoring of nature conservation sites continues and aim to increase the proportion of land in Favourable condition.
- Define and secure targets for the uptake of Local Wildlife Sites into appropriate conservation management and ensure that they are achieved.

## 2.1 State of Designated Sites in Staffordshire

### 2.1.1 Overview

Figures	Number of sites	Area (ha)
Area of Staffordshire within a <b>statutory</b> nature conservation / geological / geomorphological designation (excluding Local Nature Reserves).	82	8650* (3.2% of Staffordshire)
Area of Staffordshire within a <b>non-statutory</b> nature conservation / geological geomorphological designation (LWS & LoGS / RiGS)	982	12,061.94 (4.5% of Staffordshire)
<b>International Designations**</b>		
Special Areas of Conservation (SAC)	7	3992.45
Special Protection Areas (SPA)	1	2872.13
Ramsar	5	434.05
<b>National Designations</b>		
Biological Sites of Special Scientific Interest (SSSI)	49	8650
Geological SSSIs	10	
Biological & Geological SSSIs	5	
National Nature Reserves (NNR)**	5	535.34
<b>County Level Designations</b>		
Local Wildlife Sites (LWS)***	SBI: 911 BAS: 478	11,844 2809
Local Geological / Geomorphological Sites (LoGS) / Regionally Important Geological Sites (RiGS)	71	217.94
Local Nature Reserves (LNR)	61	930.84 (0.3% of Staffordshire)
<b>Other designations</b>		
Peak District National Park	N/A	20,590
Cannock Chase Area of Outstanding Natural Beauty	N/A	6884
Meres and Mosses Nature Improvement Area	N/A	553.5
*This figure excludes significant area overlap where sites have multiple designations. Area of the county covered by a statutory designation is 20,475 ha (7.9% of Staffordshire).		
**These are also covered by SSSI designations.		
*** Local Wildlife Sites in Staffordshire are broken down into two categories: Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS) based on their diversity when scored against the Selection Criteria for Local Wildlife Site Selection in Staffordshire. SBI's are more diverse and are generally considered of county importance, whereas BAS's are less diverse but still possess some biological interest and are generally considered more locally important. These figures exclude Stoke-on-Trent (Unitary Authority) sites.		

**Table 1. Coverage of designated sites in Staffordshire.**



**Figure 1. Designated sites and landscape areas in Staffordshire.**

The importance of Staffordshire’s habitats are recognised by various statutory and non-statutory designations. Staffordshire is covered by a number of local, national and international nature conservation and geological designations (8% of the county). Of the internationally designated sites in Staffordshire, 1.47% are SAC, 1.06% are SPA and 0.16% are Ramsar sites (some sites are covered by more than one designation).

In addition to designated sites for nature conservation and geology, there are also larger landscape-scale designations that have a broader focus than particular habitats and/or species, such as the Peak District National Park and Cannock Chase Area of Outstanding Natural Beauty (AONB).

## 2.2 International designations

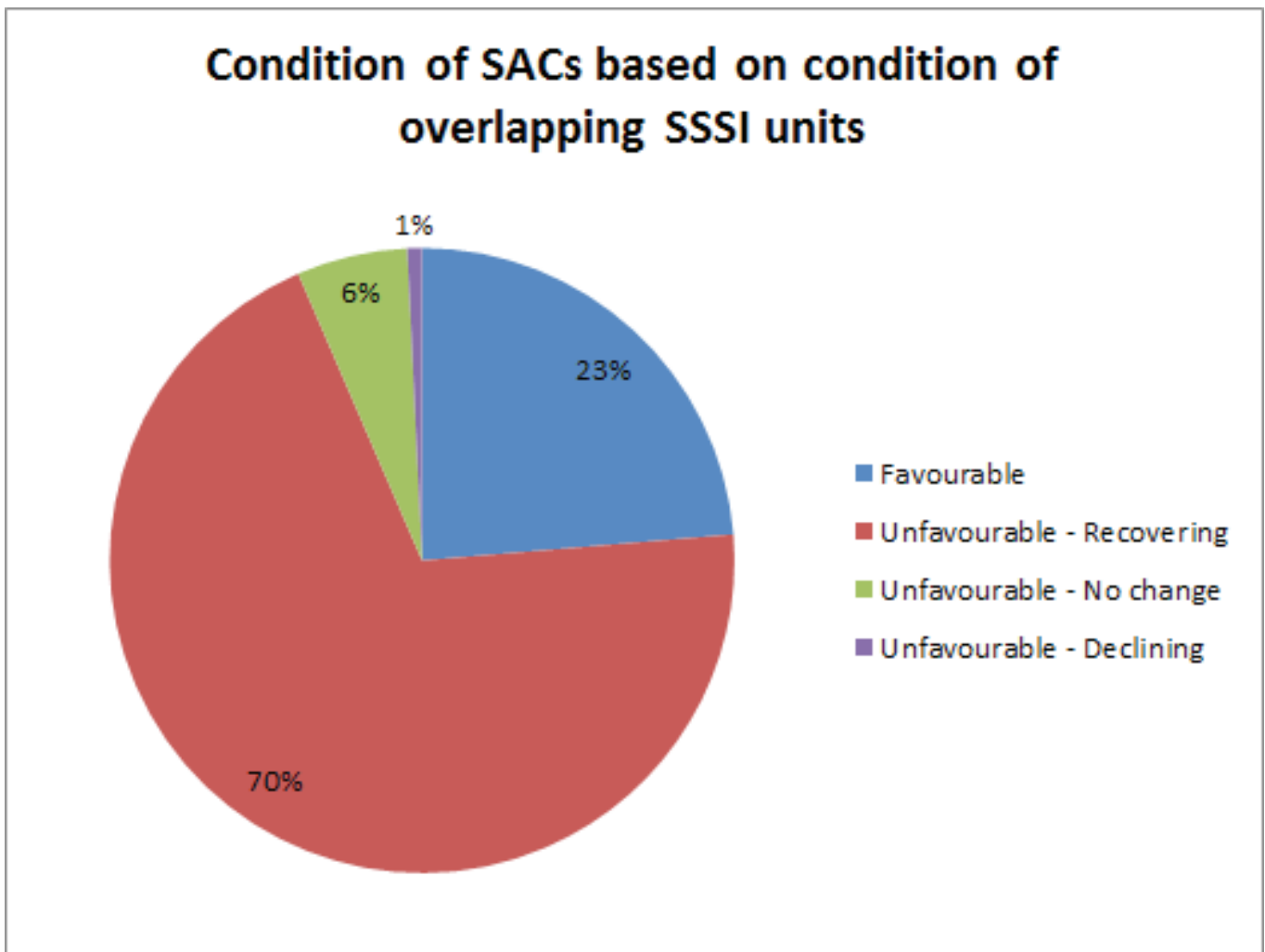
All international designations within Staffordshire overlap with a national statutory designation.

### 2.2.1 Special Areas of Conservation (SACs)

There are seven SACs in Staffordshire identifying habitats of European importance. These sites are: Cannock Chase, Cannock Extension Canal, Motte Meadows, Pasturefields Salt Marsh, Peak District Dales, River Mease, South Pennine Moors, and West Midlands Mosses (Chartley Moss).

SACs are designated and protected as a result of Article 3 of the European Commission (EC) Habitats Directive, which serves to promote the maintenance of biodiversity by establishing a network of high quality conservation sites based on the best representations of habitats and non-bird species which are deemed to be in greatest need of conservation within Europe (JNCC, 2017).

All terrestrial SACs in England are also SSSIs (Natural England, 2008), and thus the habitat condition of these sites can be gleaned by looking at the SSSI habitat condition data. Utilising the condition assessments of SSSI units that are also SAC it was found that 23% of SAC habitat in Staffordshire is in Favourable condition, 70% is Unfavourable-Recovering, 6% is Unfavourable - No change and 1% is Unfavourable Declining condition (Figure 2). The area of SAC in Staffordshire in Favourable condition is less than the 2015 cumulative national average, however the area of Unfavourable-Recovering and combined Unfavourable-Recovering and Favourable condition is greater than the average.



**Figure 2. Condition of SACs based on condition of overlapping SSSI units. Data extracted on 4th December 2015.**

SACs are afforded greater protection than SSSIs; planning authorities have more discretion over whether or not an application will affect a SSSI, whereas for an SAC if an application is likely to have a 'significant effect', the planning authority must gather an appropriate assessment of the site by a relevant government body, such as Natural England or the Environment Agency, prior to development.

### 2.2.2 Special Protection Areas (SPAs)

There is one designated SPA in Staffordshire - the Peak District Moors (South Pennine Moors Phase 1), which also extends into Derbyshire to the North, covering a roughly similar area to the South Pennine Moors SAC.

SPAs are designated under the European Commission (EC) Birds Directive for the protection of rare and vulnerable species of bird, as well as regularly occurring migrant species (JNCC, 2013). Habitat condition assessment of the area of SPA in Staffordshire can be assumed based on the same principle as for SACs, in that there is a significant overlap of SSSI units within areas of SPA. However, due to the nature of the designation being centred on birds, the suitability of the habitat condition assessments of this kind are not as reliable for SPAs.

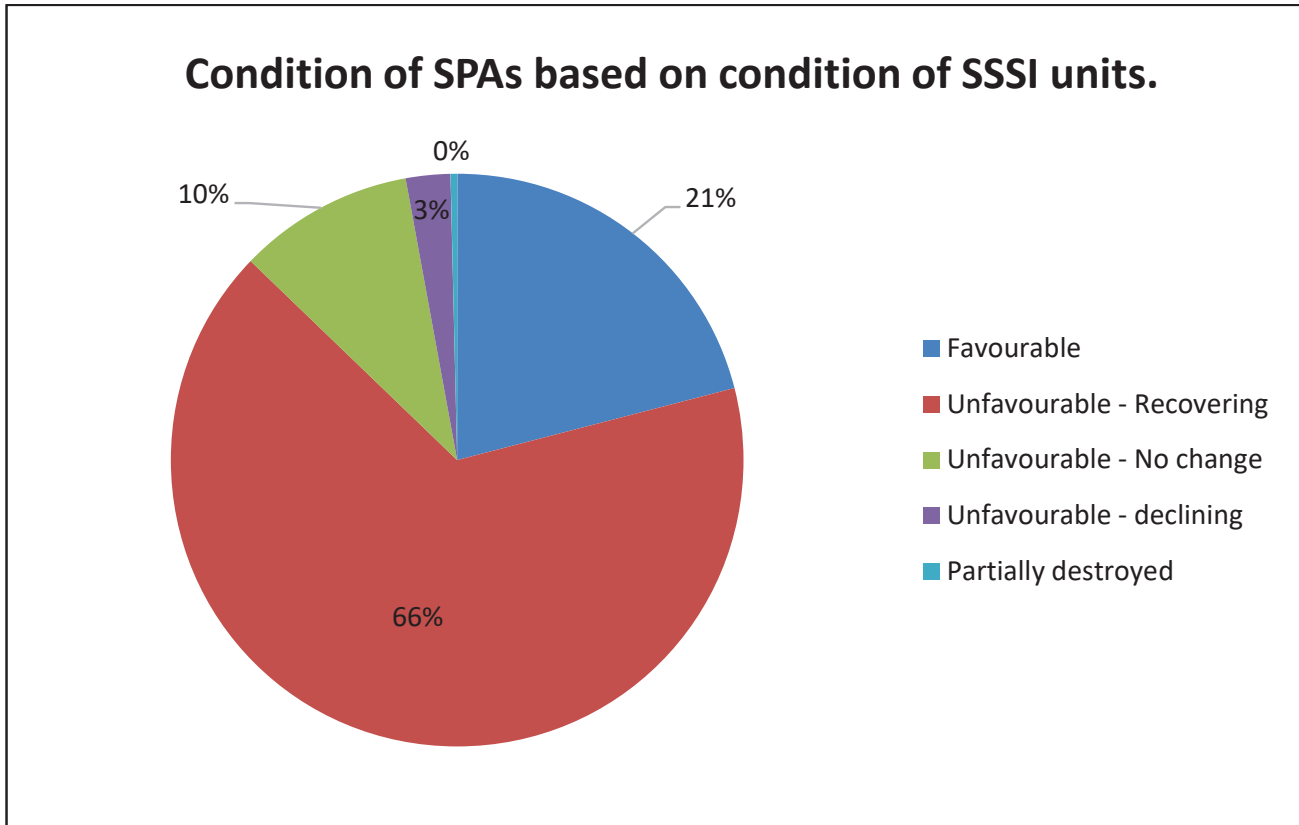


Figure 3. Condition of SPA based on condition of overlapping SSSI units. Data extracted on 4th December 2016.

### 2.2.3 Ramsar sites

There are five Ramsar sites in Staffordshire: Aqualate Mere, Betley Mere, Black Firs & Cranberry Bog, Chartley Moss and Cop Mere (all Ramsar sites in Staffordshire are known as Midlands Meres and Mosses Phase 1 and 2, but they all have other designations with individual names that are used for clarity).

Ramsar sites recognise wetland habitats of international importance and are designated under the Ramsar convention of 1971 (JNCC, 2015). Article 2.2 of the convention stipulates that 'Wetlands should be selected on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology' (Ramsar, 1971).

The five Ramsar sites in Staffordshire are important for a variety of hydrological and biological features and some sites, such as Chartley Moss, support the only known populations of species in the county.

Utilising the condition assessments of SSSI units from within the county that are also Ramsar sites, it was found that 26% of Ramsar habitat in Staffordshire is in Favourable condition, 54% is Unfavourable-Recovering and 20% is Unfavourable-No change (Figure 4). The area of Staffordshire's SPAs in Favourable condition is less than the 2015 cumulative national average, however the amount in Unfavourable-Recovering and cumulative Favourable and Unfavourable-Recovering is greater than the national average.



## Condition of Ramsars based on condition of overlapping SSSI units

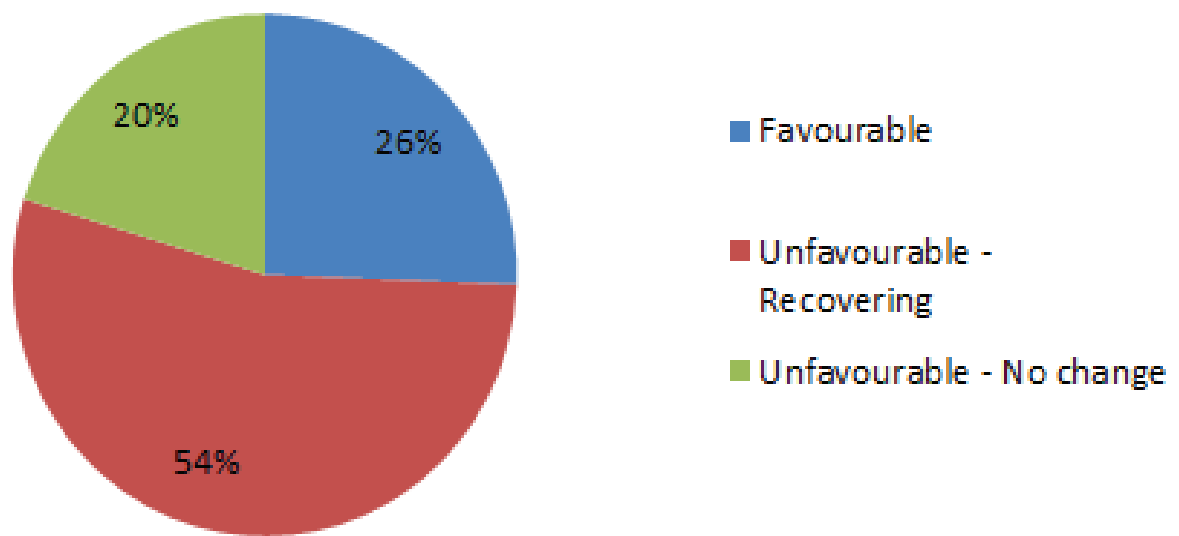


Figure 4. Condition of Staffordshire's Ramsar sites based on condition of overlapping SSSI units. Data extracted on 4th December 2015.

### 2.2.4 Summary

Approximately a quarter of the area of Staffordshire's international statutory designated sites are under Favourable condition, with the largest proportion currently in Unfavourable condition. Despite this, the Unfavourable condition areas are for the mostly recovering, with some areas seeing no change, and a very small percentage of their area declining.

According to Natural England data, of the internationally designated sites in Staffordshire, Ramsar and SPA sites have the highest proportional area of habitat in Favourable condition at 26% and 21% respectively. Ramsar sites in Staffordshire occupy a much smaller area of the county than both SACs and SPAs, and therefore the physical overall area in Favourable condition is much lower than that in SACs and SPAs.

## 2.3 National designations

### 2.3.1 National Nature Reserves (NNRs)

There are five NNRs in Staffordshire: Aqualate Mere, Dovedale (part), Chartley Moss, Hulme Quarry and Motte Meadows.

National Nature Reserves were established to protect nationally important habitats, species, and geology, and to provide opportunities for scientific research. Natural England manages about two thirds of NNRs (Natural England, 2009), although in Staffordshire a number of SSSIs are privately owned and managed.

As with a number of other statutory sites, all NNRs are also wholly covered by a SSSI designation meaning the SSSI unit condition assessment data can be used to provide insight into the current habitat condition of Staffordshire's NNRs. Figure 5 shows that of the total area of NNR in Staffordshire, 51% is in Favourable condition, a further 35% is in Unfavourable-Recovering condition and 14% is Unfavourable condition. This the highest proportional area in favourable condition when compared to all other statutory sites in Staffordshire.

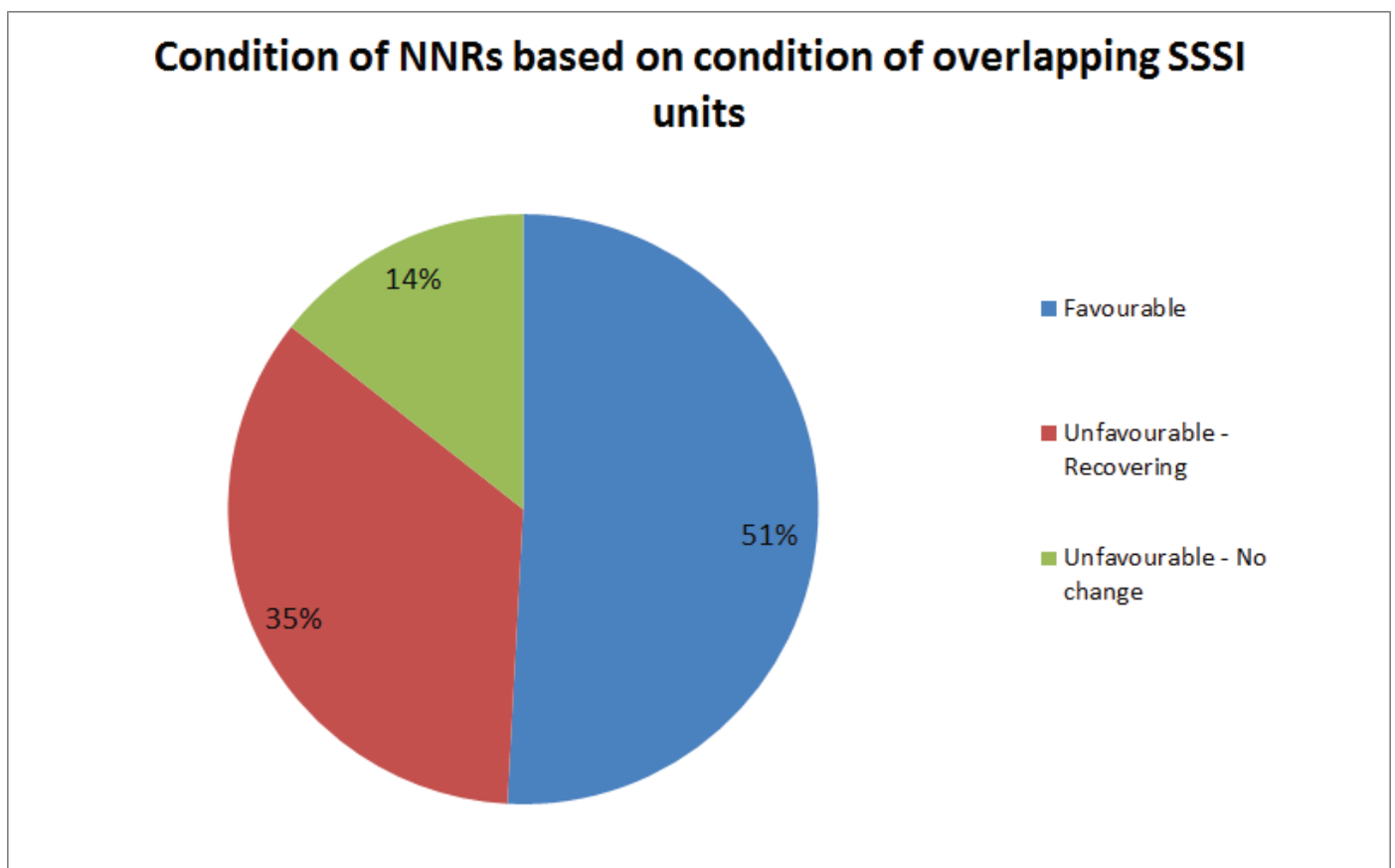
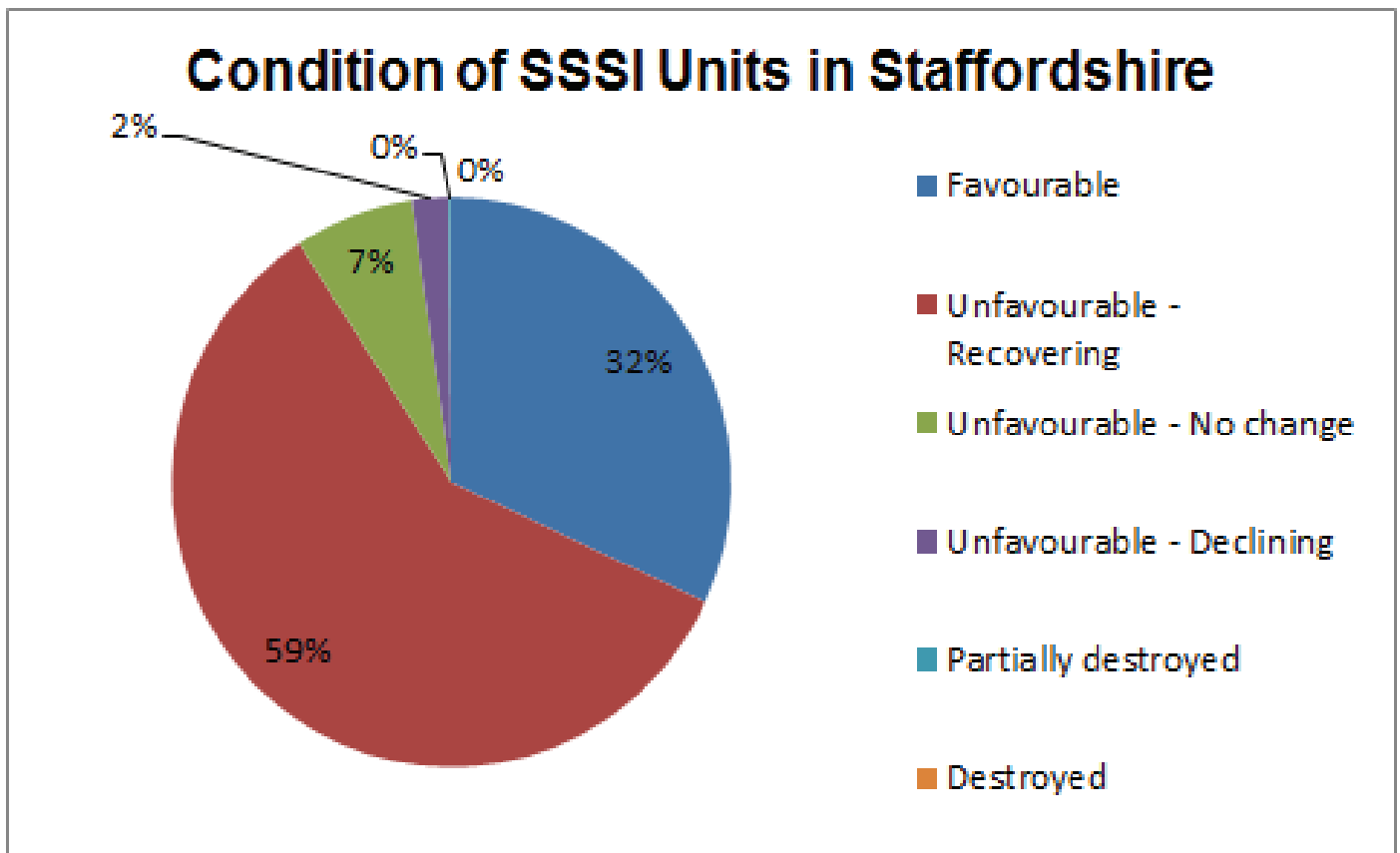


Figure 5. Condition of NNRs based on condition of overlapping SSSI units. Data extracted on 4th December 2015.

### 2.3.2 Sites of Special Scientific Interest (SSSIs)

There are 49 Biological, 10 Geological and 5 Biological & Geological SSSIs in Staffordshire, covering 8,650 ha within the county, and providing statutory protection for the best examples of the UK's flora, fauna, or geological or physiographical features (JNCC, 2014). (Some SSSIs present in Staffordshire extend beyond the county boundary. The figures presented here do not incorporate the area of these sites that do not occur in Staffordshire).

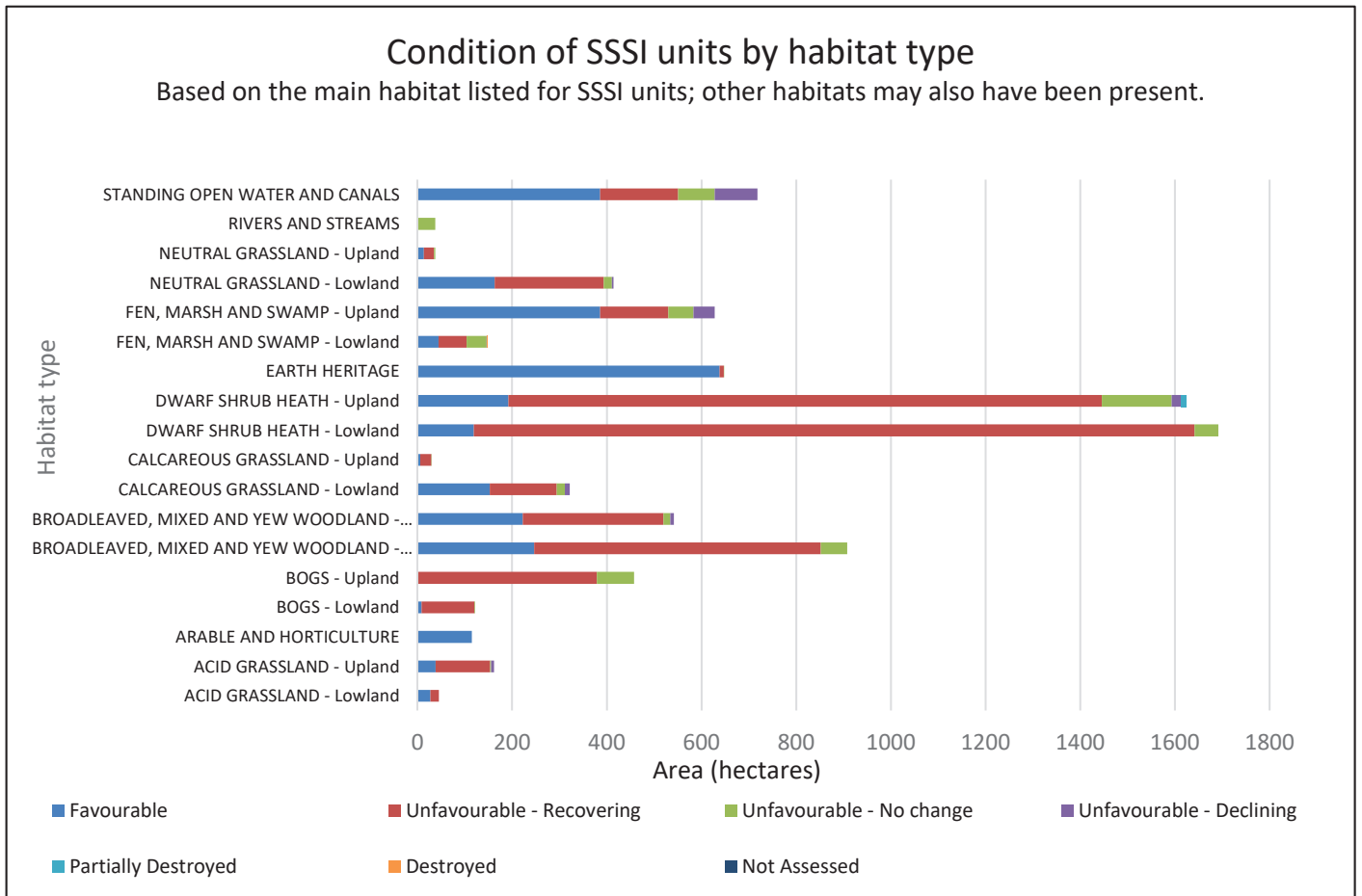
Figure 6 illustrates that the majority (59%) of SSSIs are in Unfavourable-Recovering condition, 32% are in Favourable condition, 7% Unfavourable-No change, less than 1% is Partially Destroyed and less than 1% is in Destroyed condition. Although many sites have not reached standards considered to be in ideal condition, conservation efforts are improving, with appropriate management planned or in place.



**Figure 6. Condition of SSSIs in Staffordshire. Data extracted on 4th December 2015.**

The condition of different habitats within the SSSI units can also be analysed (Figure 7), albeit with limitations; the habitat type is taken from the “main habitat” column from the SSSI unit data, and thus some habitat units may include other non-specified habitats as well. However, this analysis does still give an indication of the condition of the different habitats.

It can be seen that lowland and upland Dwarf Shrub heath comprise the greatest amount of habitat under SSSI designation in Staffordshire, and the majority of these habitats are in Unfavourable-Recovering condition. Earth Heritage (geological) SSSIs comprise the largest area in Favourable condition, with nearly 100% of the total area of this habitat type in Favourable condition.

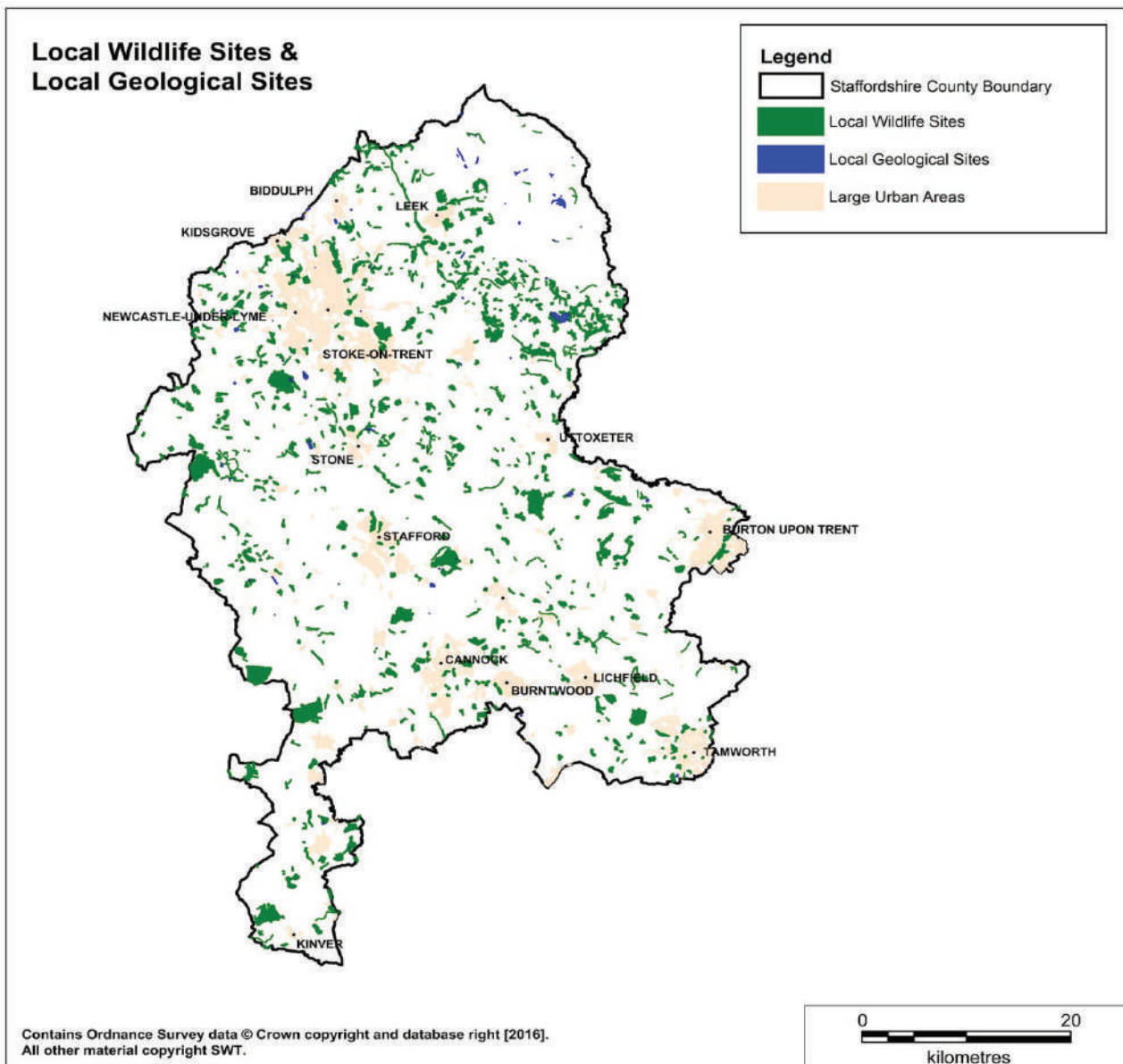


**Figure 7. Condition of SSSI units by habitat type.**

### 2.3.3 Summary

- Dwarf Shrub habitats represent the highest proportion of SSSI designation in the county, with 38% of the total area of SSSI.
- Based on habitat type, earth heritage has the highest proportion of area in Favourable condition (99%), followed by standing open water and canals (54%).
- Only 32% of Staffordshire’s SSSI Units are in Favourable condition, 59% are in Unfavourable condition but are recovering.
- Where a distinction is made between the two, there is minimal difference between the proportion of upland and lowland habitats in Favourable condition, with roughly 18% and 21% respectively in Favourable condition.
- Based on the area of overlapping SSSI, NNRs appear to have a higher proportion of land in Favourable condition compared to all SSSIs and internationally designated statutory sites.

## 2.4 County level designations



**Figure 8. Local Wildlife Sites and Local Geological Sites/Regionally Important Geological Sites in Staffordshire.**

### 2.4.1 Local Wildlife Sites (LWSs) - biological

LWSs are non-statutory designated nature conservation sites that possess a wide variety of good quality habitats and a range of species of county importance. They provide the backbone to Staffordshire's rich natural environment. The Government report, "Making space for Nature" (2010) highlighted the importance of LWSs for providing refuges for wildlife and acting as "stepping stones and corridors to link and protect nationally and internationally designated sites". The inventory of LWSs in Staffordshire provide a more comprehensive audit of an area's biodiversity than nationally or internationally designated sites, which serve as representative examples of high quality habitat across the county.

Staffordshire's LWSs are surveyed and designated by the county's LWS partnership which includes Staffordshire Wildlife Trust, Natural England, Environment Agency, Staffordshire Ecological Record, Staffordshire County Council and representatives from Local Authorities. LWSs are designated based on habitat and species selection criteria developed by the LWS partnership and are monitored at intervals depending on designated habitat type. (Sites from within Stoke-on-Trent have been excluded as at the time of the 2008 baseline assessment, the City's series of sites, previously known as Natural Heritage Sites, were assessed and designated using a different methodology to the rest of the county).

In 2008, as part of the Government's Local Area Agreements (LAAs), the management of Local Wildlife Sites was selected as one of the possible 198 indicators of local authority performance. Along with 25 other counties in England, National Indicator 197 (known as 'Improved Local Biodiversity') was adopted by Staffordshire with the target of increasing the number of sites in appropriate conservation management by 5% a year over the course of the three years of the LAAs (2008 – 2011). Following discussions with central government regarding the agreed assessment measure, in March 2008, Staffordshire's LWSs (Sites of Biological Importance only) were analysed to identify a baseline number of sites which were under appropriate conservation management (Figure 9).

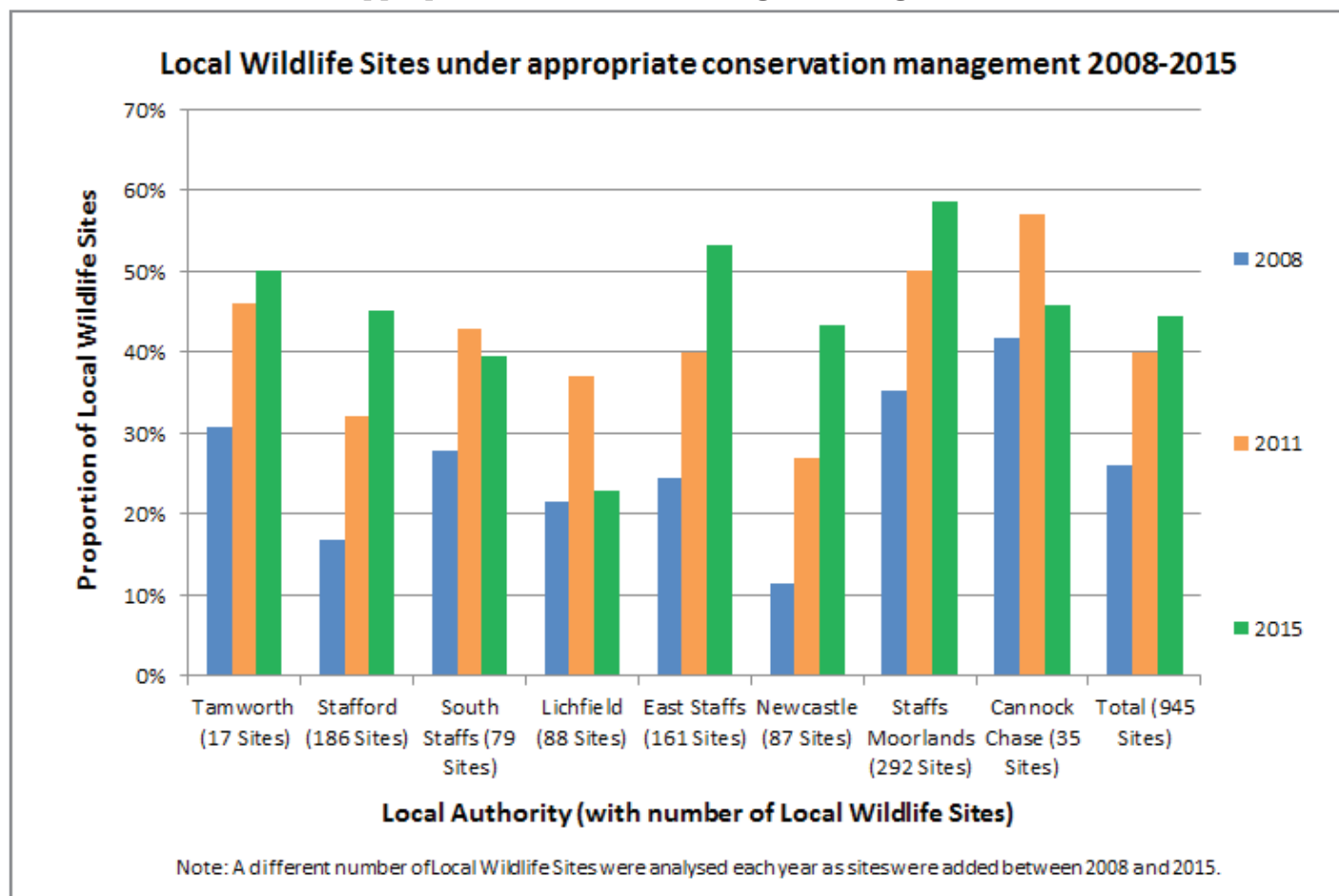


Figure 9. Local Wildlife Sites under appropriate conservation management 2008 – 2015.

In 2008, 25% of the LWSs analysed were considered to be under appropriate conservation management. The assessment used the following criteria to judge if a site was deemed to be in appropriate conservation management:

- An agri-environment scheme agreement or woodland grant scheme with options appropriate for the designated habitat/s.
- A current and appropriate management plan.
- Management guidance that had been documented and was being acted upon.

At the completion of the LAAs in March 2011, Staffordshire had achieved the target of a 5% a year increase countywide in the number of sites under appropriate conservation management and the total proportion stood at 40% (Figure 9). The completion of the LAAs saw the introduction of the Single Data List (SDL), which is a list of datasets local government must submit to central government on an annual basis. While 'Improved Local Biodiversity' remained on the list of reporting indicators, crucially, there were no targets agreed with central government for the indicator to improve further.

As part of the State of Staffordshire's Nature Report, the indicator assessment was carried out again in 2015 using the same methodology as in 2008 for the 945 sites in the county present in 2015. Proportional increases of LWSs under appropriate conservation management were observed in every local authority between 2008 and 2015, with the total standing at 45%, however the proportional increases differed between each local authority, with five out of the eight local authorities witnessing an increase between 2011 and 2015.

To summarise, in 2008 25% of LWSs were considered to be under appropriate conservation management. This increased to 40% in 2011, and at the end of 2015 the figure stood at 45% (Figure 9). The increase of LWSs under appropriate management during the 2008 to 2011 period was driven by the need to achieve Improved Local Biodiversity targets set out by the LAAs. The LWS partnership was critical in securing appropriate conservation management through landowner liaison to facilitate the entry of LWS into agri-environment schemes as well as provide conservation advice and help produce management plans.

Following the completion of LAAs targets in 2011 and the subsequent introduction of the SDL, the overall number of LWS entering into appropriate conservation management slowed due to the lack of any agreed targets. The replacement of the Countryside Stewardship Scheme (CSS) and Environmentally Sensitive Area (ESA) scheme with more financially targeted agri-environment schemes that included options and payments benefitting specific habitat types has since potentially had a positive influence on the number of LWS under appropriate conservation management since the 2011 LAAs completion.

The Staffordshire LWS partnership has remained strong and active and continues to survey and monitor LWSs annually, with annual statistics submitted to government to contribute to the SDL.

#### **2.4.2 Geological Sites (LoGS & RiGS)**

Local Geodiversity Sites (LoGS) and Regionally Important Geological/Geomorphological Sites (RiGS) are surveyed and designated by Geoconservation Staffordshire in agreement with Local Authorities. LoGS / RiGS are also afforded the same protection as LWSs, with their designations based on the county importance of the geological and geomorphological features of a site in much the same way as LWS designations.

#### **2.4.3 Local Nature Reserves (LNRs)**

There are currently 61 LNRs in Staffordshire. LNRs are statutory designations under Schedule 11 of the Natural Environment and Rural Communities Act 2006; these sites are designated by Local Authorities on the basis of wildlife, geology, education or public benefit. LNRs are designated and generally owned by a Local Authority, however the management of sites may be passed on to a 3rd party. Protection is afforded to LNRs through the development and delivery of local plans developed by each Local Authority.

## **2.5 Summary of findings from designated sites**

Cumulatively, Staffordshire's designated sites occupy 8% of the counties land area, providing recognition and protection for a number of important habitats and species. Non-statutory designated sites cover both a larger area as well as a wider extent of the county than statutory designated sites, and provide an even more comprehensive assessment of the counties habitats of nature conservation value.

- Most of the area of National and International statutory designated sites is in Unfavourable condition, but is recovering.
- Only 32% of Staffordshire's SSSIs are in Favourable condition, with 59% in Unfavourable condition, but is recovering.
- NNRs have a higher proportion of their area under Favourable condition than other national / international statutory sites (50%).
- Based on SSSI habitat types, almost 100% of earth heritage is in favourable condition, the next highest being standing open water and canals (54%).
- Dwarf Shrub Heath (upland and lowland) makes up 38% (3315.64 ha) of the total SSSI habitat in Staffordshire, which is more than any other habitat type. Only 9% of dwarf shrub heath is in Favourable condition, with 84% in Unfavourable condition but recovering.
- Where a distinction is made between the two, there is minimal difference between the proportion of upland and lowland habitats in favourable condition with roughly 18% and 21% respectively in Favourable condition.
- The number of Local Wildlife Sites in appropriate conservation management stands at 45% in 2015, increasing from 25% in 2008. The LWS partnership also remains active and continues to designate and monitor sites annually throughout the county.

## 2.6 Threats

There are an array of issues currently affecting nature conservation sites both directly and indirectly. Despite being under varying degrees of protection compared to other areas of the landscape, designated sites are often still subject to the same issues and pressures as the wider countryside, however the habitats are often more vulnerable.

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1-18:** dominant species control; pollution; nitrification; runoff; lack of grazing; overgrazing; access / disturbance; habitat fragmentation and severance; resources; nitrogen deposition; neglect; inappropriate management; intensive agriculture; habitat loss; land drainage; invasive non-native species.

### Additional specific issues for designated sites

- Over the past few decades development has become a significant threat, particularly on sites located in urban environments or in the urban fringe where development proposals may cause direct loss of a site or part of a site. Alternatively, development can have an indirect impact on a site through species disturbance or diffuse pollution.
- Both diffuse and point source pollution from multiple sources pose major risks to designated nature conservation sites. This has been particularly evident surrounding several sites in Staffordshire such as Motte Meadows SSSI / NNR.
- A high proportion of Staffordshire's riparian statutory and non-statutory sites are adversely affected by non-native species. Notably, Himalayan balsam and American signal crayfish have caused widespread loss of important habitats and species within the county's designated sites.
- Staffordshire's non-statutory designated sites (e.g. LWSs) can suffer from inappropriate management as there is less legal obligation to manage their natural features sympathetically.
- High visitor pressure threatens larger more scenic designated sites, e.g. The Roaches and Cannock Chase. This has caused both direct and indirect impacts on sites, such as footpath erosion leading to sediment mobilisation, direct loss of habitat through disturbance or loss of species through poaching.
- There is future uncertainty surrounding agricultural and environmental subsidies that currently incentivise landowners to consider biodiversity through site management. Whilst the impact may be less prevalent for nationally / internationally statutory designated sites where funding may be more readily available, many non-statutory sites that rely heavily on subsidies to secure long-term appropriate management could be negatively affected.



## 2.7 Conserving designated sites – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to designated sites:

- Friends of Motte Meadows (grassland chapter)
- Restoring species-rich grassland at Cauldon Quarry (grassland chapter)
- Connecting Cannock Chase (lowland heathland chapter)
- Heathland restoration at Kinver Edge (lowland heathland chapter)
- Wild About Tamworth (built environment chapter)
- Motte Meadows Rural Sustainable Drainage Systems (RSuDS) (farmland chapter)
- Increasing opportunities for nesting solitary bees and wasps (invertebrates chapter)
- Snake's head fritillary population at Broad Meadow LNR, Tamworth (plants chapter)
- Burntwood Milestone Way Strategic Development Allocation (areas chapter)
- Habitat network mapping in the Churnet Valley (why is nature changing & what needs to happen chapter)
- Whittington Heath Golf Course, HS2 Phase 1 Biodiversity Offset Scheme (why is nature changing & what needs to happen chapter)

Case study 1 – Chasewater and Southern Staffordshire Coalfield Heaths SSSI (Authors and contributors: Ali Glaisher, Jaclyn Lake)

Case Study 2 - Doxey and Tillington Marshes SSSI flood compensation works (Authors and contributors: Ali Glaisher, Jeff Sim)

In addition to the case studies above, there are more examples of positive work that is of benefit to designated sites in Staffordshire. These include:

- Presently and in the past, a number of Rural Sustainable Drainage Schemes (RSuDS) and Natural Flood Management (NFM) projects have been carried out by Staffordshire Wildlife Trust alongside national and local partner organisations. These projects provide multiple benefits by protecting existing sites and providing additional new habitat. These projects have so far been carried out to protect several Local Wildlife Sites and currently a SSSI/NNR from the effects of diffuse pollution whilst simultaneously delivering desirable outcomes for landowners.
- Establishment of landscape-scale project boundaries with defined targets for habitat restoration and creation currently provide numerous opportunities for designated sites, e.g. the Churnet Valley Living Landscape (CVLL). Restoration and enhancement of several statutory and non-statutory designated sites has taken place through direct practical work, engaging with the local community and restoring important grassland areas within the landscape.
- Mitigation for large scale developments has led to the design and incorporation of ecologically beneficial elements in new infrastructure as well as dedicating habitat improvements and renewal to existing sites. Recently several large scale developments, for example development of junction 14 of the M6 and southern access road developments to Doxey Marshes have all contributed to the improvement and provision of additional habitat surrounding designated sites.
- The LWS partnership remains active, constant effort is maintained to ensure that Local Wildlife Sites are routinely surveyed and monitored. Bi-annual meetings are held by the partnership seeking to continually update the inventory of sites, develop the criteria for assessing sites. The partnership is crucial in maintaining the inventory and management of non-statutory sites through direct landowner liaison, discussion and securing further associated improvement work.

## 2.8 Conserving designated sites – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**HC1; M1-17; DM1-5:** increase habitat size and connectivity, increase bare ground habitat, manage for structural habitat diversity, increase resources, ensure appropriate grazing, improve planning & use of chemicals, implement Sustainable Drainage Systems (SuDs), innovative management of recreation pressures, consider potential recreation impacts on habitats & species when planning management, more integrated planning and management of sites across ownership boundaries, integrated use of volunteer groups, use of by-products from management, sustainable management, survey and monitoring, instate suitable mowing regime, manage hedgerows by rotational winter cutting, manage woodlands for age and habitat diversity, increase research, agri-environment schemes, habitat creation through the planning system, increase uptake of grants, guidelines for planners, large-scale habitat creation projects.

### Additional specific recommendations for designated sites

- Continue and expand monitoring for both statutory and non-statutory sites in order to recognise changes in habitat condition and extent of change to quickly and efficiently influence changes in management to benefit habitats.
- Explore ways in which appropriate management can be incentivised amongst 3rd party landowners without reliance on future policy funding.
- Nationally agreed and legally binding targets for designated sites under appropriate conservation management like those which were present as part of the NI197 2008 – 2011. This ensures that there is incentive to facilitate appropriate conservation management amongst landowners and secures protection of a network of highly important sites.
- Designated sites that are sensitive to change (meres and mosses sites, riparian habitats etc.) should be adequately buffered from potential impacts from the wider countryside.
- Future mitigation and biodiversity offsetting should seek to implement net gains for biodiversity as a minimum rather than no net loss.

## Designated Sites - Case Study Number 1

### Chasewater and the Southern Staffordshire Coalfield Heaths SSSI

#### Habitats & species:

Habitats: heathlands, wetlands, nutrient-poor open water.

Species: plants: floating water-plantain, round-leaved wintergreen; birds: willow tit, bird assemblage; invertebrates: white-clawed crayfish; amphibians: great crested newt.



Photo: Heathland created on colliery site at Norton Bog, Rob Davies

#### Key messages

Chasewater and the Southern Staffordshire Coalfield Heaths SSSI demonstrates a landscape-scale approach to habitat protection and includes long-standing, restored and created habitats

#### Overview

The Chasewater and Southern Staffordshire Coalfield Heaths SSSI was declared by Natural England in December 2010. The SSSI is nationally important for its wet and dry lowland heath, wetlands (mires and swamps) and oligotrophic (nutrient-poor) standing open waters, in addition to its populations of two nationally scarce plant species: floating water-plantain and round-leaved wintergreen.

The SSSI stretches for seven kilometres, including the long-standing heathland at Hednesford Hills in the north and Brownhills Common in the south, the translocated and restored wet heathland at Bleak House and created heathland at Norton Bog restored open-cast coal sites, and Chasewater Country Park and Reservoir.

It recognises the various habitat translocation and creation techniques that have minimised the impact of development by contributing to the restoration and enhancement of the local environment. Moreover, continued protection for Biddulph's Pool and the Angelsey Basin, and new protection for Chasewater and Jeffrey's Swag, recognises the high quality open water habitats present throughout the landscape in this peri-urban area.

#### Contact

Jaclyn Lake, Natural England, [jaclyn.lake@naturalengland.org.uk](mailto:jaclyn.lake@naturalengland.org.uk)

#### Partners

The SSSI was declared by Natural England. Land owners and managers include Cannock Chase District Council, Staffordshire County Council, Walsall Council, Lichfield District Council, Canal and Rivers Trust, Harworth Estates, and the Church Commissioners.

## Funding

A substantial proportion of SSSI management is supported by Environmental Stewardship Higher Level Schemes supplemented by landowner resources.

## Objectives

To recognise and protect a network of linked heathland, wetland and standing open water habitats across ownership and administrative boundaries.

## Approach

Prior to SSSI declaration in 2010 the patchwork of heathland habitats was subject to a range of designations and variable protection. Some areas were separate small SSSIs, others were designated as Local Wildlife Sites; some had no legal or policy protection. The Chasewater and Southern Staffordshire Coalfield Heaths brought these together allowing a comprehensive approach to habitat protection and management.

## Outcomes

The SSSI protects 530 hectares (ha) of heathland and associated habitats. 266 ha is within a Higher Level Countryside Stewardship scheme that delivers heathland management and further restoration. Grazing has been introduced on parts of Chasewater Country Park to complement that at Hednesford Hills. Willow scrub at Chasewater Country Park is managed for willow tit. During essential maintenance works to Chasewater Dam, extensive mitigation measures protected heathland and wetland habitats as well as species such as floating water plantain, white-clawed crayfish and great crested newt. The SSSI supports around 140 species of birds with wintering tufted duck often approaching nationally important numbers on the reservoir. Exceptional water quality, very low in nutrients, also allows uncommon aquatic plant communities to thrive at Chasewater - communities that have been lost from waterbodies in our wider countryside due to enrichment.

## Future work

Landowners will continue to manage the SSSI under Environmental Stewardship and will apply for support by its successor schemes. Partners will work together to maintain the excellent water quality of the open water bodies and wetland habitats across the SSSI. Lichfield District Council and partners are working to create complementary heathland adjacent to the SSSI to further extend habitat areas and local residential developments provide funding to offset the impact on the sensitive heathland habitats of increased recreational pressures.



Photos: Chasewater Country Park, Dan Saberton (left); Rob Davies (right)

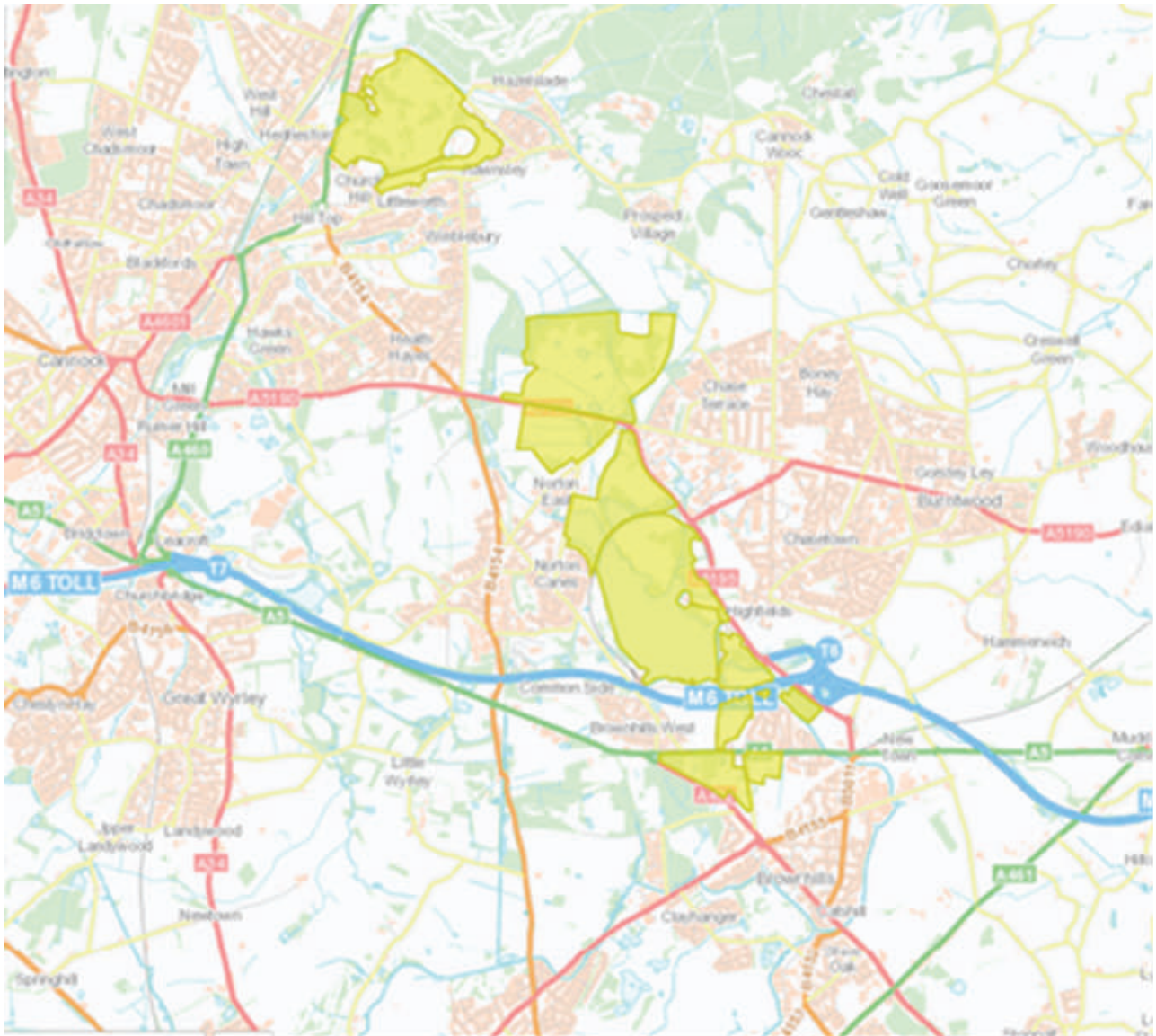


Figure 1. Map showing the extent of the Chasewater and Southern Staffordshire Coalfield Heaths SSSI, Natural England.

## Designated Sites - Case Study Number 2

### Doxey and Tillington Marshes SSSI flood compensation works

#### Habitats & species:

Habitats: Wetlands, rivers

Species: Birds, fish, otters



**Photo: New meandering river under construction with bare ground where wader scrapes and wet grassland will form at Doxey Marshes Nature reserve, N T Killingley**

#### Key messages

- Infrastructure schemes can deliver biodiversity benefits, especially through partnership working and early stakeholder involvement
- The works will provide improved habitat and feeding ground for the Doxey Marshes Nature Reserve's bird and animal life, and the meandering river alignment will create a more natural appearance to the area.
- The volume of flood storage capacity in the Nature Reserve will be increased to protect areas of Stafford downstream during times of flood.

#### Overview

As part of the planning for the Stafford Western Access Route scheme, an area of higher ground supporting species-poor grassland within Doxey Marshes Nature Reserve was identified, in consultation with Staffordshire Wildlife Trust (SWT), Natural England (NE) and the Environment Agency (EA), that could be lowered to provide additional water storage capacity during times of flood, helping to protect areas downstream and compensate for the construction of the road.

It was agreed by all parties that the excavated material could be used to part fill the deep Creswell Flash to create islands, spits and shallows for the benefit of the reserve's birdlife. A length of the River Sow, canalised adjacent to the railway line, was also realigned to introduce meanders and create a more natural appearance, for the benefit of fish, otters and wetland birds.

#### Contact

Jeff Sim, Staffordshire Wildlife Trust, [j.sim@staffs-wildlife.org.uk](mailto:j.sim@staffs-wildlife.org.uk)

## Partners

The project was managed by Amey working on behalf of Staffordshire County Council. Partners were Staffordshire Wildlife Trust, the Environment Agency and Natural England.

## Funding

The project was implemented as part of the Stafford Western Access Route that is funded by a combination of the Stoke & Staffordshire Local Enterprise Partnership, Staffordshire County Council and developer contributions.

## Objectives

- Increase flood storage capacity across Doxey Marshes Nature Reserve.
- Improve habitat and feeding ground for the reserve's birdlife.
- Re-introduce a meandering river alignment for benefit of fish, otters and wetland birds.

## Approach

Amey engineers identified a number of locations in the nature reserve that could be lowered. Following extensive consultations with SWT, one location was agreed upon due to its habitat enhancement opportunities. The area was surveyed and mitigation measures put in place to ensure habitat, species and water quality protection during the works. Added value was secured, following Environment Agency advice, by including river re-profiling along the River Sow as part of the scheme. A specialist contractor was approached for construction advice and the works were let following a competitive tender process. Works were carried out under ecological supervision during Autumn and Winter 2016, avoiding the bird breeding season.

## Outcomes

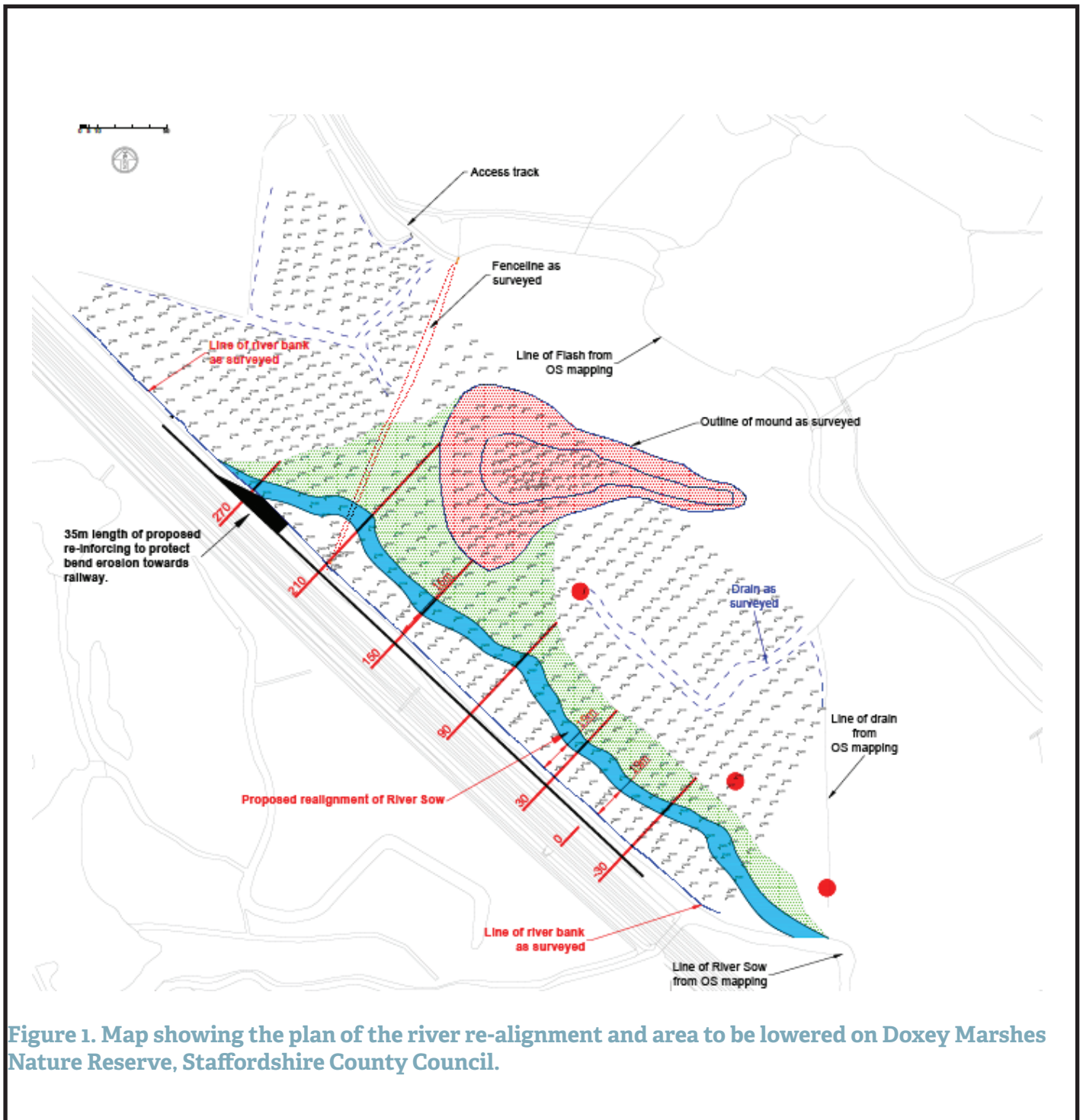
1.6 hectares of wetland habitat was created as part of a flood compensation scheme, enhancing Doxey Marshes Sites of Special Scientific Interest (SSSIs). The works create additional areas of wet grassland nesting habitat and new wader scrapes to provide feeding areas for waders such as snipe, lapwing, and redshank and their young. 400 metres of the River Sow was also re-aligned to create a wider channel with meanders and shallow slopes to provide better habitat for fish and aquatic invertebrates, and therefore otter and wetland birds. The lowered areas of land will also provide an area of extra water storage in the event of flooding, helping to protect areas downstream.

## Future work

The enhanced habitat areas will be managed by Staffordshire Wildlife Trust as part of the existing nature reserve. Construction of the Stafford Western Access Route on the SSSI edge will include the restoration of destroyed SSSI to wetland and grassland habitat, further enhancing the nature reserve.



**Photo: New islands being formed in Cresswell Flash, Jeff Sim**





## 3. Woodland and Trees

Authors: Mike Shurmer (RSPB), with contributions from Bernadette Noake (Staffordshire Wildlife Trust) and Ali Glaisher (Staffordshire County Council)

### Woodland and Trees headlines

#### Overview of habitat

Staffordshire is home to a range of woodland types, including long-standing ancient woodland, coniferous and broad-leaved plantations, wet woodland, parkland, ancient trees, orchards and scrub. Staffordshire's woodlands provide a range of important ecosystem services, including flood regulation and carbon sequestration and storage.

#### Key species

Birds: wood warbler, pied flycatcher, redstart, willow tit and lesser spotted woodpecker.  
Mammals: brown long-eared bat, Brandt's bat, whiskered bat, noctule, hazel dormouse.  
Invertebrates: saproxylic assemblages. Important species include the hoverflies *Brachypalpus laphriformis* and *Pocota personata* and *Ampedus* beetles. Important butterflies and moths include welsh clearwing, argent & sable and small pearl-bordered fritillary.  
Flora: native black poplar, veteran trees, bluebell, and other ancient woodland indicators such as herb-paris, wood spurge, and hard shield fern are also of high importance.

#### Headlines

- There are 25,212 hectares (ha) of woodland cover in Staffordshire and Stoke-on-Trent according to the Forestry Commission. Of this, 2,193 ha have SSSI status and 6,072 are on the ancient woodland inventory (Natural England, 2015a&b).
- There are 600+ veteran oaks in Brocton Coppice and associated woodland.
- The value of carbon storage by Staffordshire's woodlands is around £1.5 billion (Hölzinger & Everand, 2014).

#### Key threats

- Loss and fragmentation of woodland habitats.
- Lack of woodland management and neglect, impacting on woodland structure, ground flora and woodland habitats.
- Lack of financial markets for sustainably produced local wood products.
- Invasive species including rhododendron, Himalayan balsam and holly.
- Plant pathogens, such as Chalara dieback of ash, *Phytophthora spp.*, acute oak decline and red band needle blight.
- Resilience to climate change.

#### Successes

- The creation and development of The National Forest.
- Over 500 ha of woodlands brought into management at a landscape scale through the Churnet Valley Living Landscape Sustainable Woodland (2012-2016) project.
- Veteran tree management, acorn harvesting and oak planting project in Brocton Coppice by Staffordshire County Council.

#### Recommendations

- Restore ancient semi-natural woodland sites.
- Manage and retain woodland edge, scrub deadwood features and wet woodland.
- Support landscape-scale woodland restoration and creation, such as in the Churnet Valley and The National Forest.
- Explore potential for the Payment for Ecosystem Services schemes to support future woodland creation and management.

## 3.1 State of woodland and trees in Staffordshire

### 3.1.1 Overview

Woodland and trees figures	Amount (ha)
<b>Area of Staffordshire on the Ancient Woodland Inventory</b> (Natural England, 2015b)	<b>6071.75</b>
Ancient & Semi-Natural Woodland (ASNW)	3048.84
Ancient Replanted Woodland (PAWS)	3022.91
<b>Area of woodland cover in Staffordshire and Stoke-on-Trent</b>	<b>25,212 (FC)</b>
<b>Current known coverage of habitat in Staffordshire</b>	<b>21,942.05 (SER*)</b>
Unspecified woodland	2681.38
Deciduous woodland	10287.17
Coniferous woodland	4711.52
Recently Felled Woodland	245.55
Scrub	659.31
Parkland & Scattered Trees **	607.93
Wet Woodland ***	96.01
*a total of 53% of county is mapped on the SER system ** This figure may be underestimate as the habitat could also be mapped as grassland with scattered trees *** wet woodland is also included in the wetland chapter	
<b>Total known habitat with statutory designation</b>	<b>2444.74</b>
Total known habitat with Ramsar designation	49.33
Total known habitat with SAC designation	592.52
Total known habitat with SPA designation	69.77
Total known habitat with SSSI designation	2193
Total known habitat with NNR designation	92.27
Total known habitat with LNR designation	251.74
<b>Total known habitat with non-statutory designation</b>	<b>7231.8</b>
Total known habitat with LWS designation	7197.68
Total known habitat with LoGS designation	34.12

**Table 1. Coverage of woodland habitats and designated woodland sites in Staffordshire.**

#### Woodland Species:

Birds: wood warbler, pied flycatcher, redstart, willow tit and lesser spotted woodpecker.

Mammals: brown long-eared bat, Brandt's bat, whiskered bat, noctule, common pipistrelle, soprano pipistrelle, hazel dormouse.

Invertebrates: saproxylic assemblages. Important species include the hoverflies *Brachypalpus lapriformis* and *Pocota personata* and *Ampedus* beetles. Important butterflies and moths include welsh clearwing, argent & sable and small pearl-bordered fritillary.

Flora: native black poplar, veteran trees, bluebell, and other ancient woodland indicators such as herb-paris, wood spurge, and hard shield fern are also of high importance.

#### Woodland habitats:

Priority woodland habitats listed on the Staffordshire BAP include lowland wood-pasture and parkland, native woodland, wet woodland and ancient/diverse hedgerows.

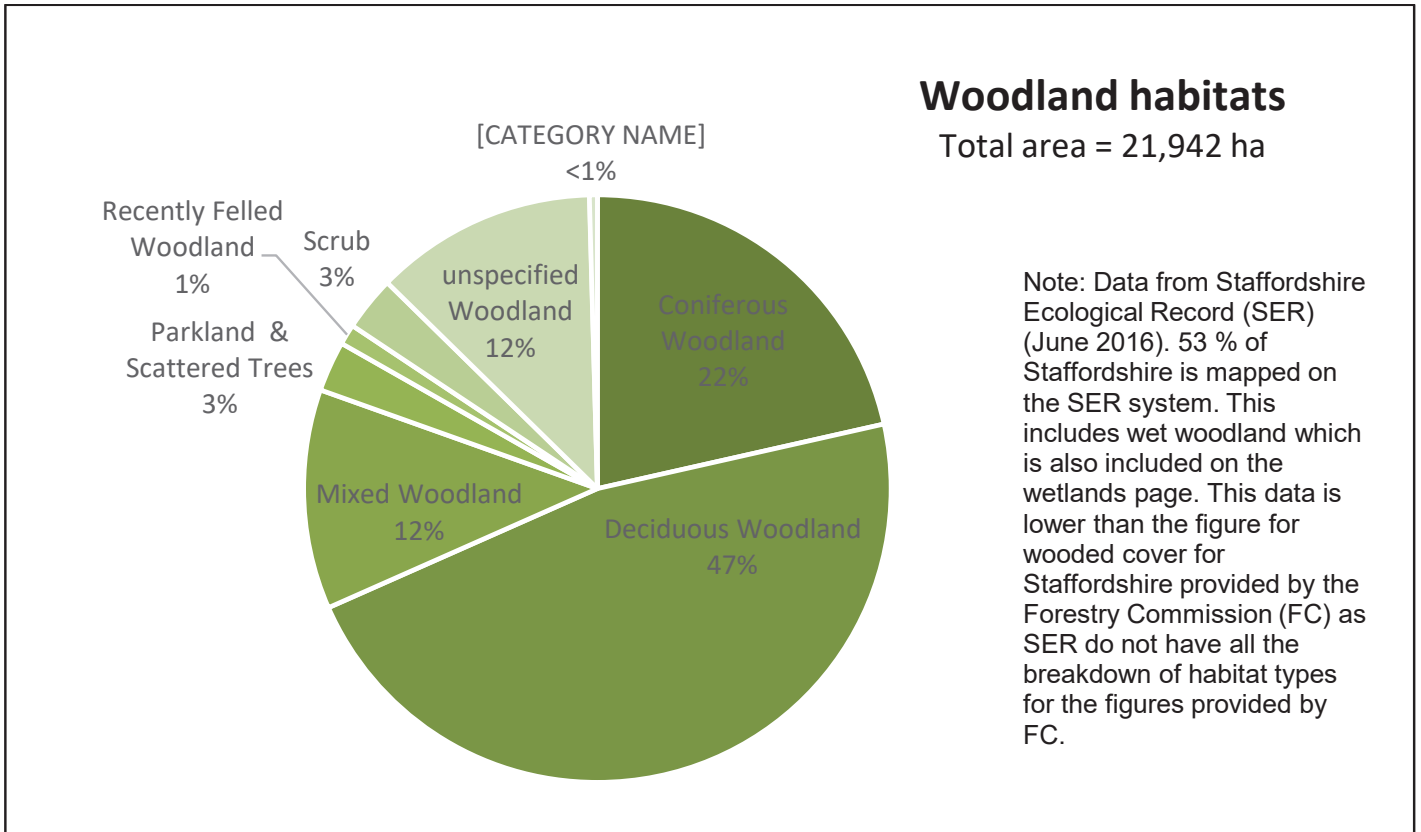


Figure 1. Percentage breakdown woodland habitat types recorded within Staffordshire.

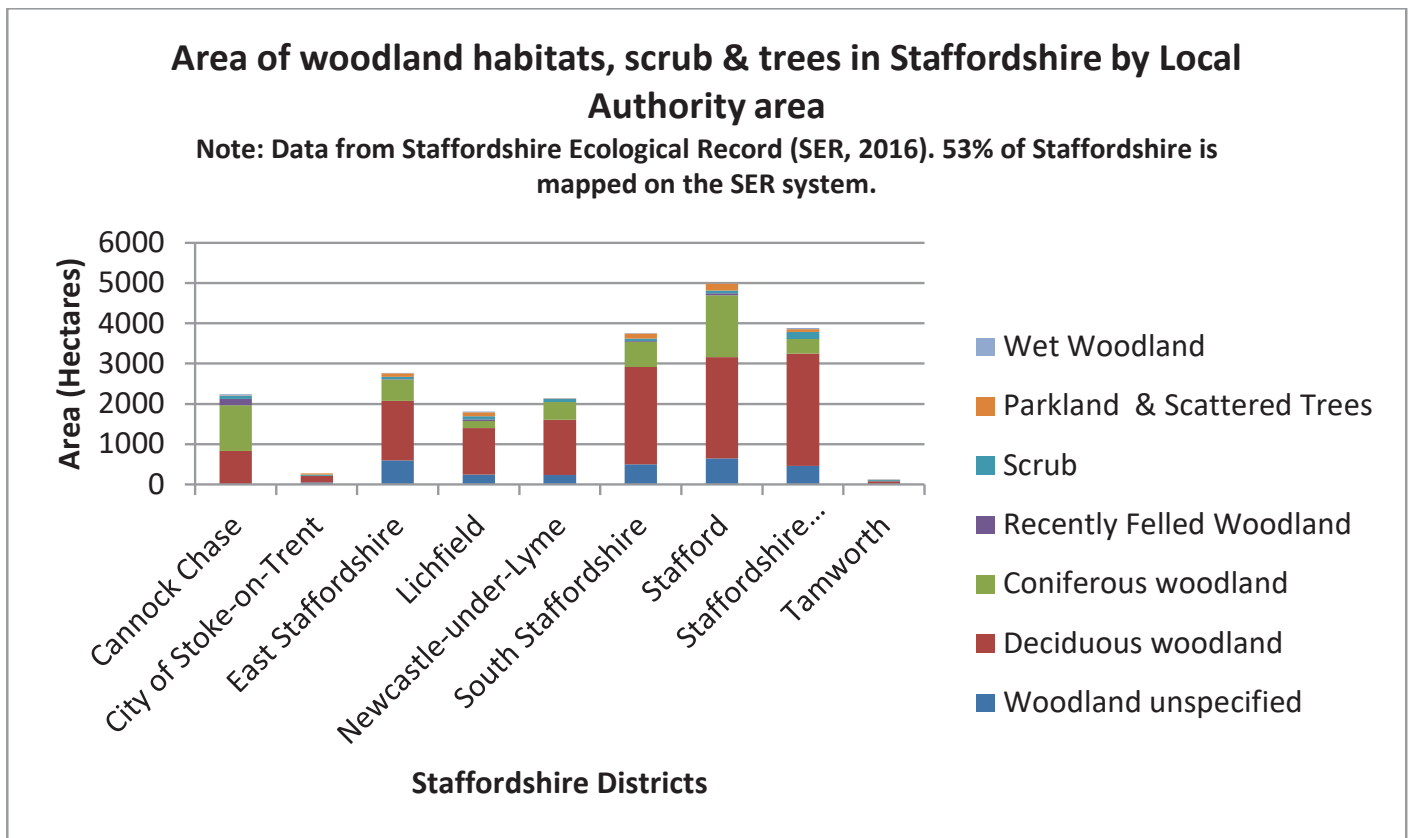


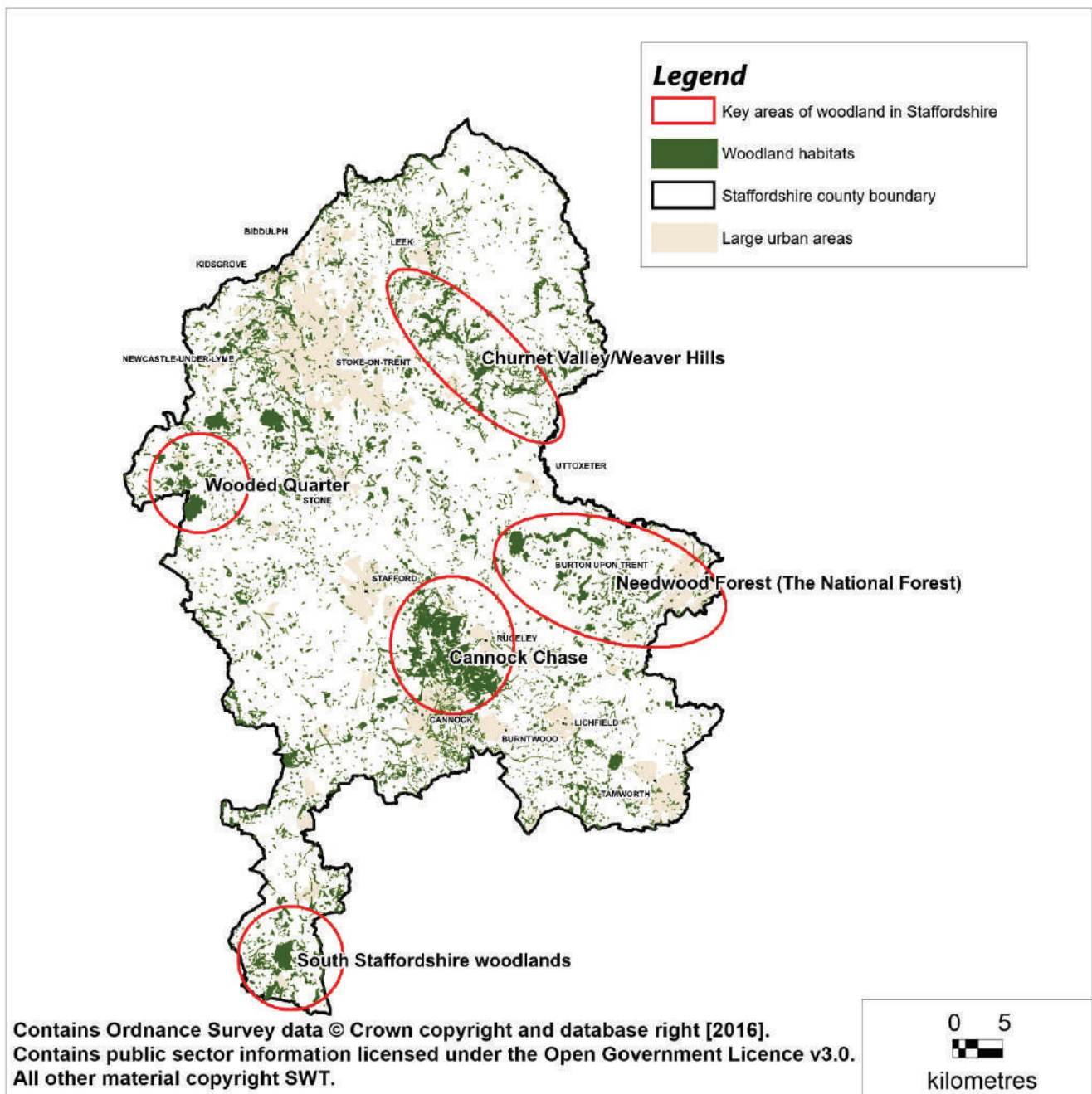
Figure 2. Area of woodland habitats in Staffordshire by Local Authority area

Staffordshire's woodlands are relatively widespread but represent only approximately 9% of the county, compared to 8.4% woodland cover in England at the turn of the 21st century (Forestry Commission, 2016). There is a great variation in woodland habitat types across the county and in some areas woodlands are relatively extensive, though often modified by planting. These woodlands are an integral part of Staffordshire's landscapes, and are important for a huge range of wildlife including a range of Priority Species. There are particular strongholds of declining woodland bird species, such as wood warbler and pied flycatcher, important invertebrate assemblages including the nationally important argent & sable moth, mammals including bats and woodland flora. Much of this wildlife is in decline as woodlands are often neglected and fragmented.

Staffordshire has over 6,000 ha of ancient woodland, of which just over 3,000 ha is plantation on ancient woodland site. Semi-natural woodland habitats of particular importance in Staffordshire include base-rich woodland, primarily dominated by ash, acidic woodlands primarily dominated by oak and/or birch, wet woodlands and steep-sided stream valleys (known locally as cloughs or drumbles). Large areas of coniferous and plantation woodlands are found in many areas of the county, particularly around Cannock Chase, Bagot Forest, Forest of Needwood, Bishop's Wood and Maer Hills (Hawksford *et al.*, 2011). These woodlands can also be of benefit for wildlife through the provision of wide woodland rides and rotational clearings. For example, young plantations in heathland areas initially attract nightjar.

Other important tree dominated habitats include orchards, wood pasture and parkland. Veteran trees, both within and near these habitats, provide a very important resource of dead or dying wood with sap runs, heartwood rot and fungi, utilised by specialist invertebrates (Webb, J. pers comm). These saproxylic invertebrates are often rare, with several species of national importance in the county. Available data is limited, but it is highly probable that veteran trees on these sites are also important for bat species.

The Churnet Valley in northeast Staffordshire contains the most extensive areas of ancient woodland. Other key areas include woodlands, parkland and wood pasture habitats of Needwood Forest/ Marchington woodlands, the ancient sessile oak woodlands of Cannock Chase, the wooded quarter in northwest Staffordshire and various smaller woodlands scattered throughout the county. The National Forest, which covers part of the Needwood Forest Area, has created large amounts of woodland while Forest of Mercia planting has contributed north of the West Midlands conurbation.



**Figure 3. Key woodland areas in Staffordshire.**

As indicated in Figure 2, the key areas of woodland habitats are summarised below:

- **Churnet Valley Woodlands:** the most extensive areas of woodland in the county are found in the Churnet Valley, where they are typically restricted to the steep slopes of the river valleys. The main woodland types in this area are ash woodlands on base-rich soils; sessile oak, pedunculate oak and silver birch woodlands on drier soils; alder woodland in valley bottoms and flushes; and conifer plantations. These areas have remained unsuitable for reversion to agriculture, though the extreme topography is also a hindrance to woodland management.
- **The Needwood Forest / Marchington Woodlands:** a number of ancient woodlands, parklands and other woodland habitats occur on the Needwood Plateau, and although substantial blocks remain, they are fragments of a once much larger wooded landscape. The area supports a range of semi-natural woodland types, some of the most important parkland and wood pasture habitats in the County, and also forestry plantations. Woodlands in this area are predominantly found on clay substrates and represent a range of woodland communities. A high proportion of woodland habitats in this area have been designated with SSSI or Local Wildlife Site status and support a range of rare flora and fauna. A portion of The National Forest covers part of Needwood Forest. The initiative aims to increase native woodland cover, assisted by grants and advice from the National Forest Company. The initiative started in 1990, and woodland cover had increased by approximately 12% by 2009 (Hawksford *et al.*, 2011).

- **Cannock Chase woodlands:** the ancient sessile oak and birch woodlands, which are important for a range of Priority woodland species, are found on the acidic free draining soils of Cannock Chase. Brocton Coppice, is of particular importance, with many ancient, veteran oak trees. Coniferous plantations are the predominant woodland type on Cannock Chase, and where the plantations are more open, and along rides, they can have an acidic understorey with heathland characteristics reflecting the previous habitat.
- **The Wilderness and Vermin Valley:** this 4.5 ha ancient woodland to the south of Staffordshire is a base-rich ash, field maple and pedunculate oak woodland with an understorey of hazel (Hawksford *et al.*, 2011).
- **Kinver Edge:** an acidic pedunculate oak and silver birch woodland in South Staffordshire, with an understorey of hazel and rowan (Hawksford *et al.*, 2011).
- **Wooded quarter:** in the north west of the county there are a number of ancient woodlands on acidic soils (Hawksford *et al.*, 2011). Many of these have been modified by planting with conifers and the majority of the remaining semi-natural woodlands are designated as SSSIs or Local Wildlife Sites. Hybrid Oak and birch dominate the canopy of the semi-natural woodlands. Woodlands in this area provide important habitats for invertebrates, notably the argent & sable moth, and also hold the only known natural population of hazel dormouse in the county. Key woodland sites in this area include Wrinehill Wood, Burnt Wood, Waltons Wood and The Gladings.
- In the **Peak District** woodland cloughs are found on steep slopes and around outcrops, and can be important for species such as tree pipit and redstart.
- **Wet woodlands:** there are a number of significant wet woodland sites within the county. In addition, many broadleaved woodlands have wet communities within them (Hawksford *et al.*, 2011). Sites that contain particularly important wet woodland habitat include Aqualate Mere, Chartley Moss, Loynton Moss, Jackson's Marsh and Cop Mere. Many former quarries have developed habitats that should succeed to wet woodland in time, for example, Branston Water Park has a complex of reedbed, scrub and wet woodland. Alder is frequent within wet woodland canopies, occasionally with ash, crack willow, grey willow, or downy birch. Several uncommon or rare botanical species in the county are found within wet woodland. Wet woodlands are also important for birds such as lesser spotted woodpecker, and invertebrates, for example the crane flies *Pedicia rivosa* and *Lisothrix errans* and the hoverfly *Xylota florum* add in their importance for invertebrates.
- **Drumbles** (also known in Staffordshire as Dingles, Pingles, Sprinks and Clough woodlands) are primarily found in the north of the county on steep-sided, often inaccessible, headwater stream valleys. They are usually shaded with watercourses and wetter woodland at the bottom of the slopes. They often have an exceptionally diverse flora and are important for a range of invertebrates, such as the log jammer hoverfly, northern yellow splinter crane fly and comb horn crane fly. Key bird species include wood warbler, pied flycatcher, and redstart.
- **Parkland and wood pasture:** a number of important sites with veteran trees are found in East Staffordshire (e.g. Byrkley Park, Brankley Pastures), South Staffordshire (e.g. Weston Park, Chillington Estate, Enville Estate, Himley Park) and Stafford Borough (e.g. Shugborough Estate, Brocton Coppice, Swynnerton Estate).
- **Traditional orchards** are primarily found in South Staffordshire and Stafford Borough, and are usually very small and isolated compared to those in nearby Herefordshire and Worcestershire. In Staffordshire they are usually found within gardens of older dwellings. Orchards are of importance as a repository of rare cultivated fruit species. These are often very localised, for example Tettenhall dick pear (*Pyrus domestica*) in Wolverhampton and South Staffordshire. Many Staffordshire orchards also feature damson trees. Little or no information is available about orchard dependent species, although older orchards are probably of importance for lichens and saproxylic invertebrates.

### 3.1.2 Habitat changes

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding. A comparison of Local Wildlife Sites (LWSs) was also undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016.

A summary of the results from these analyses as well as additional trends relating to woodlands and trees are presented in Table 2. The methods used for the 1km grid square and LWS analyses are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares known of deciduous woodland in Staffordshire	21,942 ha
Number of hectares analysed in 1 km grid square analysis	3387 ha
Hectares of deciduous woodland in 1978-83 in the 68 selected 1 km grid squares	608 ha
Hectares of deciduous woodland in 1995-2015 in the 68 selected 1 km grid squares	735 ha
% change in analysed 1 km grid squares	+20.91%
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>• 33.32 ha of lowland acid grassland had become deciduous woodland in the second survey</li> <li>• 19.64 ha of neutral grassland had become deciduous woodland in the second survey</li> <li>• 13.63 ha of poor quality grassland had become deciduous woodland in the second survey</li> <li>• 11.76 ha of lowland heathland had become deciduous woodland in the second survey</li> <li>• 40.8 ha of coniferous was woodland was deciduous woodland in the second survey</li> <li>• 84.48 ha of bracken and scrub were classed as deciduous woodland in the second survey</li> <li>• There were also some deciduous woodland from the first survey that became other habitats including 66.44 ha of coniferous woodland, 8.33 ha of neutral grassland, 7.50 ha of poor quality grassland and 18.48 ha of lowland heathland.</li> <li>• Parkland and scattered tree declined by 184.31 ha with 26.65 ha changing to deciduous woodland and 84 ha to poor quality grassland in the second survey</li> </ul>	
<b>Summary of habitat changes from the Local Wildlife Site analysis</b>	
<p>There are currently 7680 ha of woodland under a LWS designation in Staffordshire. 70.39 ha of woodland LWS was de-scheduled between the original baseline surveys and the modern resurveys. Lichfield, East Staffordshire and Stafford Borough all observed reductions in the area of woodland LWS and this was largely influenced by neglect and inappropriate management.</p>	
<b>Summary of key woodland species changes</b>	
<p>Many of the woodland bird species found in Staffordshire are showing national declines. Lesser-spotted woodpecker, willow tit, tree pipit and wood warbler have all shown strong long-term of declines of more than 50%, whilst redstart and pied flycatcher have shown moderate long-term declines of 25% to 50%. Willow tit is the UKs fastest declining resident bird. Meanwhile woodland butterflies declined 55% in England between 1990 and 2014 (Fox <i>et al.</i>, 2015).</p>	

### Summary of reasons for changes

The 1km grid square habitat change analysis shows an increase in the amount of deciduous woodland, which can possibly be attributed to succession of grassland and heathland sites. Some deciduous woodland was also lost, and the LWS analysis shows a reduction in the amount of woodland with LWS status, partly attributable to factors including:

- Loss of favourable condition of woodlands
- Neglect and lack of management
- Habitat fragmentation
- Invasive species

The decline in parkland and scattered trees cannot be relied upon to indicate habitat loss due to the way the sites have been mapped during the two surveys. These areas could have been traditional parkland habitats with good quality grassland, or it could have been scattered trees over poor quality grassland. Further investigation into the data would be required to determine whether the indicated parkland loss is an actual issue of concern.

**Table 2. Summary of changes relating to woodlands and trees.**

Parkland and scattered tree declined by 184.31 ha. The decline in parkland and scattered trees cannot be relied upon to indicate habitat loss due to the way the sites have been mapped during the two surveys. These areas could have been traditional parkland habitats with good quality grassland, or it could have been scattered trees over poor quality grassland. Further investigation into the data would be required to determine whether the indicated parkland loss is an actual issue of concern.

### 3.1.3 Habitat condition

Woodland cover has increased in recent decades, due in part to initiatives such as The National Forest and woodland planting through forestry grants. However, the condition of many existing broadleaved woodland habitats continues to be poor or declining. The neglect and lack of management of woodlands is a key driver with Favourable habitat condition not being met. Important components of woodland, such as dead wood habitats, veteran trees, ground flora communities and open glades and rides have declined. Few broadleaved woodland areas are managed for the production of wood products due to the poor economic viability of this management. The result is that woodland areas can fall into neglect. Many former ancient woodland sites are under coniferous plantations, though restoration has happened in some areas. Invasive species, particularly rhododendron, and plant diseases such as Phytophthora and Chalara, are a further threat to woodland condition.

The following factors are important for good habitat condition:

- Varied age structure of native broad-leaved trees, with a good proportion of current and candidate veteran trees to ensure continuity of deadwood habitat, both in terms of woodlands and in open or parkland habitats.
- A variety of both standing and fallen deadwood habitats left in situ.
- Woodland glades and rides to provide open habitats.
- Native ground flora and shrub layer with low cover of invasive species.
- Variation in woodland types, including scrub and wet woodland.
- Connectivity between woodland blocks to allow large areas of continuous habitat to facilitate species movement.
- Good biosecurity measures to control impacts of diseases such as Phytophthora.



## Condition of woodland SSSI units by habitat type

Using the habitat listed in the "Main Habitat" column of SSSI Unit data.

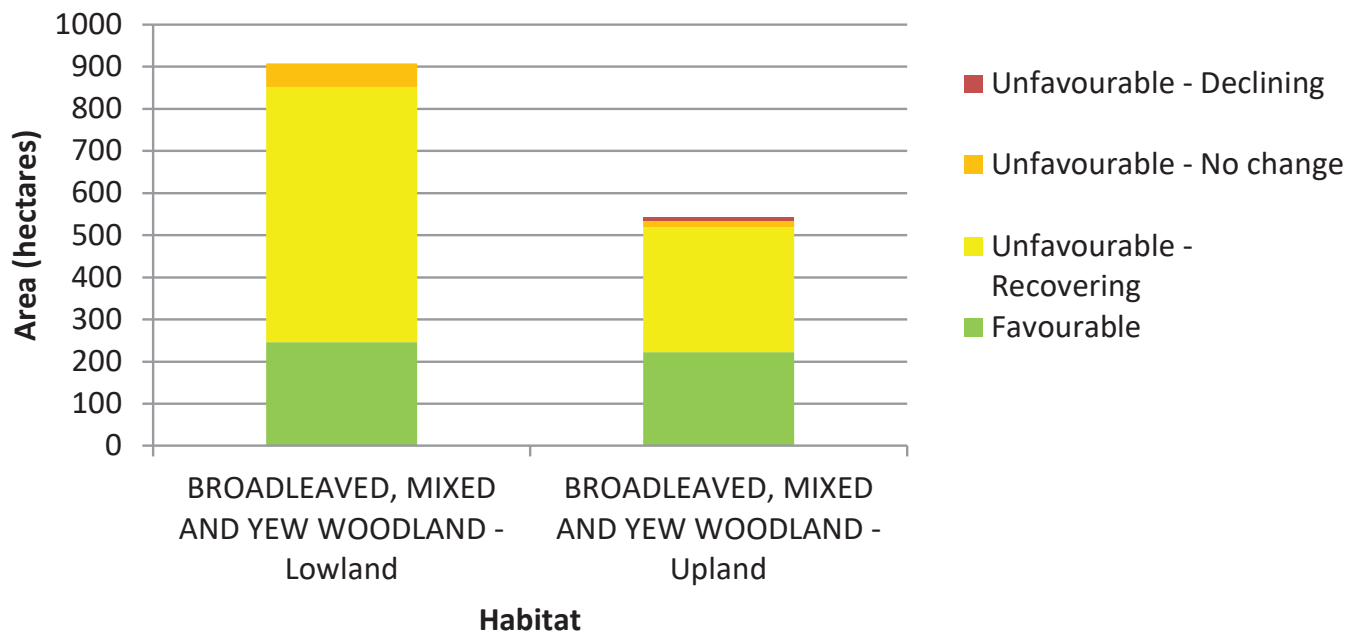


Figure 4. Condition of SSSI units in Staffordshire where the main habitat in the unit is woodland (data correct as of 4th December 2015; Natural England, 2015).

## 3.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1, 6, 10 – 14, 15, 18;** dominant species control (scrub and bracken); runoff (chemical runoff in the control invasive species); habitat fragmentation; resources; nitrogen deposition; neglect; inappropriate management; habitat loss (to development); invasive non-native species.

### Additional specific issues for woodland and trees

- Loss and fragmentation of woodland habitats.
- Lack of woodland management and neglect, leading to loss of habitat quality and availability of components such as deadwood, veteran trees and varied woodland physical and age structure.
- Lack of financial markets for sustainably produced local wood products.
- Plantation woodlands on ancient semi-natural woodland sites.
- Invasive species including rhododendron, Himalayan balsam and holly.
- Plant pathogens, such as Chalara threatening ash woodland, Phytophthora, acute oak decline, and red band needle blight.
- Resilience to climate change.
- Management of veteran trees.
- Access and difficult topography hindering management.
- High Speed Rail 2 is planned to cross Staffordshire. The land required for the construction of the Proposed Scheme may significantly affect 2 Ancient Woodlands Inventory Sites and a further 10 woodlands, not currently listed on the AWI, but that have the potential to be ancient woodlands based on a review of historical mapping. Ancient woodland is irreplaceable. This equates to the permanent loss of approximately 6.5 ha of irreplaceable ancient woodland (not including the potential additional 10 sites), approximately 114km of hedgerows and 158 ponds.
- Loss of traditional skills threatening orchard management and sustainability, e.g. grafting, which is needed to perpetuate rare cultivars.
- Over-tidying leading to loss of deadwood habitat.
- Nutrient enrichment from neighbouring agriculture / dog walking, causing nettles, bramble and grasses to outcompete woodland ground flora.
- Neglect of veteran trees outside parkland habitats.
- Pollution and nutrient enrichment of wet woodland habitat.

### 3.3 Conserving woodland and trees – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies:

<b>CASE STUDIES</b>
Case studies elsewhere in the report relevant to woodland and trees: <ul style="list-style-type: none"><li>• Brund Hill Plantation (moorland chapter)</li><li>• Burton-upon-Trent i-Tree Project (built environment chapter)</li><li>• Redhill Business Park (amphibian and reptile chapter)</li><li>• Woodland Wildflower Project, Forest of Mercia 2001 - 2005 (plant chapter)</li></ul>
Case Study 1 – 25 years of The National Forest (Authors and contributors: Sam Lattaway)
Case Study 2 – Staffordshire Woodfuel Project (Authors and contributors: James Cartwright, Ali Glaisher)
Case Study 3 – Woodland bird recovery in the Churnet Valley (Authors and contributors: Mike Shurmer)

In addition to the case studies above, there are more examples of positive work that is of benefit to woodlands and trees in Staffordshire. These include:

- Survey efforts in 2015 discovered willow tit at 50 locations in the Churnet Valley, many more than previously thought.
- 52% of woodland, equivalent to 13,333 ha, is in some form of active management.
- Veteran tree management, acorn harvesting and oak planting project in Brocton Coppice by Staffordshire County Council.
- Native black poplar propagation by Staffordshire County Council.

### 3.4 Conserving woodland and trees – recommendations

#### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M2; M3; M9 - M13; M16; DM1 - DM5:** Improve the following: increase habitat size & connectivity; manage for structural habitat diversity; increase resources; more integrated planning & management across ownership boundaries; integrated use of volunteer groups; use of by-products from management; sustainable management; survey and monitoring; manage woodlands for age & diversity; agri-environment schemes; habitat creation through the planning system, grants; guidelines for planners; large-scale habitat creation.

#### Additional specific recommendations for woodland

- Improve woodland habitats through improving woodland structure, restoring ancient semi-natural woodland sites and managing invasive species.
- Support landscape-scale woodland restoration and creation, such as in the Churnet Valley and The National Forest.
- Improve infrastructure and develop markets for sustainably produced wood products, to support management.
- Develop and expand the Staffordshire County Council wood fuel project to provide sustainable woodland management.
- Manage and retain scrub and wet woodland along canal networks, river corridors and disused railway lines as well as deadwood features and wet woodland.
- Increase woodland management where appropriate, including woodland glade creation, ride management and rotational coppicing and felling where appropriate. Considering the requirements of different species in the planning of this work, e.g. mobility of key invertebrates requiring early successional habitats when planning rides and clearings etc.
- Promote ideal ride and glade management of woodlands for invertebrates to provide a mosaic of different ages of vegetation.
- Promote the introduction of locally sourced woodland ground flora on woodland planting sites where the woodland seed bank is unlikely to remain.
- Monitor Priority Species including woodland birds, saproxylic invertebrate assemblages and argent & sable.
- Monitor and mitigate against plant health issues, with good biosecurity practices.
- Record and map veteran trees outside of parkland sites.
- Explore potential for the Payment for Ecosystem Services schemes to support future woodland creation and management.
- Continue efforts through the Churnet Valley Living landscape partnership to support the sustainable management of woodlands.
- Continue the work of the National Forest Company.
- Look for opportunities to link woodland habitats, particularly around the Loggerheads area to benefit argent & sable and hazel dormouse, through woodland and/or hedgerow planting in appropriate locations.

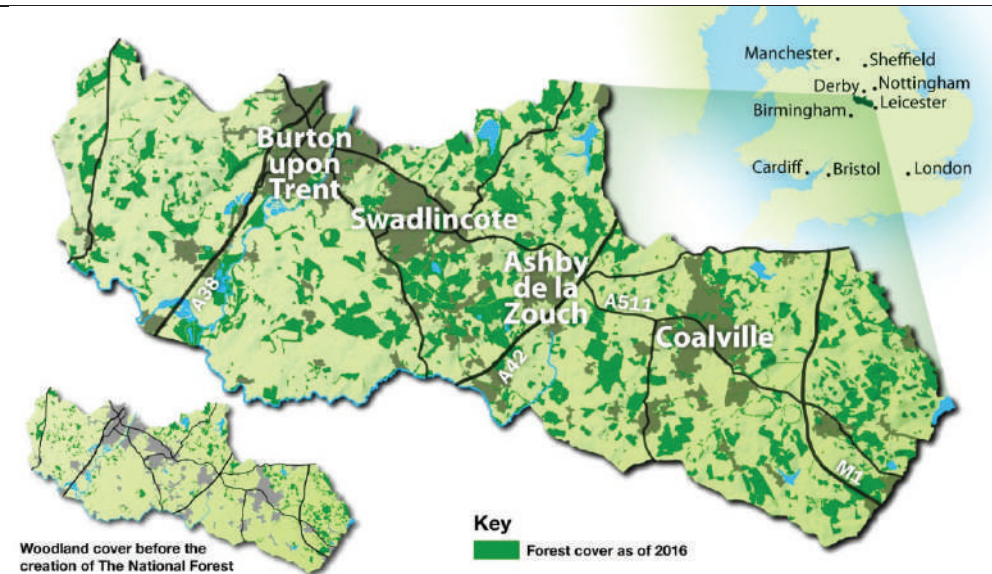
## State of Staffordshire's Nature Report - Case Study Number 1

### 25 years of The National Forest

#### Habitats & species:

**Habitats:** Woodland, wood pasture/parkland, grassland, heathland and open water.

**Species:** A wide range of flora and fauna.



#### Key messages

- 8.5 million trees planted
- Forest cover taken from 6% to over 20%
- 7,169 ha of new habitats created, of which 2,200 ha are non-wooded priority habitats.
- 60% of woodlands in management
- Inward investment of over £1 billion
- A local tourism economy worth £373 million per year with 7.8 million visitors.

#### Overview

In the late 1980s, the concept of creating a new forest for the nation was conceived. An area of 200 square miles covering parts of Derbyshire, Leicestershire and Staffordshire was chosen as the location for The National Forest, due to its history of industrial decline and the opportunities that this represented for environmental, economic and social regeneration. Starting from a relatively low woodland cover of 6%, the first trees being planted in 1991. In 1995, the National Forest Company was established to lead the creation of the Forest through a combination of partnership development, grants to landowners and community liaison.

#### Contact

Sam Lattaway  
National Forest Company  
Email: [slattaway@nationalforest.org](mailto:slattaway@nationalforest.org)

#### Partners

The creation of the Forest is led by the National Forest Company, which works with a wide range of partners.

#### Funding

The creation of the Forest has been largely funded from public funds via a Defra grant-in-aid, with additional income from grant giving bodies, corporate support, major donors and individual contributions.

## Objectives

- Deliver landscape-scale woodland-led habitat creation and management.
- Engage local people in the transformation of their local environment.
- Support the development of a sustainable woodland management economy.
- Create a Forest economy supporting local business and tourism.

## Approach

Led by a small, multi-disciplinary team, the National Forest Company has utilised large- and small-scale Forest creation grants to enable a range of landowners to create habitats on their property. The NFC has also worked with partner organisations to purchase sites such as Croxall Lakes. In addition, the planning system has been an important source of Forest creation through the restoration of derelict industrial land and the creation of green infrastructure alongside new developments.

Small grants are available to local organisations to support biodiversity activities such as habitat restoration and management. More recently a programme of woodland management advice and grants has been established.

Forest creation has been complemented by extensive programmes of community engagement, environmental education and economic development.

## Outcomes

In the past 25 years, 8.5 million trees have been planted as part of over 7,000 ha of new habitats, creating a truly landscape-scale showcase for environmental restoration and conservation. Forest cover has risen from 6% to over 20%. Of the new habitats created, 2,200 ha have been non-woodland BAP Priority Habitats. Over 60% of all woodlands in the Forest are now in active management.

More than 300,000 people have taken part in Forest-related activities and 550,000 children have benefitted from environmental education sessions. The local tourism economy has flourished, now employing nearly 5,000 people and bringing in £373 million per year.

## Future work

2016 is the 25<sup>th</sup> anniversary of The National Forest and, alongside celebrating what has been achieved; thoughts are turning to the next 25 years and legacy of the Forest. We want to continue growing the Forest with new woodlands and other habitats. We want to target creation that will have the greatest impact, by bridging gaps in ecological networks and bringing the Forest close to where people live. We want the original ambition of creating a new forest to translate into new and innovative approaches to landscape-scale conservation on a local, national and international stage.

We also want to embed a 'Forest culture' within local communities where they feel part of the Forest and the Forest is part of their everyday lives. We want to continue the Forest's development as a tourism destination and establish a sustainable Forest economy that will support the future management of all the places, programmes and projects that make the Forest.



**Photo:** The National Forest, Ross Hoddinott 2020Vision

**Staffordshire Wood Fuel Project**

**Habitats & species:**

**Habitats:** Woodland, heathland.



**Photos:** Tree felling for heathland restoration provides wood that can be baled (right) and used in the wood fuel market, James Cartwright (left); Sue Sheppard (right)

**Key messages**

- Wood fuel as an energy source has increased greatly since 2010 when Staffordshire County Council commenced supporting the development of this market.
- This means that small woodlands can be managed successfully as mixed species, and timber size loads can be effectively utilised for wood chip.
- High quality fuels to sustain local markets is key; haulage is one of the largest costs to this local fuel.

**Overview**

Wood Fuel Trading & Consulting was set up by Staffordshire County Council (SCC) to provide a sustainable source of high quality wood fuels and advice to both private and public sector organisations within Staffordshire and its surrounding counties. The project is a key part of SCCs drive to reduce costs, increase efficiency and reduce carbon emissions across the county. The project was set up to kick-start the market for biomass in Staffordshire.

For SCC there is now a real value to biomass that can be generated on our Countryside land. This saves money for the residents of Staffordshire as well as having a significant impact on lowering our CO<sub>2</sub> generation.

**Contact**

James Cartwright  
Staffordshire County Council  
Email: [james.cartwright@staffordshire.gov.uk](mailto:james.cartwright@staffordshire.gov.uk)

**Partners**

The project followed on from the Rethink Energy European funded project that included Staffordshire Wildlife Trust

**Funding**

Staffordshire County Council funded project start-up. The project now generates a profit.

## Objectives

- To maintain a sustainable wood fuel supply chain in Staffordshire.
- To encourage/advise on the use of biomass as a fuel across the local area.
- To install wood fuel boilers in SCC buildings and ensure secure supply of consistently high quality wood fuel.
- To support the development of a sustainable woodland management economy.
- To be financially cost-neutral.

## Approach

SCC started the trading unit in 2010 when there was only one other wood fuel supply company in the region for the development of the biomass boiler market. With SCC also installing biomass boilers in its property portfolio as part of the biomass project, this gave a real stability to the development of this sustainable market in the locality. A project officer is employed by SCC to manage the project. High quality, dependable and affordable fuel is the key to running a successful biomass installation. The project uses sustainable, locally sourced timber from the SCC estate and from private woodland owners including from heathland restoration and woodland management on Country Parks, such as Cannock Chase, saving money and turning waste into a resource that generates income.

## Outcomes

SCC produce biomass wood chip which is cost effective and therefore can provide income for small-scale woodland management. The project has also found a use for tree brash that normally needs to be burnt on site or disposed of at a cost. Brash bales from tree felling for heathland restoration on Cannock Chase went to the Shotton Combined Heat and Power Plant in winter 2010-11, offsetting heathland restoration costs. Additional outcomes include:

1. The saving of 843 tonnes of CO<sub>2</sub> per annum.
2. The saving of 310,000 litres of heating oil per annum.
3. The energy cost saving to properties of £30,000 per annum.
4. The income generation of £60,000 per annum.
5. Providing school pupils an opportunity to learn about renewable energy on their own campus.
6. Supporting Cannock Chase heathland restoration and Country Park woodland management.

## Future work

The project will continue to manage the supply of biomass from SCC land for at least 20 years. The project officer also has the role of supporting other Councils and landowners in the development of similar initiatives. The project officer works with the forestry sector in the development of technology to further develop the market for the use of woodland management arisings including the development of cost-effective timber and brash extraction and haulage techniques.



**Photos:** Timber is processed to produce high quality wood fuel, James Cartwright (left & right)



Woodland bird recovery in the Churnet Valley

**Habitats & species:**

**Habitats:** Woodland.

**Species:** Birds: lesser-spotted woodpecker, pied flycatcher, willow tit, wood warbler; Invertebrates: argent & sable (moth), logjammer hoverfly.



**Photo:** Oak and ash woodland of the Coombes Valley SSSI in the Churnet Valley, RSPB images

**Key messages**

- Advice given to 54 woodland owners, covering 1083 hectares, with 513 hectares of woodland brought in active management
- Willow tits found at 50 new locations across area.
- Financial return from woodland management of a minimum £31,000.

**Overview**

The Churnet Valley contains a network of 2,000 hectares of woodland, typically found on steep-sided valleys. Priority bird species include lesser-spotted woodpecker, pied flycatcher, willow tit and wood warbler, along with the rare argent & sable moth and the logjammer hoverfly. Much of this woodland had fallen out of active management, leading to a deterioration in habitat condition. The challenging topography and small management units mean that viable and sustainable management is difficult.

A sustainable woodland project was launched in 2012, as part of the Churnet Valley Living Landscape Partnership. The project aimed to work with woodland owners to bring woodlands back into active management and support the development of a viable and sustainable woodland economy. The funding for the project ended in 2016.

**Contact**

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**Partners**

The project was managed by the RSPB, and formed part of the Churnet Valley Living Landscape Partnership, led by the Staffordshire Wildlife Trust.

**Funding**

The project was funded by Heritage Lottery Fund, as part of the Churnet Valley Living Landscape Partnership Landscape Partnership Scheme. Additional funding was provided by Natural England's Innovation Fund.

## Objectives

- Engage with woodland owners across the Churnet Valley.
- Bring 400 hectares of woodland into active management.
- Support the development of a sustainable woodland management economy.

## Approach

A project officer was employed by the RSPB from November 2012 to March 2016. They provided targeted woodland management advice, assisted with grant applications, identified sites for woodland planting and ran a series of woodland demonstration events. Related work included carrying out surveys of priority woodland species, to better understand their distribution and improving targeting of management.

## Outcomes

Advice was given to 54 woodland owners, covering 1038 hectares, with 513 hectares of woodland brought in active management. Management typically involved thinning, coppicing, clearance of rhododendron and holly and creation of woodland glades and rides. Survey work revealed willow tits at 50 locations across area, increasing our knowledge of its distribution and resulting in habitat interventions. The financial benefit of this management work was estimated to be a minimum of £31,000. Feasibility work on developing a landscape-scale woodland business plan for the Churnet Valley was initiated.

## Future work

Though funding for the project has ended, further work to continue the legacy of the project is planned. Dependant on external fundraising, this includes consolidating advisory work on priority sites, improving scrub and wet woodland habitats for willow tit and developing a landscape-scale business plan and costed forestry models for priority sites.



**Photo:** Willow tit, Harry Hog

## 4. Grassland

Authors: David Cadman (Staffordshire Wildlife Trust), with contributions from Sue Lawley (Independent expert) and Ali Glaisher (Staffordshire County Council)

### Grassland headlines

#### Overview of habitat

Staffordshire is host to a varied array of species-rich grassland habitats that exhibit different species depending on the underlying soil and rock types, residual moisture and management regimes. These include limestone or calcareous, acidic, neutral and, associated with the county's network of watercourses, wet grassland. These grasslands are not only important for floral species of increasing rarity, but also for the vast range of invertebrates, including important pollinators, which they support.

#### Key species

Flora: early-purple orchid, frog orchid and lesser butterfly-orchid, dyer's greenweed, snake's-head fritillary, mountain pansy, grass-of-Parnassus and autumn gentian.

Invertebrates: brown-banded carder bee, red-shanked bumblebee, Roesel's bush cricket, dark green fritillary, meadow brown, gatekeeper, small heath and dingy skipper.

Birds: Skylark, lapwing, snipe, meadow pipit, curlew.

#### Headlines

- There are more than 47,000 hectares (ha) of grassland habitat in Staffordshire (SER, 2016), of which 1,010 ha is designated with Site of Special Scientific Interest (SSSI) status (Natural England, 2015).
- 40% of SSSI grasslands are in Favourable condition and 54% are in Unfavourable Recovering condition.
- 206 ha of wildflower-rich grassland were lost from Local Wildlife Sites (LWS) between 1979 & 2000 (Cadman, 2002).

#### Key threats

- Grassland lost to urban fringe development and large infrastructure projects.
- Continued loss of grassland biodiversity due to issues such as neglect, intensive agriculture, and inappropriate management e.g. overgrazing.
- Species extinctions due to small and isolated sites.
- Decreasing availability of agri-environment schemes promoting sustainable environmental management practices due to increasingly limited funds.

#### Successes

- Since 2006, there has been a series of partnership initiatives with grassland as a core focus, such as the Cauldon Quarries grassland networks project, Coronation Meadows and National Meadows Day.

#### Recommendations

- Increase awareness and understanding of issues surrounding grassland losses, e.g. the importance of species-rich grassland for pollinator support.
- Expand and improve species-rich grassland connectivity by creating ecological networks.
- Promote biodiversity offsetting and grassland creation and restoration, especially in core locations such as the Churnet Valley and working with the quarry industry where there is scope for large-scale creation projects.
- Encourage farmers to take up and maintain grant schemes such as Countryside Stewardship.

## 4.1 State of grassland in Staffordshire

### 4.1.1 Overview

Grassland figures	Amount (ha)
<b>Current known coverage of habitat in Staffordshire</b>	<b>47,209.9 (SER*)</b>
Calcareous Grassland	266.02
Lowland Acid Grassland**	559.04
Neutral Grassland	5377.28
Poor Quality Grassland	40206.11
Unspecified Grassland	542.71
Upland Acid Grassland***	258.68
*a total of 53% of the county is mapped on the SER system	
** Lowland acid grassland is also included in the lowland heathland chapter	
*** Upland acid grassland is also included in the Moorland chapter	
<b>Total known habitat with statutory designation</b>	<b>1,304.58</b>
Total known habitat with Ramsar designation	103.14
Total known habitat with SAC designation	339.35
Total known habitat with SPA designation	187.81
Total known habitat with SSSI designation	1,010
Total known habitat with NNR designation	227.23
Total known habitat with LNR designation	294.58
<b>Total known habitat with non-statutory designation</b>	<b>4,327.08</b>
Total known habitat with LWS designation	4,241.90
Total known habitat with LoGS designation	85.18

**Table 1. Coverage of grassland habitats and designated grassland sites in Staffordshire.**

#### Grassland species:

Flora: frog orchid and lesser butterfly-orchid, especially in the Churnet Valley and the White Peak; snake's-head fritillary at Broad Meadow and Motte Meadows, the only two native sites in the county; mountain pansy at Thorswood, Baldstones; grass-of-Parnassus and autumn gentian in the White Peak and dyer's greenweed in the north of the county.

Invertebrates: a range of bumblebee, solitary bee and wasp species such as the brown-banded carder bee, red-shanked bumblebee and the mining bee *Andrena nigriceps*, Roesel's bush cricket and butterflies such as dark green fritillary, meadow brown, large skipper, ringlet, small heath, marbled white. Invertebrates that prefer short grassland swards include dingy skipper, gatekeeper and a range of bee and wasp assemblages.

Birds: Skylark, lapwing, snipe, meadow pipit, curlew.

Mammals: Brown hare, common shrew, pygmy shrew, mole, field vole, rabbit.

#### Grassland habitats:

Priority grassland habitats listed on the Staffordshire BAP include lowland acid grassland, lowland calcareous grassland, lowland wet grassland and unimproved neutral grassland.

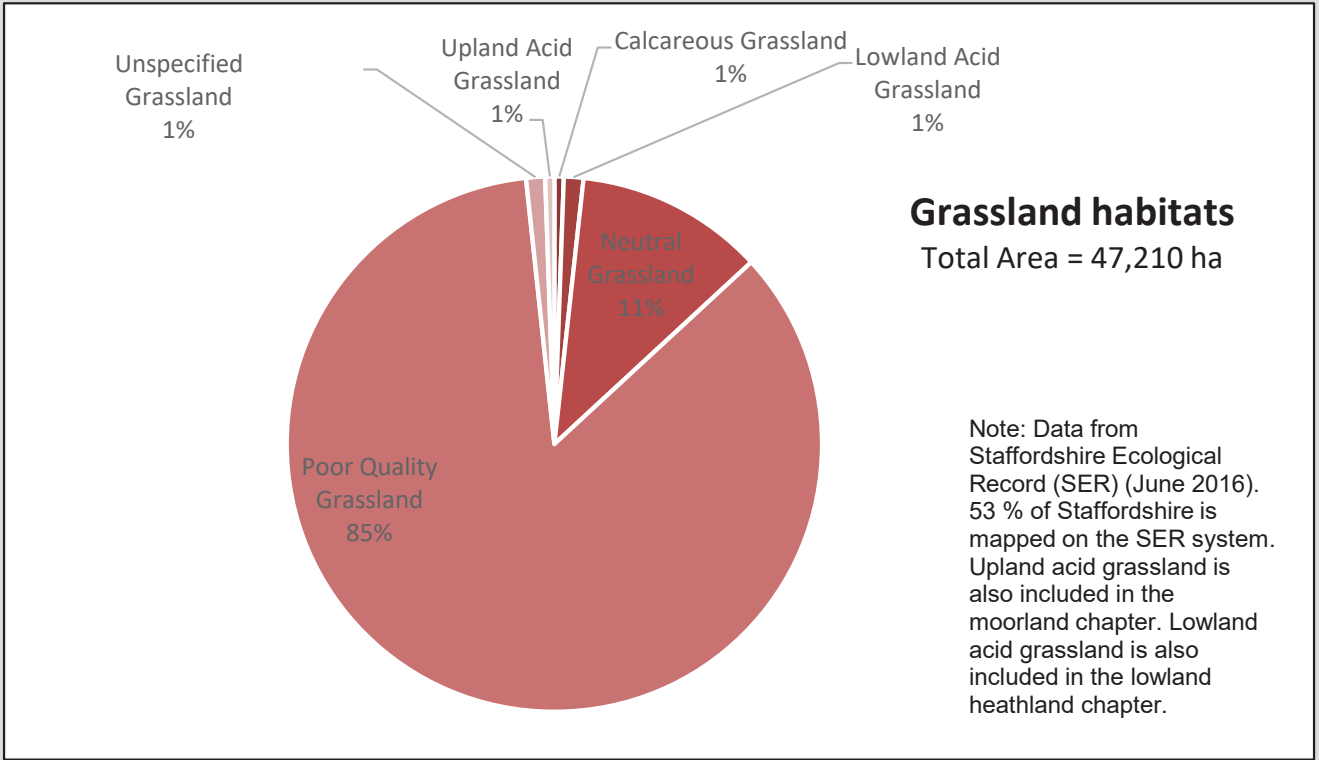


Figure 1. Percentage breakdown of grassland habitat types recorded in Staffordshire.

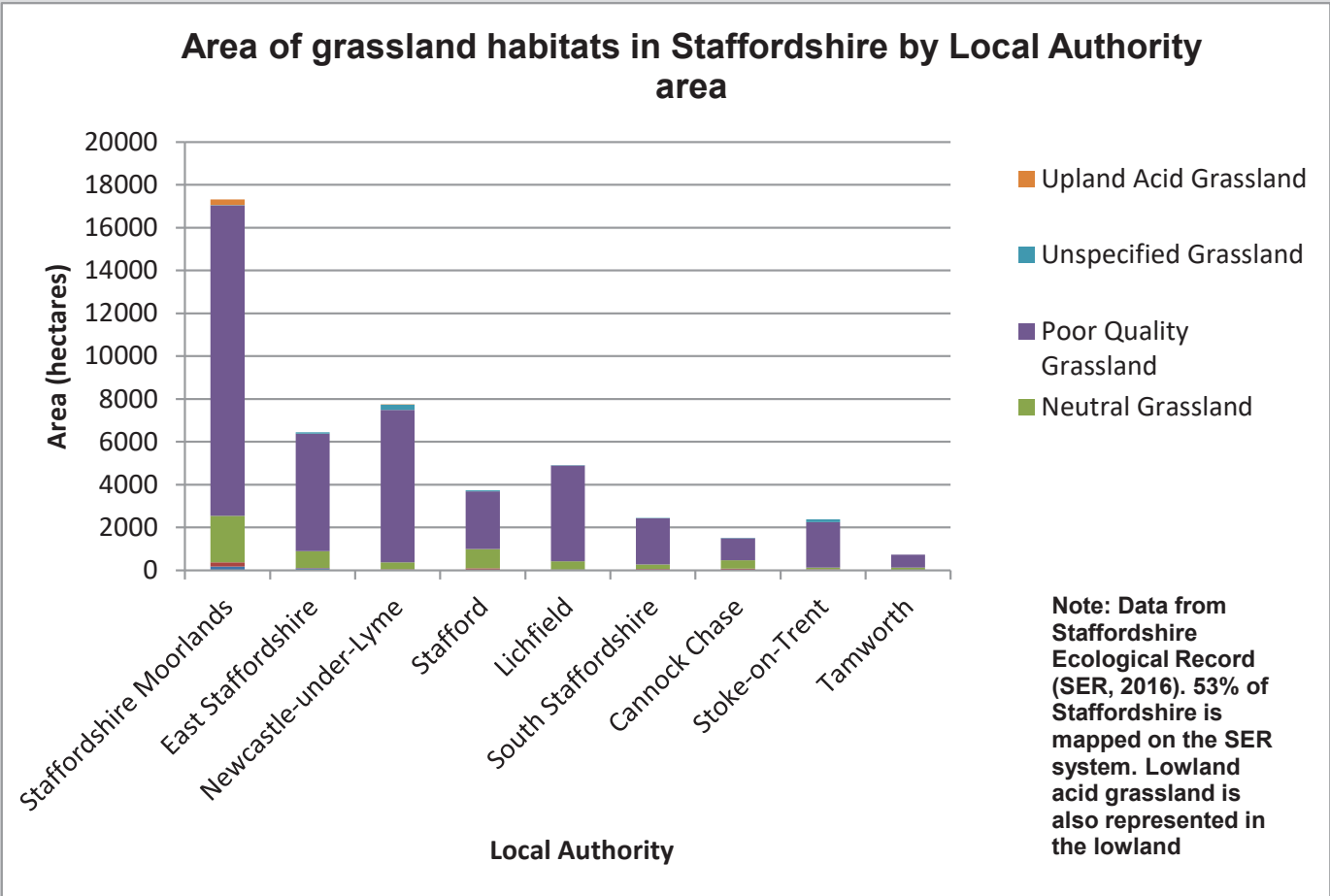


Figure 2. Area of grassland habitats in Staffordshire by Local Authority area.

Species-rich grasslands, in particular, are an integral part of the semi-natural landscape and are of major importance for biodiversity in agricultural landscapes, as they provide a range of habitats to support a range of high biological diversity including invertebrates, birds, mammals and fungi (Klimek *et al.*, 2007; Mykkestad and Sætersdal, 2004). Traditionally managed hay meadows, for example, are among the habitats with the highest amount of botanical species richness, and will support native species including habitat specialists and regionally rare species (Mykkestad and Sætersdal, 2004).

The general distribution of grasslands of nature conservation importance in Staffordshire (Figure 3) is dictated by a series of factors including underlying geology, residual moisture, topography and predominant management regime. Much of the southern region of the county is composed of arable farm holdings and throughout this area grassland sites are scattered in low density with a lack of ecological connectivity. Competing land uses are a substantial barrier to further expansion. The most significant concentrations of acidic grassland are focused in the south of the county around the Cannock Chase area, associated with heathland habitats, while the Kinver area supports some rare acidic grassland assemblages (Rodwell, 1992).

As ever there are exceptions to the rule; Mottey Meadows National Nature Reserve (NNR), covering an area of approximately 44 ha, is the county's largest and most important lowland grassland site. Mottey Meadows has a long history of appropriate conservation management but issues such as agricultural diffuse pollution affecting water quality continue to threaten the site's ecological status. Other lowland meadow sites of note include the Chillington Estate in South Staffordshire, and located west of Stafford; Seighford Moor, Allimore Green Common Site of Special Scientific Interest (SSSI) and Derrington Millennium Green, which is a great example of a meadow created by green hay-strewing.

Wet grassland is widespread throughout the county, but it is fragmented and declining. Some sites are situated in the floodplains of the river network, such as Rawbones Meadow and Doxey Marshes in Stafford.

The northern and north-western areas of Staffordshire are largely dominated by dairy and livestock farms. Existing good quality grassland in the north-western area of the county, specifically the Newcastle-under-Lyme area, is generally restricted to publicly-owned sites, restoration sites from the mining and quarrying industry and marginal areas of landholdings.

In the north-eastern area of Staffordshire, in the Churnet Valley/Weaver Hills and White Peak areas, the challenging topography renders significant tracts of land as unsuitable for agricultural intensification. In combination with the area's varied geology, these factors have produced the diverse complex of grassland habitat types, which are of national importance. This is reflected by the number of SSSI and Local Wildlife Sites (LWS) in the area, which are designated for their grassland interest. Within this area, the county's resource of limestone, or calcareous, grassland supports rare plant species such as early-purple orchid, frog orchid and grass-of-Parnassus. Limestone in the area is extensively quarried, resulting in a loss of grassland habitat. However, opportunities for large-scale grassland creation and enhancement have followed via the planning process, and so far over 10 ha have been created with more work planned over the next 5-10 years.

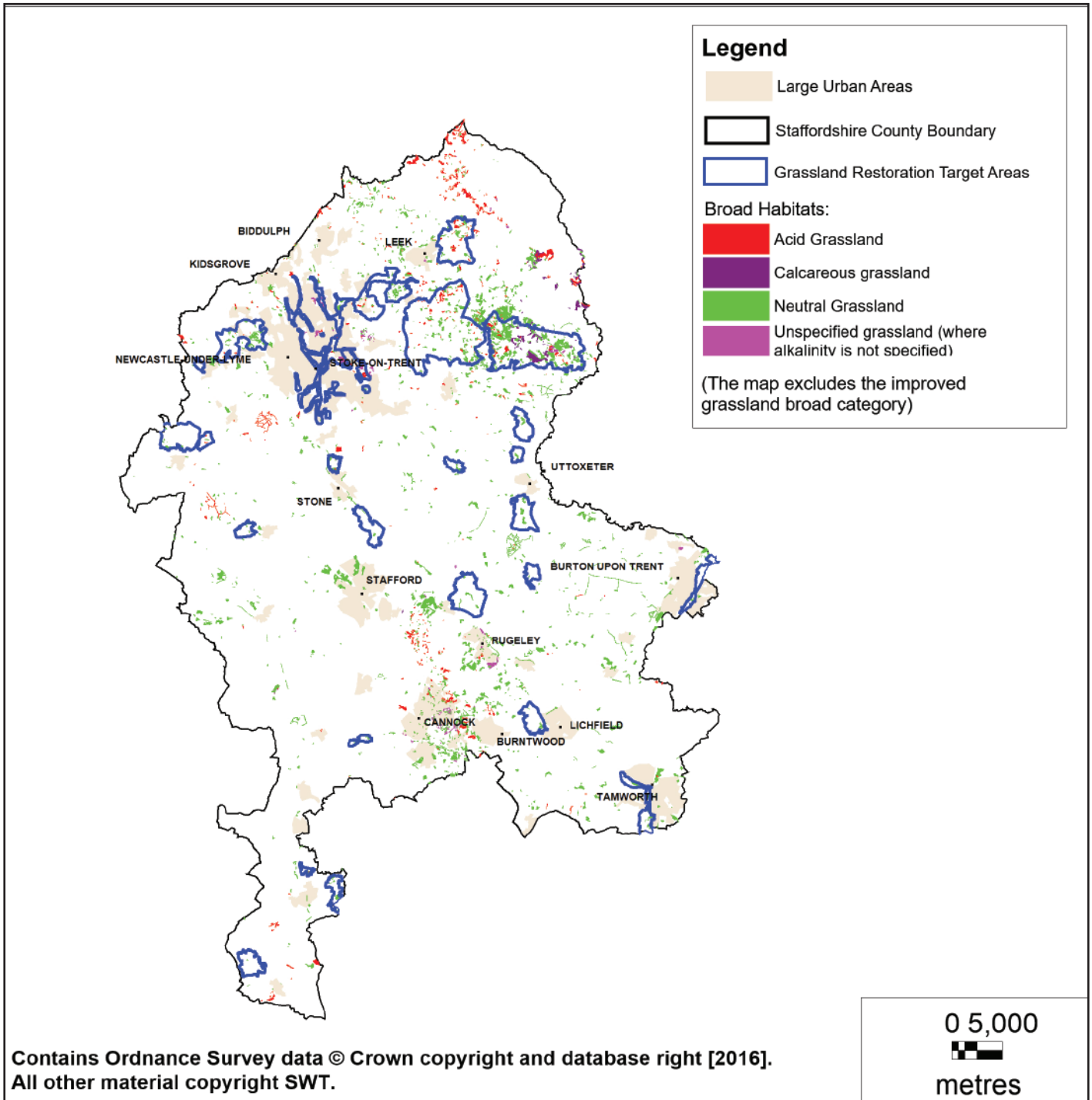


Figure 3. Key semi-natural and unimproved grassland areas in Staffordshire

#### 4.1.2 Habitat changes

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding. A comparison of Local Wildlife Sites (LWSs) was also undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016. A summary of the results from these analyses as well as additional trends relating to grassland habitats are presented in Table 2. The methods used for the 1km grid square and LWS analyses are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares (Ha) of known grassland in Staffordshire	47,210 ha
Number of hectares analysed in 1 km grid square analysis	3387 ha
Hectares of grassland in 1978-1983 in the 68 selected 1 km grid squares (including lowland acid grassland, upland acid grassland, neutral grassland and calcareous grassland)	456 ha
Hectares of grassland in 1995-2015 in the 68 selected 1 km grid squares (including lowland acid grassland, upland acid grassland, neutral grassland and calcareous grassland)	307 ha
Change in lowland acid grassland in analysed 1 km grid squares	-186 ha
Change in upland acid grassland in analysed 1 km grid squares	-15 ha
Change in neutral grassland in analysed 1 km grid squares	+33 ha
Change in calcareous grassland in analysed 1 km grid squares	+20 ha
Change in poor quality grassland in analysed 1 km grid squares	+133 ha
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>• 102.48 ha lowland acid grassland changed to lowland heathland</li> <li>• 9.87 ha upland acid grassland changed to upland heathland</li> <li>• 21.18 ha poor quality grassland and 16.65 ha upland heathland changed to neutral grassland</li> <li>• 30.31 ha tall herb changed to calcareous grassland</li> <li>• 84 ha of parkland and scattered trees changed to poor quality grassland</li> </ul>	
<b>Summary of habitat changes from the Local Wildlife Site analysis</b>	
<ul style="list-style-type: none"> <li>• 206 ha of wildflower-rich grassland were lost from Local wildlife Sites between 1979 and 2000 (Cadman, 2002)</li> <li>• There are currently 4215 ha of grassland under a Local Wildlife Site (LWS) designation in Staffordshire. Approximately 60 ha of grassland habitat under a LWS designation was either lost or de-scheduled between the original 1996-2000 baseline surveys and the modern resurveys of these sites. A large area of grassland was lost in East Staffordshire due to development, with further reductions in the area of grassland LWS in Lichfield, Stafford Borough and South Staffordshire.</li> </ul>	
<b>Summary of key grassland species changes</b>	
<ul style="list-style-type: none"> <li>• Decline of species-rich, semi-natural grassland habitat has a corresponding decrease in species diversity and of their characteristic species.</li> <li>• Neutral grassland species, such as bulbous buttercup, dyer's greenweed and devil's-bit scabious have gradually decreased due to loss of suitable habitats as a result of urban development and agricultural intensification.</li> <li>• Calcareous grassland species, such as mountain pansy, cowslip and meadow saxifrage have declined due to agricultural intensification and neglect. Grass-of-Parnassus has declined due to changes in grazing practices and the extension of quarrying activities.</li> </ul>	



- Acid grassland species, such as tormentil, harebell, mat-grass and heath-grass have been lost due to agricultural improvement.
- Wet grassland species, such as marsh-marigold, meadow thistle, bog stitchwort, ragged-robin and great burnet have gradually decreased due to loss of suitable habitat, mainly as a result of drainage.
- Decline of breeding waders such as lapwing that require wet grassland.
- Yellow-rattle has been lost at some sites due to agricultural improvement, however there have been a few gains as a result of grassland restoration and creation work in the county.
- All specific species accounts have been taken from Hawksford *et al.*, (2011).

### Summary of reasons for changes

- Declines and losses of existing species-rich grassland sites and species continue throughout the county where good quality grassland is being lost to poor quality grassland mainly due to the lack of appropriate management and agricultural intensification. Highways Authority budget constraints have adversely affected grassland verge management. The increase in barn conversions has, in some locations, led to an increase in horsiculture and overgrazing of good quality grassland sites.
- Loss of wet grassland habitat and species has mainly been due to the drainage of land.
- A notable trend has been the increase in rural residential development over the preceding decades due to pressures on the agricultural economy.
- Habitat change from acid grassland to heathland seems to be the cause for habitat loss of acid grassland this could be due to a lack of appropriate management or an increase in heathland restoration and creation.
- Increases in calcareous grassland are due to grassland restoration and creation work mainly restoring quarry sites but also through Environmental Stewardship Schemes.

**Table 2. Summary of changes relating to grassland habitats.**

Grassland biodiversity has shown a dramatic decline over the 20th century, which is threatening biological diversity and is therefore of major conservation concern. In particular, the area of unimproved neutral grassland habitat has sustained a remarkable decline, almost entirely due to the changing agricultural practices (Klimek *et al.*, 2007).

In the UK, during the agricultural reconstruction in the post-war period, farming practices have become increasingly intensive (Blackstock *et al.*, 1999), which has a wide range of impacts on biodiversity. Although losses in habitat quantity remain a major driver of biodiversity loss, particularly for plants, widespread degradation in habitat quality, such as more intensive field management including overgrazing and unsuitable cutting regimes, lack of appropriate management partly due to local authority budget constraints, drainage, the use of artificial pesticides and fertilisers which increase levels of nutrient availability ensuring increased productivity of selected species, and increasing habitat homogeneity from species-rich to species-poor communities, is currently more important (Robinson and Sutherland, 2002). Furthermore, some grasslands have been lost over the preceding decades due to urban expansion and neglect.

In lowland England and Wales, it is estimated that between 1930 and 1984, semi-natural grassland had declined by 97% (Blackstock *et al.*, 1999; Fuller, 1987). Losses have continued, and have been recorded occurring annually between approximately 2-10% in some parts of England (Biodiversity Reporting and Information Group (ed. Ant Maddock), 2008). Similar patterns are reflected in Staffordshire.

During recent years of surveying, the increase in barn conversions and landowners fragmenting larger landholdings by selling smaller parcels of grassland to horse owners has been noted, particularly in the northern areas of the county. This has meant that there has been an increase in the lack of appropriate management such as overgrazing and is therefore adversely affecting good quality grassland sites.

Recently however, quarry companies in the county have taken a sympathetic approach to restoration with innovative and collaborative working involving Staffordshire County Council (SCC) and Staffordshire Wildlife Trust (SWT), setting a benchmark for grassland habitat restoration and/or creation. In addition to this, grassland restoration and creation works have been carried out through agri-environment schemes over the last few decades; this may explain some positive increases in grassland species and habitats.

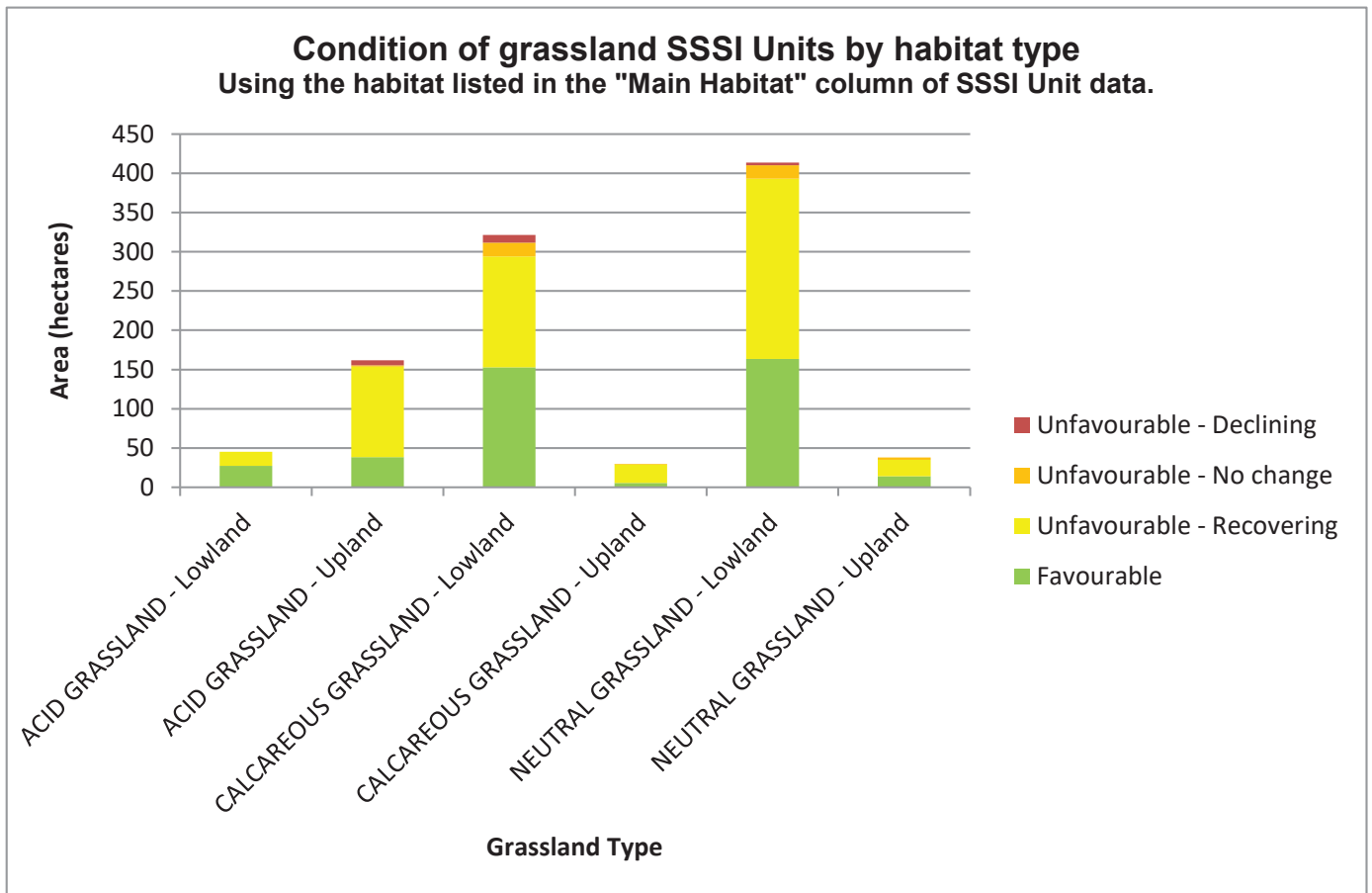
Some increases and decreases in habitat change can be attributed to increased survey and monitoring effort and the differences in recording the habitat types. For example, a site may have previously been recorded as acid grassland but currently be recorded as heathland as the site is a mosaic, this would then appear to be a loss of acid grassland habitat to heathland.

#### **4.1.3 Habitat condition**

The condition of grasslands remains threatened as remaining parcels of existing good quality grassland habitats, which are often confined to marginal areas of farms and land that is of a lower agricultural grade, are often neglected. Where appropriate management is not in place on remaining parcels of good quality grassland, these areas can decline in quality simply due to this lack of management. Even if they are managed appropriately they can also be threatened by external influences, for example in the case of agricultural runoff onto floodplain meadows affecting sites such as the aforementioned Motte Meadows. The condition of SSSIs are monitored by Natural England (figure 4), which shows that for Staffordshire SSSI grasslands are mostly moving towards favourable condition with the majority classed as recovering. It is important to note however that this does not reflect the condition of grasslands outside of SSSIs, though they may support grasslands of equal value, as they do not have statutory protection and in many cases are still threatened. An increase in the creation and restoration of priority grassland types has arisen from the uptake of agri-environment agreements. However these gains may be short-lived as an agreement is only in place for ten years and with the uncertainty around the continuation of Environmental Stewardship Schemes, or the form that they will take if they do continue, following the decision for the United Kingdom to exit the European Union, some landowners may struggle to maintain appropriate management if they do not gain the funding to support it. Some gains have been made through planning, in particular in the quarrying industry where large landscape scale restoration of priority grassland habitats is becoming more widespread in response to promotion by local authorities.

The following factors are important for good habitat condition:

- Appropriate management to maintain low fertility and species diversity, such as low intensity cutting and grazing regimes.
- Timing of cuts / grazing should be appropriate to allow for plants to set seed.
- Grant support for farmers and landowners.
- Availability of advice for farmers and landowners.
- Connectivity and size of habitat; many grasslands are small and isolated, which can be a barrier to plant species dispersal.
- Ensuring after care management is in place following restoration or creation activity.



**Figure 4. Condition of SSSI units in Staffordshire where the main habitat in the unit is grassland (data correct as of 4th December 2015; Natural England, 2015).**

## 4.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1-3, 7-8, 10-11, 13-17;** dominant species control (scrub etc), pollution, nutrification, lack of grazing/under grazing, overgrazing, habitat fragmentation, resources, neglect, inappropriate management e.g. grass cutting, intensive agriculture e.g. fertiliser application, habitat loss e.g. to development and land drainage.

### Additional specific issues for grassland

- Increasing fragmentation of grasslands, particularly in west and south Staffordshire.
- Species extinctions due to small and isolated sites.
- Grassland lost to urban fringe development, large infrastructure projects and the extension of quarrying activities.
- Pressures on the agricultural economy leading to small farms becoming incorporated into larger enterprises.
- Conversion to fisheries (marshes, fens).
- Continued loss of grassland biodiversity due to issues such as neglect, more intensive agriculture, and lack of appropriate management e.g. overgrazing.
- Decreasing availability of agri-environment schemes promoting sustainable environmental management practices due to increasingly limited funds.
- Drainage of wet grassland sites for agriculture.
- Limited funding for inclusion of aftercare management for created or restored grasslands e.g. environmental stewardship only 10 year agreements and no guarantee of follow up funding.
- Lack of access to suitable machinery particularly on public open spaces where grass arisings cannot always be collected following a cut.

### 4.3 Conserving grassland – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted in the case studies below:

CASE STUDIES
Case studies elsewhere in the report relevant to grassland: <ul style="list-style-type: none"><li>• Doxey and Tillington Marshes SSSI flood compensation works (designated sites chapter)</li><li>• Redhill Business Park (amphibian and reptile chapter)</li><li>• Butterfly surveys in the Churnet Valley (Lepidoptera chapter)</li><li>• Mottey Meadows Rural sustainable drainage systems (Farmland chapter)</li></ul>
Case Study 1: Blooming Stoke (Authors and contributors: Bernadette Noake, Victoria Brooks, David Cadman)
Case Study 2: Friends of Mottey Meadows (Authors and contributors: Ruth Green, Victoria Liu, Friends of Mottey Meadows, David Cadman, Anna Maxwell)
Case Study 3: Restoring species-rich grassland at Cauldon Quarry (Authors and contributors: Victoria Brooks, David Cadman, Dominic Woodfield, Ali Glaisher, Adam Wells)

In addition to the case studies above, there are more examples of positive work that is of benefit to grasslands in Staffordshire. These include:

- The CVLLP grasslands project which focused on increasing the connectivity of species-rich grassland habitats local to the Churnet Valley Living Landscape project area.

## 4.4 Conserving grasslands – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M1 – M4, M9, M10, M12, M13, M14 & M17; DM1 – DM4:** Improve the following: Increase habitat size and connectivity; increase bare ground habitat for invertebrates; manage for structural diversity; increase resources; ensure appropriate grazing; more integrated planning and management of sites across ownership boundaries; use volunteer groups; sustainable management; survey and monitoring; suitable mowing regime; increase research and link with universities colleges and schools; use opportunities through agri-environment schemes; make use of opportunities through the planning system to do creation and restoration work and provide guidelines to planners; continue to apply for grants.

### Additional specific recommendations for grassland

- Work at a national and local level to ensure new agricultural support schemes include species-rich grassland maintenance and creation.
- Work with highways agencies to improve road verge grassland management.
- Promote biodiversity offsetting and grassland habitat creation including working with the quarry industry where there is scope for large-scale creation projects.
- Encourage farmers to take up and maintain grant schemes such as Countryside Stewardship.
- Work with local authorities to promote the creation of species-rich grassland areas in public spaces.
- Create and maintain a directory of green hay and seed sources and contractors with suitable machinery for harvest and spreading/seeding.
- Encouraging farmers to take up and maintain grant schemes such as Countryside Stewardship to support traditional grassland management.
- Maintaining and enhancing the important network of limestone and neutral grasslands in the White Peak.
- Support the planning network with advice and promotion of grassland creation and restoration schemes in biodiversity offsetting where appropriate.
- Raise the profile of best practice case studies to relevant people and organisations through encouraging access and events on demonstration sites.
- Promote the exchange of ideas between grassland network groups to increase knowledge and share resources in order to aid the practical side of grassland projects.

**Blooming Stoke**

**Habitats & species:**

**Habitats:** Species-rich lowland neutral grassland.

**Species:** Common knapweed, hay-rattle, oxeye daisy, cat's-ear, as well as invertebrates such as butterfly species & bees.



**Photo:** Bradeley Fields two years after green hay strewing, Bernadette Noake

**Key messages**

- 19.35 hectares of grassland enhancement occurred across 10 public sites in Stoke-on-Trent.
- The created meadows provide stepping stones between existing sites of importance for wildlife and has improved connectivity.

**Overview**

Between 2013 and 2015, Stoke-on-Trent City Council (S-on-T CC) worked together with Staffordshire Wildlife Trust to create and enhance 10 lowland meadows within public open spaces to enrich floral diversity, benefit a wide variety of wildlife and enhance public wellbeing. The locations of the meadows were strategic; in order to provide stepping stones between existing sites of wildlife value to benefit the mobility of species. Initial monitoring showed the successful transfer of target species common knapweed and hay-rattle in all of the created meadows with a variety of other flowering plants also present. Continued management is carried out by S-on-T CC with a cutting regime which benefits and enhances the floristic diversity of the meadows.

**Contact**

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**Partners**

Blooming Stoke is a partnership between Stoke-on-Trent City Council, Staffordshire Wildlife Trust and Staffordshire Biodiversity Action Plan

**Funding**

Blooming Stoke was funded by SITA Trust, through the landfill communities fund, Natural England, The People's Postcode Lottery and various charitable trusts with in-kind contributions from Stoke-on-Trent City Council and Staffordshire Wildlife Trust.

## Objectives

- To create up to 20 hectares of species-rich neutral grassland within Stoke-on-Trent
- To work towards connecting the existing sites of wildlife value across Stoke-on-Trent.

## Approach

The sites were prepared by cutting and also exposing the ground through a combination of herbicide and harrowing treatments. The seed was transferred in green hay – a process where hay from a species-rich donor site is cut and the whole crop is taken immediately to be spread out and dried into hay on the receiver field, when it is dry, the seeds will drop off into soils which have been exposed on the site being created.

## Outcomes

All of the created meadows showed an increase in the diversity of plants recorded after the creation activities took place with target species; Common Knapweed and Hay-rattle now present in all created sites. The hay meadow management as well has started to affect the ratio of wildflowers to grasses with wildflowers now making up a greater proportion of the swards than previously recorded.

## Future work

The sites will continue to be managed by S-on-T CC who are following a cutting regime designed to continue to promote floristic diversity. The sites are cut after the flowers have set seed in late August and cuttings are removed to prevent nutrient enrichment which is more beneficial to grasses than wildflowers.



**Photo:** Bradeley Fields prior to restoration, Bernadette Noake



**Friends of Mottey Meadows**

**Habitats & species:**

**Habitats:** Lowland grassland.

**Species:** Plants: snake's head fritillary, saw-wort, common meadow rue, yellow flag iris, cuckoo flower, greater burnet; Invertebrates: horsetail weevil, butterflies; Birds: snipe, curlew, lapwing.



**Photo:** Mottey Meadows National Nature Reserve, Victoria Brooks

**Key messages**

- Support given through 'Friends of' groups is a recognised and valuable way of helping wildlife sites.
- Community driven involvement in a local site is effective for both fundraising and raising awareness of the site.

**Overview**

Mottey Meadows National Nature Reserve near Wheaton Aston is a highly designated site supporting over 240 species of flowering plants and grasses, and holds the most northerly population of snake's head fritillary across its natural range in the UK. The site also protects a variety of important invertebrate and bird species.

The Friends of Mottey Meadows is a support group for Mottey Meadows and surrounding land that was founded in 2008 by Wes & Chris Weate, Brian & Mary Littleford and Chris Palmer. The group has grown over the years and currently has the support of around 50 members with a core committee of around 10 people who give up their own time to meet monthly to discuss ways to help the site. The Friends formed originally to help make locals aware of the important nature reserve on their doorstep and put increased value on it. They now support Natural England in promoting and developing the site. The Friends of Mottey Meadows also link up with other Friends groups across the region thanks to the South Staffs Forum of Friends Groups.

**Contact**

Dr. Ruth Green, Friends of Mottey Meadows Email: [wheatonaston@hotmail.com](mailto:wheatonaston@hotmail.com)

**Partners**

Mottey Meadows National Nature Reserve is managed by Natural England with the help of the Friends of Mottey Meadows, Staffordshire County Council, Floodplain Meadows Partnership and South Staffordshire Community and Voluntary Action.

**Funding**

Funding to manage the meadows comes primarily from Natural England with additional funding from South Staffordshire Council.

## Objectives

- To support Natural England in promoting and developing Mottey Meadows.
- To gain funding to support Natural England in the management of Mottey Meadows.
- To gain local community involvement in the management of Mottey Meadows and to encourage local people to value the reserve.

## Approach

In order to gain funding, the Friends of Mottey Meadows submit funding applications and organise public events including guided walks and an annual Hay Festival. The Hay Festival also hosts traditional crafts and demonstrations such as scythe cutting to help raise awareness and increase community involvement and understanding of the site. In addition, the group organises volunteer work parties to directly help manage the reserve.

## Outcomes

Between 2009 and 2014 the Friends of Mottey Meadows raised £5000 from the events they ran, allowing additional signage, infrastructure and equipment to be bought for the site. The events, particularly the Hay Festival, are key to increasing membership within the group and raising awareness of the site. In 2015, the group also obtained a Heritage Lottery Grant for £3,200 for hedge restoration works on the site where they replanted a hedge with species such as hawthorn, hazel and holly. Other practical works they perform include clearing Himalayan balsam from the Motty Meadows Brook, clearing scrub, protecting fritillary populations from grazing damage using wire fencing, undertaking vegetation surveys and monitoring the water quality of the Motty Meadows Brook. Much of the practical work is particularly valuable in providing additional and much needed on the ground support to Natural England. Under management as a national nature reserve, the quality of habitat has improved at Mottey Meadows, with population increases of rare species such as snake's head fritillary and meadow thistle being seen.

## Future work

With a decrease in the amount of funding available, the Friends of Mottey Meadows plan to continue organising fundraising events and undertaking practical conservation works to support the site. The Friends also plan to further promote membership to increase the influence of the group.



## Further information

The Friends of Mottey Meadows also produce quarterly newsletters and promote their work through a website and social media. More information can be found through the following links:

[www.facebook.com/FriendsofMotteyMeadows](https://www.facebook.com/FriendsofMotteyMeadows)

[www.friendsofmotteymeadows.org.uk/](http://www.friendsofmotteymeadows.org.uk/)

[www.twitter.com/MeadowsMottey](https://www.twitter.com/MeadowsMottey)

**Photo:** Mottey Meadows Hay Festival by Mel Brown

Restoring species-rich grassland at Cauldon Quarry

**Habitats & species:**

**Habitats:** Species-rich neutral and calcareous grassland.

**Species:** Butterflies: dingy skipper; Plants: rock-rose, grass-of-Parnassus, frog orchid.



**Photo:** Restored slopes in the quarry first created in 2010, Rory Middleton

**Key messages**

- Target grassland communities have been created as part of quarry restoration to provide links with local priority habitats and designated sites within and outside Cauldon Quarry.

**Overview**

In order to help offset impacts of quarrying of the Caldon Dales Site of Special Scientific Interest (SSSI), SCC, SWT and Lafarge Holcim, along with their ecological consultants Bioscan (UK) Limited, have been working to create species-rich grassland in worked-out and non-operational areas of the Cauldon limestone quarry. The area of SSSI due to be lost through expansion of the quarry will be translocated using the best techniques emerging from the results of ongoing monitoring of a pilot translocation project. As added value, habitat creation on a wider landscape-scale is being pursued to reconnect, support and expand existing ecological networks and add to the local habitat resource. A strategic approach will enhance some grasslands and link existing and new habitats together. The target habitats include species-rich calcareous and neutral grasslands. Restoration started in 2009, and in 2016 3 ha was created using green hay from the Hamps and Manifold SSSI adding to the 7 ha already created within the non-operational areas of the quarry.

**Contact**

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**Partners**

Staffordshire Wildlife Trust (SWT) worked with Lafarge Holcim, Staffordshire County Council (SCC) and Bioscan (UK) Ltd to restore grasslands within the Cauldon Quarry. Aggregates Industries are now continuing the work.

**Funding**

The restoration work was funded by Lafarge Holcim.

## Objectives

- Establish species-rich grassland within the quarry comparable to the adjacent SSSI grassland.
- Determine the most effective method of creating the grassland habitats typical of the locality.
- Contribute to enhancement of ecological connectivity.

## Approach / Methods

Initially several different restoration methods were trialled onto different substrates. These included translocated turfs from a species-rich area adjacent to the Caldon Dales SSSI, green hay strewing with additional seed sourced locally, and natural regeneration. Different soil finishes were used ranging from bare rock to limestone scalplings and varying thicknesses of top-soils and sub-soils.

## Outcomes

Ongoing monitoring by Bioscan has indicated that the 2010 created plots show all communities increasing in similarity towards the donor resource with the translocated turfs being the most similar. There is still a divide between the species found in the restoration plots and the species found in the SSSI, however plots strewn with green hay and seed onto subsoils show the closest affinity. Continued work will use local green hay and seed but will also be supplemented with targeted species from the SSSI that are missing in the restoration plots.

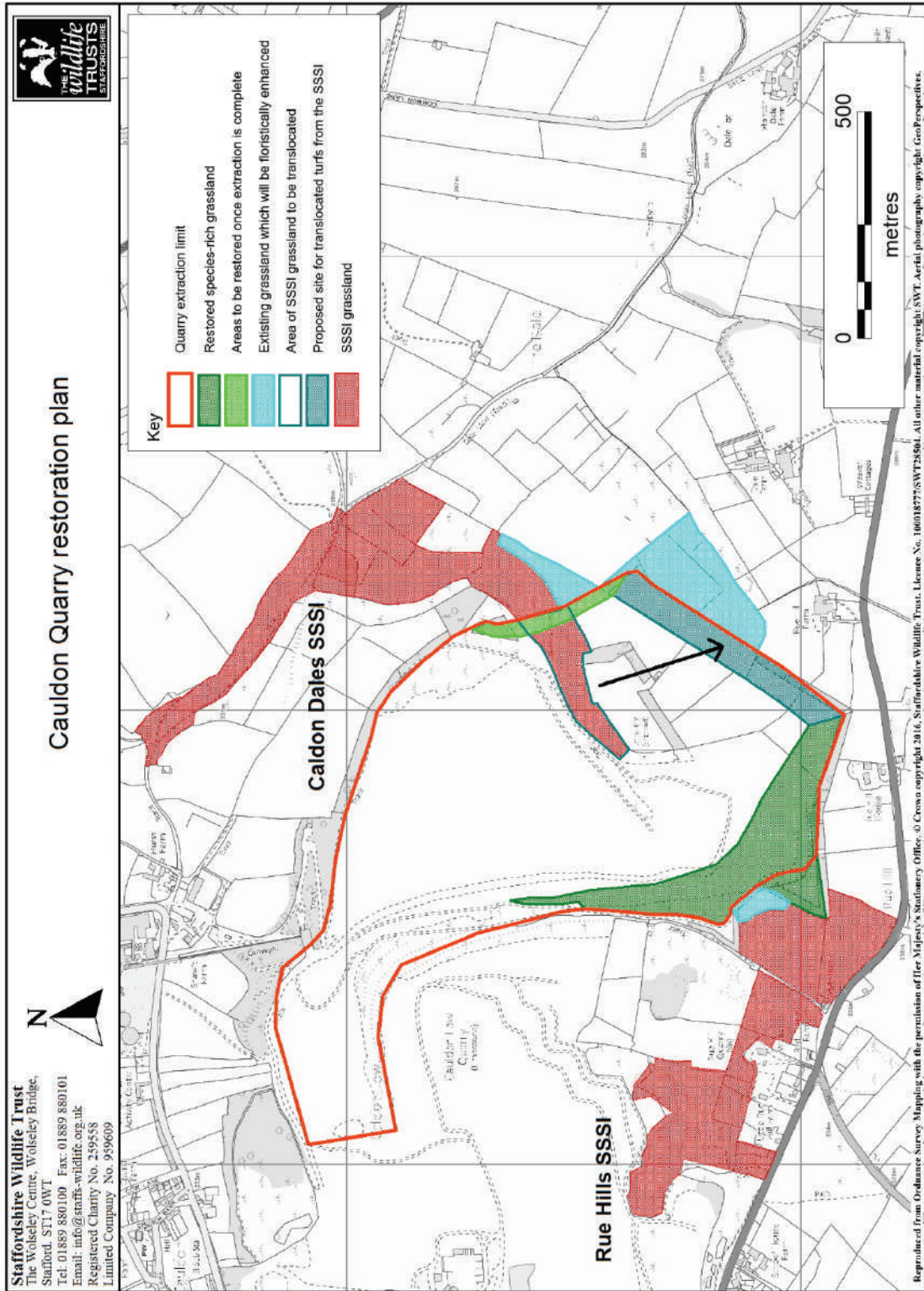
## Future work

Further creation work as well as sympathetic management of the quarry landholding will continue. It is the aim that that the newly created grassland will link up the Caldon Dales and Rue Hill SSSIs to provide a corridor and resource to support the recovery of the translocated section of SSSI and ensure there are no barriers to seed dispersal and establishment (Figure 1). This project will be linked to a similar one at the adjacent Cauldon Lowe aggregates quarry, which also involves SSSI translocation and grassland enhancement and creation at the landscape scale.



**Photo:** Hay strewing in the quarry 2016, David Cadman

**Figure 1.** Map showing the Cauldon Quarry restoration plan



## 5. Lowland Heathland

Authors: Bernadette Noake (Staffordshire Wildlife Trust), with contributions from Sue Lawley (Independent expert), Ali Glaisher (Staffordshire County Council), Sue Sheppard (Staffordshire County Council) and David Cadman (Staffordshire Wildlife Trust)

### Lowland heathland headlines

#### Overview of habitat

Lowland Heathland is an internationally rare habitat occurring below an altitude of approximately 300 metres, normally on acidic, free draining soils. It is dominated by shrubs of the heather family (*Ericaceae*), together with gorse (*Ulex* spp.), bracken (*Pteridium aquilinum*) and acidic grasses, scrub and scattered trees. In areas of impeded drainage, wet heath and bog may be present, with a different assemblage of species (Hawksford *et al.*, 2011).

#### Key species

Lowland heathlands in Staffordshire support a range of important species such as adder, common lizard, nightjar, woodlark, green tiger beetle, black darter, emperor moth, green hairstreak, and plants hybrid bilberry, bog asphodel, and round-leaved sundew.

#### Headlines

- There are over 1,700 hectares (ha) of lowland heathland (including lowland acid grassland) in Staffordshire (SER, 2016). 1,691 ha has Site of Special Scientific Interest (SSSI) status (Natural England, 2015).
- A study in 1990 showed that almost 90% of heathland in Staffordshire had been lost over 215 years (Adams, 1990)
- Through careful management, 90% of Staffordshire's SSSI lowland heathland is improving, but only 7% is already in Favourable Condition.

#### Key threats

- Insufficient resources to fund sustainable, appropriate management on all sites.
- Disturbance to sensitive species and habitats through recreation.
- Habitat fragmentation and isolation of heathland sites.
- Atmospheric pollution.
- Climate change.
- Invasion by trees, scrub and bracken.
- Difficulties in changing management, e.g. introducing grazing on Common Land.

#### Successes

- Over 65 ha of landscape-scale habitat restoration through the Connecting Cannock Chase project (2012-2015).
- Landscape-scale approach to SSSI designation of the Chasewater & South Staffordshire Coalfield Heaths
- Introduction of grazing to many heathland sites (e.g. Hednesford Hills, Chasewater, part of Cannock Chase, Barlaston Common).

#### Recommendations

- Additional funding is required and more sustainable appropriate management on sites where it is lacking.
- Target heathland creation to link fragmented and isolated sites in key areas, particularly between Cannock Chase and Sutton Park.
- Further investigate opportunities for creation through the planning system.
- Monitor habitats and the impacts of changes in climate.
- Minimise disturbance and damage caused by recreation, through continued work by the Cannock Chase Special Area of Conservation partnership.

## 5.1 State of lowland heathland in Staffordshire

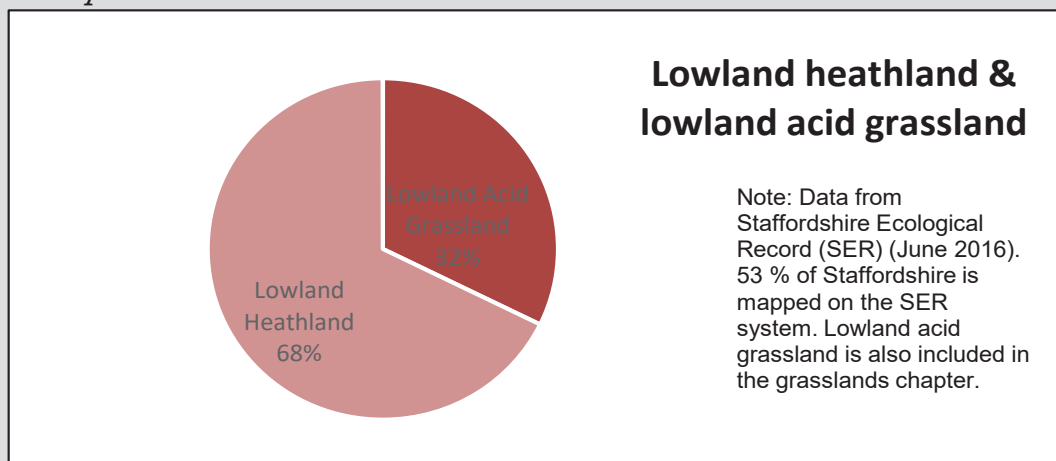
### 5.1.1 Overview

Lowland heathland figures	Amount (ha)
Current known coverage of lowland heathland (excluding acid grassland, which occurs on many heathland sites)	1064 (SER*)
Current known coverage of lowland heathland (including acid grassland)	1731.45 (SER*)
<b>Total known habitat with statutory designation</b>	<b>1794.87</b>
Total known habitat with SAC designation	1021.11
Total known habitat with SSSI designation	1691
Total known habitat with LNR designation	103.87
<b>Total known habitat with non-statutory designation</b>	<b>266.56</b>
Total known habitat with LWS designation	258.28
Total known habitat with LoGS designation	8.28

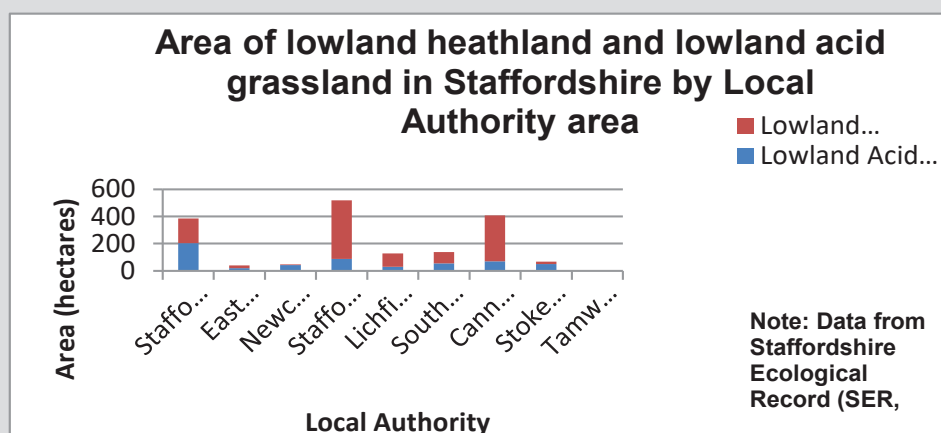
**Table 1. Coverage of lowland heathland habitats and designated lowland heathland sites in Staffordshire.**

**Lowland heathland species:** Lowland heathlands in Staffordshire support a range of important species such as adder, common lizard, nightjar, woodlark, green tiger beetle, black darter, emperor moth, green hairstreak, and plants hybrid bilberry, bog asphodel, and round-leaved sundew.

**Lowland heathland habitats:** Both lowland heathland and lowland acid grassland land are listed as Priority Habitats for the Staffordshire BAP.



**Figure 1. Percentage breakdown of lowland heathland and lowland acid grassland recorded in Staffordshire.**



**Figure 2. Area of lowland heathland and lowland acid grassland in Staffordshire by Local Authority area.**

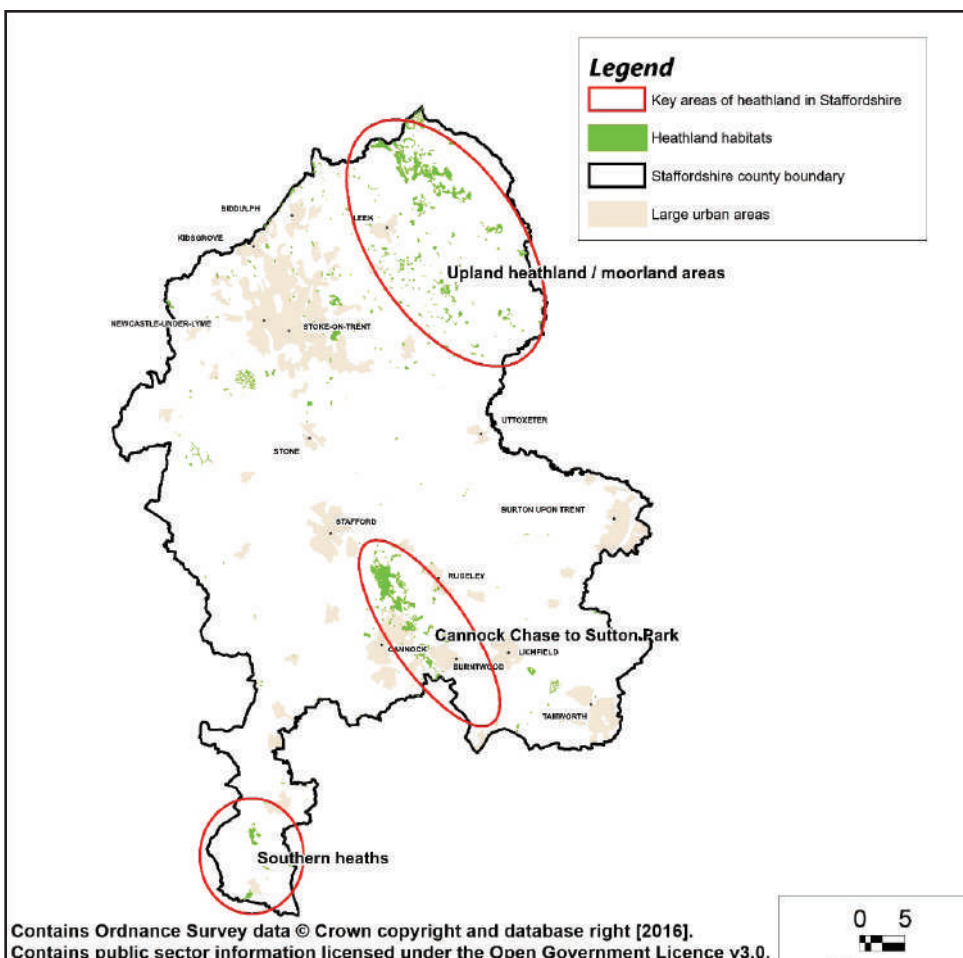
Britain contains 20% of the international total area of lowland heathland (English Nature, 2002; Newton *et al*, 2009). Heathland is an internationally rare habitat that is home to many important species, and we therefore have an important responsibility to protect it.

Lowland heathland forms part of a distinctive and ancient landscape which is an important part of Staffordshire's heritage. They are notable for their transitional nature between southern/lowland heathland types and northern/upland heather moors, with typical northern or upland species as cowberry (*Vaccinium vitis-idaea*) and crowberry (*Empetrum nigrum*). These species are particularly found on the central and northern Staffordshire heaths, often in extensive patches. These transitional heathlands therefore represent an important type of heath within the range occurring in Britain.

Heathland was once much more extensive in Staffordshire; in 1990 a comparison to Yates' map of 1775, showed there had been a 90% decrease in heathland habitats in Staffordshire, particularly between Cannock Chase and Sutton Park (83.16% loss), Kinver and Highgate Common (91.95 % loss) and around Wetley Moor (81.65 % loss) (Adams, 1990).

Despite these losses, there is some degree of lowland heathland and acid grassland habitat in most districts within the county, albeit some of these heathlands are small and fragmented. The main areas of lowland heathland have been summarised below:

- Dry heathland and acid grassland habitats at Highgate Common and Kinver Edge and a few other sites to the south east.
- The largest surviving area of heathland in the Midlands, Cannock Chase (Natural England, 2012), is primarily dry heathland with some areas of valley mire, wet heath and flush mosaic habitats. Extending south towards Barr Beacon and Sutton Park there are a number of fragmented heathland sites, including the Southern Staffordshire Coalfield heathlands, typically with wetter vegetation.
- In central to northern parts of Staffordshire there are a number of scattered dry grass-heath dominated heathland sites.
- The highest altitude lowland heathlands, approximately 240 m to 270 m, are perhaps more closely related to the South Pennine Moorland habitats, but lack the deep peaty soils (Hawksford *et al.*, 2011)



**Figure 3. Key heathland areas in Staffordshire.**



### 5.1.2 Habitat changes

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding.

A comparison of Local Wildlife Sites (LWSs) was also undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016. A summary of the results from these analyses as well as additional trends relating to lowland heathland habitats are presented in Table 2.

The methods used for the 1km grid square and LWS analyses are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares known of Lowland Heathland in Staffordshire (excluding acid grassland, which occurs on many heathland sites)	1064 ha
Number of hectares analysed in 1 km grid square analysis	3387 ha
Hectares of lowland heathland in 1978-83 in the 68 selected 1 km grid squares	247 ha
Hectares of lowland heathland in 1995-2015 in the 68 selected 1 km grid squares	458 ha
% change in analysed 1 km grid squares	+85.65%
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>● 102.48 ha which were classed as lowland acid grassland in the first survey were classed as lowland heathland/heathland mosaic habitats in the more recent survey.</li> <li>● 85.97 ha of bracken from the first survey was lowland heathland in the second survey.</li> <li>● Approximately 55 ha of woodland (18.48 ha deciduous, 28.42 ha conifer) and scrub (8.10 ha) in the first survey was lowland heathland in the second survey.</li> <li>● In addition, 11.76 ha of deciduous woodland and 9.44 ha mixed woodland was lowland heathland in the second survey.</li> </ul>	
<b>Summary of habitat changes from the Local Wildlife Site analysis</b>	
<p>At present there are 407 ha of lowland heath under a LWS designation in Staffordshire. The area of lowland heathland with a LWS designation did not change between the original 96-2000 baseline surveys and the modern resurveys despite the loss of LWS area between these surveys.</p>	
<b>Other trends</b>	
<p>In 1990 it was estimated that just under 90% of heathland had been lost since the 1775 Yates map, which illustrated distinctions between cultivated land, woodland, parkland and wasteland which consisted predominantly of heathland, in Staffordshire (note that this was using the pre-1974 Staffordshire boundary, Adams, 1990; South Staffordshire Council, 2013).</p> <p>In the UK, the extent of lowland heathland is now approximately 16% of that present in 1800 (JNCC, 2013b; English Nature 2002), with c. 25,800 ha lost between 1947 and 1969 across England and Wales (Newton et al, 2009; Staffordshire Wildlife Trust, 2014)</p>	

### Summary of reasons for changes

Heathland restoration and improved management, e.g. removal of scrub and bracken, has led to the conversion of some habitats to lowland heathland on well managed sites.

However, on a wider scale, heathland losses can be attributed to factors including:

- Urbanisation
- Agriculture
- Afforestation
- Mining
- Insufficient management leading to natural succession to woodland
- Changes in traditional use and reduction of grazing pressure

**Table 2. Summary of changes relating to lowland heathland and lowland acid grassland habitats.**

Much of the decline in heathland area is attributable to changing patterns of land use including intensive grazing, modern arable practices, afforestation (commercial conifer plantations), mining and urban development. There has also been a widespread decline in the traditional use of heathlands, which typically included livestock grazing, controlled burning and cutting of vegetation for use as fuel and animal fodder, together with the cutting of turf and peat (Webb, 1998). As a result, many heathlands have reverted to scrub or woodland through a process of natural succession.

This lack of appropriate management now represents one of the main threats to communities of plants and animals associated with lowland heathland habitats (English Nature, 2002; Newton *et al*, 2009; Staffordshire Wildlife Trust, 2014). To address these issues, many organisations have been involved in excellent heathland management and creation, but more work is still required.

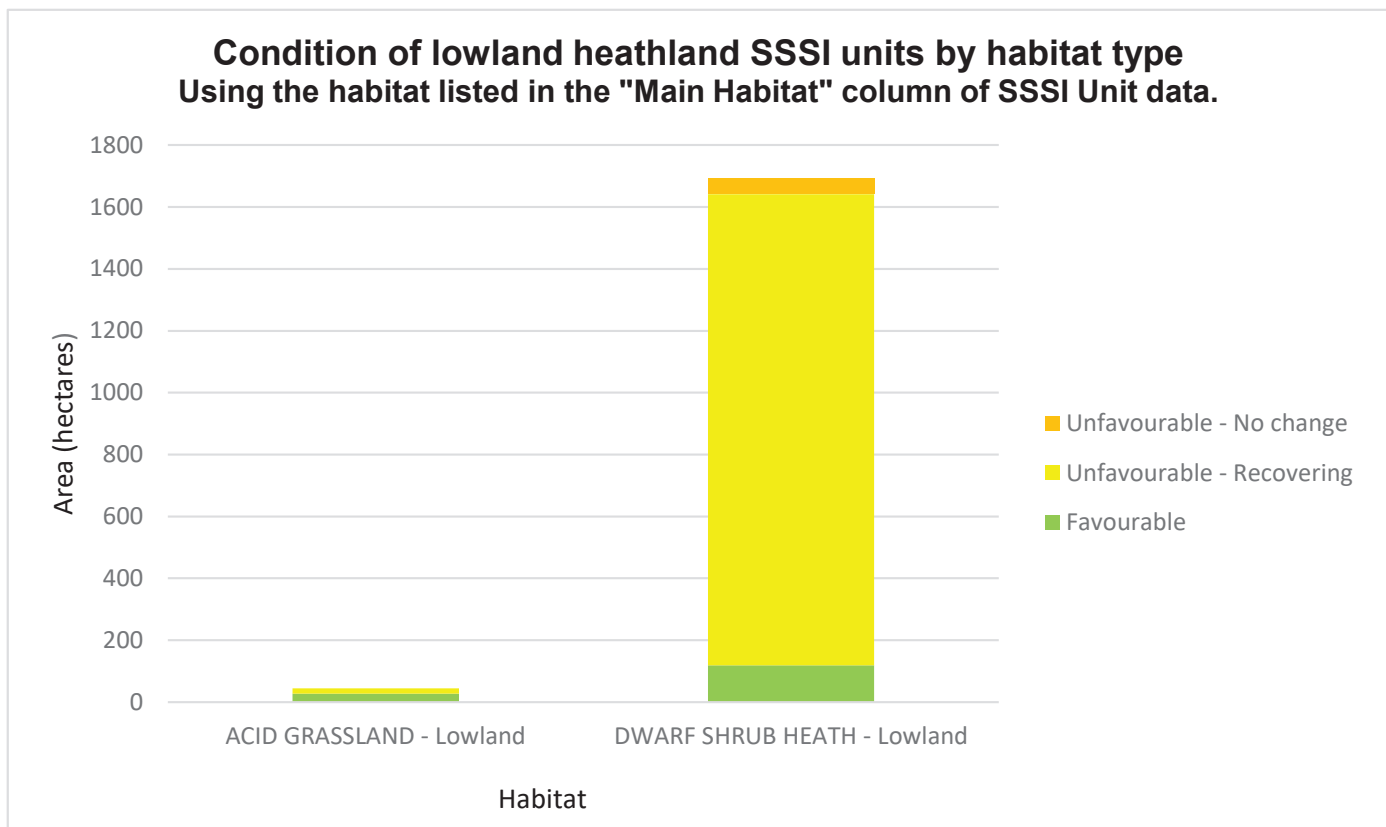
In Staffordshire, the improvements to lowland heathland and associated habitats is largely a tribute to the diligence of county and district councils and National Trust, working to control bracken and scrub and instate other good management, for example grazing on sites such as Downs Banks, Hednesford Hills and Barlaston Common and bracken control and conifer removal at Cannock Chase.

#### 5.1.3 Habitat condition

The majority of lowland heathlands in Staffordshire are under a management regime, however a number of management challenges and issues remain (see issues section) which alongside limited resources can prevent favourable habitat condition being met. The data available for the current habitat condition of lowland heathland relates to lowland heathland sites within SSSIs.

The following factors are all important for good habitat condition:

- Low cover of invasive species (primarily scrub and bracken) to prevent heathland plants being out-competed. Some degree of scrub and bracken is important for a variety of species.
- Structural diversity of dwarf shrubs to provide a broad range of age classes that will be of benefit to a wider range of species.
- Vegetation Composition - factors including % cover of dwarf shrubs and fine grasses, frequency of desirable forbs/nectar plants.
- Habitat size and connectivity are also important factors which affect the quality and functioning of habitats in terms of species survival and mobility.
- Bare ground habitat in varied conditions (vertical, sloping and horizontal) is important for a range of species, particularly for invertebrates such as solitary bees and wasps.



**Figure 4. Condition of SSSI units in Staffordshire where the main habitat in the unit is lowland heathland or lowland acid grassland (data correct as of 4th December 2015; Natural England, 2015).**

## 5.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1 - 13, 18:** dominant species control (scrub and bracken), pollution, nutrification, runoff (roads, land uses, chemicals), lack of grazing, overgrazing, access / disturbance, habitat fragmentation, lack of resources, nitrogen deposition, neglect, invasive non-native species

### Additional specific issues for lowland heathland

- Habitat fragmentation and isolation of heathland sites.
- Inappropriate or lack of suitable management, e.g. leading to an invasion of heathland by trees, scrub and bracken.
- Insufficient resources to fund sustainable, appropriate management on all sites. Management of lowland heathland is particularly resource intensive (including bracken and scrub control and heather cutting/burning to create structural diversity). Grazing will only assist with this, not remove the need for other management.
- Disturbance to sensitive species and habitats through recreation.
- Difficulties in attitudes towards changing management, e.g. introducing grazing on large areas of heathland can be challenging on sites with high visitor numbers, heavy recreational pressure, busy roads and Common Land designations.
- Spread of plant diseases, e.g. *Phytophthora pseudosyringae* infecting bilberry on Cannock Chase.
- The potential to significantly expand and link areas of heathland may be restricted by other land uses, soil nutrient status and important habitats.

### 5.3 Conserving lowland heathland – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted in the case studies below:

CASE STUDIES
Case studies elsewhere in the report relevant to lowland heathland: <ul style="list-style-type: none"><li>• Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (designated sites chapter)</li><li>• Increasing opportunity for nesting solitary bees and wasps (invertebrates chapter)</li><li>• Burntwood Milestone Way Strategic Development Allocation (area chapter)</li><li>• Whittington Heath Golf Course, HS2 Phase 1 Biodiversity Offset Scheme (why is nature changing &amp; what needs to happen chapter)</li></ul>
Case study 1 - Connecting Cannock Chase (Authors and contributors: Jeff Sim and Bernadette Noake)
Case Study 2 – Heathland Restoration at Kinver Edge (Authors and contributors: Simon Barker, Ewan Chapman and Andrew Perry)
Case Study 3 – Heathland restoration and Barlaston & Rough Close Common (Authors and contributors: William Waller)

In addition to the case studies above, there are more examples of positive work that is of benefit to lowland heathland in Staffordshire, including:

- The introduction of grazing to many heathland sites (e.g. Hednesford Hills, Chasewater, part of Cannock Chase, Barlaston Common).
- Heathland management through Higher Level Stewardship schemes has allowed restoration of large areas of heathland, e.g. on Cannock Chase.
- Volunteer efforts in practical tasks and species surveying has been fundamental to heathland management efforts.

## 5.4 Conserving lowland heathland – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M1 - M13; DM1 - DM5:** Improve the following: increase habitat size and connectivity; increase bare ground habitat; manage for structural habitat diversity; increase resources; ensure appropriate grazing; improve planning and use of chemicals; implement Sustainable Drainage Systems; innovative management of recreation pressures; consider potential recreation impacts on habitats and species when planning management; more integrated planning and management of sites across ownership boundaries; integrated use of volunteer groups; use of byproducts from management; agri-environment schemes; habitat creation through the planning system; increase take up of grants; guidelines for planners; large-scale habitat creation projects.

### Additional specific recommendations for lowland heathland

- Additional funding is required and more sustainable appropriate management on sites where it is lacking, including the provision of a rotational supply of bare ground habitats for invertebrates and variation in habitat structure.
- Target heathland creation to link fragmented and isolated sites in key areas, particularly Cannock Chase to Sutton Park.
- Further investigate opportunities for creation through the planning system, e.g. see the Lichfield District Council's Biodiversity Offsetting work as best practice, on appropriate sites, to fund heathland creation in strategic locations.
- Continue the Cannock Chase SAC Partnership work to minimise the impact of recreation on Cannock Chase SAC. Look for innovative ways to minimise the impacts. Mitigation is expected to focus on access and visitor management measures on and adjoining the SAC itself, as this is thought to be the most cost effective method which will also tackle visitors from further afield. Depending on the individual circumstances on a site, there may still be opportunities for open space provision to contribute to the heathland network.
- Continue the Heathland Networks/Connecting Cannock Chase project to link and expand the heathlands in the Cannock Chase and Cank Wood NCA; progress investigations and heathland creation.
- Monitor habitats and the impacts of changes in climate.

## Connecting Cannock Chase

### Habitats & species:

**Habitats:** Lowland heathland.

**Species:** Birds: nightjar, woodlark, dartford warbler; Reptiles: adder, common lizard; Invertebrates: solitary bees & wasps.



**Photos:** Volunteers helping with scrub clearance (left); Cattle grazing on Cannock Chase (right), Bernadette Noake

### Key messages

- Reintroduction of grazing livestock on Cannock Chase - the first such habitat management on the Chase for 100 years.
- Landscape-scale partnership restoring areas of former conifer plantation that had already been felled to lowland heathland.
- Increased public involvement through volunteer work parties and livestock fencing checks.

### Overview

From 2012 - 2015 this project contributed to the process of restoring over 65 ha of heathland in corridors that connect existing SSSI heathland on Forestry Commission land.

In order to create a more diverse habitat, light cattle grazing was introduced in one area, bracken control was carried out and bare ground was created. Volunteer work parties were formed to help control scrub and to spread heather brash to encourage heather regeneration.

Working in partnership was key to the success of the project. The project was managed by Staffordshire Wildlife Trust, working closely with the Forestry Commission and other Connecting Cannock Chase partnership organisations.

### Contact

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### Partners

The project is being run by a partnership of organisations including Staffordshire Wildlife Trust, Forestry Commission, Natural England, Cannock Chase AONB, Butterfly Conservation, Cannock Chase Council and RSPB.

### Funding

The Connecting Cannock Chase project has been funded by SITA Trust's Enriching Nature Programme and CEMEX Community Fund, through the Landfill Communities Fund, Cargill, and partner organisations.

## Objectives

- Carry out heathland restoration and management in strategic locations to improve heathland habitat connectivity across Cannock Chase, including scrub clearance, scrape creation and bracken control.
- Introduce low density cattle grazing project on a circa 25 ha area of Cannock Chase
- Install grazing infrastructure - Livestock holding facilities, fencing, water pipes & trough network

## Approach

A part-time project officer was employed by Staffordshire Wildlife Trust to oversee the public liaison prior, during and after the installation of grazing infrastructure, assist the Forestry Commission in the selection of a grazer and organising heathland restoration works, undertake vegetation surveys and recruit volunteers to assist with practical conservation work parties. Large scrapes of bare earth were created by contractors in order to create more diverse habitats of benefit for invertebrates and other species. Some of these scrapes were then covered with heather brash to encourage the development of pioneer heather plants. The project officer also recruited volunteers to assist in the monitoring of fence-lines, water usage and fixed-point photography. Vegetation surveys were undertaken at the start and end of the project, and invertebrate surveys of the grazing area and some of the areas of bare ground scrapes were also carried out.

## Outcomes

The project was successful in initiating grazing on Cannock Chase. This is an important step in introducing grazing to other parts of Cannock Chase. The local community played an important part in the project through volunteering to check cattle grazing infrastructure and through volunteer work parties. The heathland sites are all making good progress and the habitat condition is improving. The project also helped identify other sites in the wider Cannock Chase landscape and beyond which could host potential future heathland restoration opportunities. Working in partnership was key to the success of the project.

## Future work

Though funding for the project has ended, the legacy of the project is continuing through the volunteer work parties and grazing will continue into the future.



**Photos:** Before (left) and after (right) photos showing an example of where bare ground scrapes have been created on Cannock Chase, Bernadette Noake

Heathland restoration at Kinver Edge

**Habitats & species:**

**Habitats:** Lowland heath and lowland dry acid grassland.

**Species:** All widespread reptile species; Invertebrates: especially Lepidoptera, including heathland-specialist moths and brown argus butterfly, and Aculeate Hymenoptera; Plants: grey hair-grass *Corynephorus canescens*.



**Photo:** Flowering heather and Kinver Edge, Ewan Chapman

**Key messages**

- Over 24 hectares (ha) of heathland restored over the past twenty years under Countryside Stewardship Scheme (CSS) / Higher Level Stewardship (HLS).
- Over 8 ha of acid grassland is under restoration.
- Higher Tier Countryside Stewardship to be implemented from start of 2018.

**Overview**

Owned and managed by the National Trust, Kinver Edge Site of Special Scientific Interest (SSSI) is one of a series of lowland heaths on the Triassic sandstones of south-west Staffordshire, extending into Worcestershire. With the loss of traditional grazing management, the area of open heath steadily declined as trees and scrub encroached. Determined restoration efforts commenced in the early 1990s, with local volunteers to the fore, and gathered pace via agri-environment schemes from 1997 onwards. The return of cattle grazing in 2007 was a big step forward, but volunteer effort continues to be key, both to practical management and the monitoring of its impacts on species and habitats. The gifting of additional land by Staffordshire and Worcestershire County Councils has opened up the prospect of significant new areas of heathland restoration, creating habitats which are bigger, better and more joined up.

**Contact**

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**Partners**

Natural England, Kinver Edge moth group, Birmingham and Black Country Amphibian and Reptile Group (Paul Wilkinson), and Kinver Edge Committee.

**Funding**

Natural England  
Kinver Edge Committee  
National Trust



## Objectives

- Restore condition of lowland heathland and acid grassland;
- Increase extent and connectivity of heath;
- Conserve and enhance habitat for key species, e.g. adder;
- Increase visitor engagement to encourage support for conservation management.

## Approach

- Tree / scrub clearance from the early 1990s via volunteers started the restoration process;
- Ten year Countryside Stewardship Scheme commenced in 1997 and saw an intensification of management;
- Ten year Higher Level Stewardship from 2007 continued the restoration process;
- Grazing restored in 2007, using native breed cattle to graze the heathland and acid grassland;
- Conifer clearance on land acquired from Staffordshire County Council.

## Outcomes

- Increased extent and improved condition of lowland heathland and acid grassland habitats, although loss of grazing for two years caused a temporary setback;
- 3.6 ha of conifer removed with objective of restoring to lowland heath – after two years, positive indicators (e.g. heather) are increasing and negative indicators (e.g. Himalayan balsam) are decreasing;
- Species-specific management has been undertaken, including purpose-built reptile hibernaculum and the creation of scrapes for grey hair-grass. Populations of key species such as adder are stable;
- Natural colonisers include brown argus butterfly;
- Regular monitoring of habitats and species has been established.

## Future work

- Focus maintenance to improve the condition of existing heathland and acid grassland;
- Acquisition of Kingsford Country Park enables further heathland restoration and potential to graze the whole site as a single unit,
- Improve connectivity of open habitat in woodland areas, with reptiles in mind;
- Higher Tier Countryside Stewardship will from start of 2018;
- Improve species monitoring.



**Photos:** Conifers cleared for heather restoration, Simon Barker (left);  
Cattle grazing, Ewan Chapman (right)

## Heathland Restoration at Barlaston & Rough Close Common

### Habitats & Species discussed:

**Habitats:** Lowland heathland, acid grassland.

**Species:** Common heather, cross-leaved heath, sedges



**Photo:** An increase in the amount of heather has been seen at Barlaston & Rough Close Common since the start of the project, Bill Waller

### Key messages

- The effects of grazing the lowland heathland has resulted in a significant increase in heather.
- An increased diversity of the site's vegetation has been seen.

### Overview

Barlaston & Rough Close Common is the best surviving remnant of the original Meir Heath. The heathland has been present for at least 300 years, created by generations of commoners who grazed their animals and gathered wood for fuel. The management aim is to preserve the open heathland habitat of the site by replicating past activities of grazing and scrub control.

As part of the conservation management of the lower common, grazing was introduced in 2008. This was made possible by funding from SITA and Natural England that allowed the 20 ha site to be fenced. The site had lost much of its floral diversity and was dominated by a couple of grass species. The aim of grazing was to restore and improve the condition of the heathland/ acid grassland habitat.

### Contact

Bill Waller  
Stafford Borough Council

### Partners

The project is managed by  
Stafford Borough Council

### Funding

The grazing project was funded by SITA Enriching Nature Fund. Additional funding was provided by Natural England through Countryside Stewardship and then through Higher Level Stewardship.

## Objectives

- Establish and maintain grazing as a key component of the site's management.
- Manage and enhance 20 ha of heathland/acid grassland.
- Monitor the results of the project.

## Approach

Community consultation was a key part in the application to Defra to fence a registered common. Once we received permission, a grant application was made to SITA. A local grazier was found with Red Poll cattle, and in 2008 grazing began. A monitoring programme using fixed quadrats and photography also started that year.

## Outcomes

The dominance of *Molinia* and *Deschampsia* grasses has decreased consistently since grazing began. Over the same time period, the frequency of heather and other finer grasses along with floral diversity has increased. Average number of species per quadrat increased from 5.7 in 2008 to 12.6 in 2015. Thus over the monitoring period, average species diversity per quadrat has more than doubled. Of particular interest has been the recovery of marsh violet, devil's bit scabious and sneezewort.

## Future work

Following the next survey (2017) it is recommended that a fuller report is produced including statistical analysis of results, comparisons of individual quadrats and comparison of quadrat and monitoring photos. Results of this analysis should be published on the 10<sup>th</sup> anniversary of grazing in 2018.



**Photo:** Cattle grazing at Barlaston & Rough Close Common, Bill Waller

## 6. Moorland

Authors: Helen Dale (Staffordshire Wildlife Trust), with contributions from Penny Anderson (Independent expert)

### Moorland headlines

#### Overview of habitat

Moorland is an all-embracing term covering a wide range of habitats that reflect the character of the soils and hydrology, as well as the long term management to which they have been subjected. Moorlands include peat-based blanket bogs, dwarfshrub heath on peaty or mineral soils, acid grassland and wet flushes. Upland waders are a particular feature of the Staffordshire moorlands and the habitat holds important populations of curlew, lapwing and snipe. The rivers and streams of the moorlands are typically fast flowing and oxygen-rich, with a diverse aquatic invertebrate community.

#### Key species

Flora: heather, bilberry, crowberry, cowberry, cottongrasses

Birds: lapwing, curlew, snipe, short-eared owl, merlin, hobby, ring ouzel, red grouse, meadow pipit

Invertebrates: bilberry bumblebee, green hairstreak, emperor moth, glaucous shears (moth), bilberry pug (moth)

Mammals: red deer, brown hare, noctule bat

#### Headlines

- There are well over 2,000 hectares (ha) of moorland in Staffordshire, the majority of which is designated with Site of Special Scientific Interest (SSSI) status.
- 66% of SSSI moorland habitats are in Unfavourable Recovering condition, but only 21% are in Favourable condition.
- Moorland peat holds a significant store of carbon and can have an important role in flood water storage.

#### Key threats

- Marginal economic viability for farmers; 50% of landholdings within the South West Peak Natural Character Area are smaller than 20 ha (Natural England, 2013).
- Drainage in areas of marshy grassland
- Habitat fragmentation
- Agricultural improvement and heavy grazing and compaction of wet grassland.
- Recreational pressure
- Effects of climate change

#### Successes

- Moorland restoration at Warslow Estate moors (NPA) through drain blocking and installing appropriate grazing and at Brund Hill.
- Introduction of mixed grazing on the Roaches Estate has improved vegetation structure.

#### Recommendations

- Increase habitat connectivity by enhancing the wildlife value of moorland fringe and associated upland habitats.
- Support a return to mixed livestock grazing systems and use of traditional breeds.
- Work at a landscape-scale to carry out management for the benefit of upland waders, including predator control.
- Identify further opportunities for drain blocking on blanket bog and grasslands to retain water, slow down run-off and help restore peat habitats to increase resilience to climate change.

## 6.1 State of Moorland in Staffordshire

### 6.1.1 Overview

Moorland Figures	Amount (ha)
Current known coverage of moorland habitats (moorland habitats are classed as occurring above 300 metres)	<b>2108.84 (SER*)</b>
Upland acid grassland**	258
Upland heathland	1053
Upland mire	790
*a total of 53% of the county is mapped on the SER system **Upland acid grassland is also included in the grassland chapter	
<b>Total known habitat with statutory designation</b>	<b>2871.21</b>
Total known habitat with SAC designation	2063.4
Total known habitat with SPA designation	2767.4
Total known habitat with SSSI designation	2871.21
<b>Total known habitat with non-statutory designation</b>	<b>36.5</b>
Total known habitat with LWS designation	32.86
Total known habitat with LoGS designation	3.64

**Table 1. Coverage of moorland habitats and designated moorland sites in Staffordshire.**

#### Moorland species:

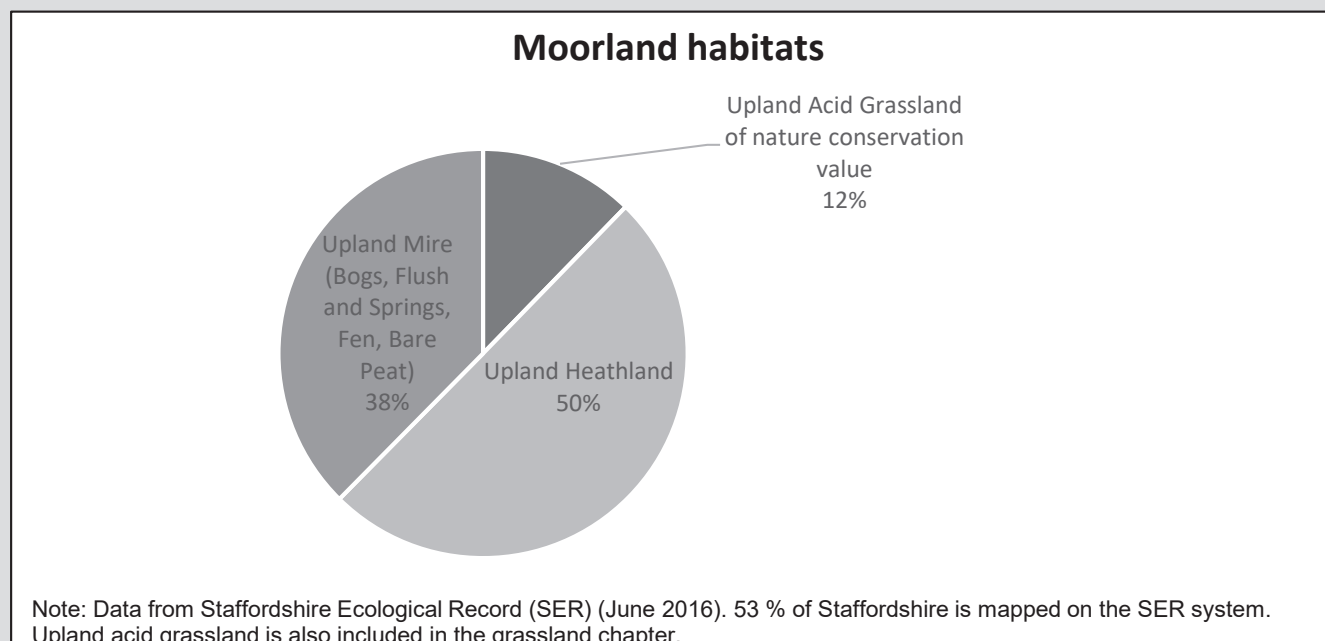
NERC Act 2006, Schedule 41: Species of Principal Importance: red grouse, curlew, ring ouzel, lapwing, tree pipit, skylark, grey mountain carpet (moth), Haworth's minor (moth), heath rustic (moth), white-clawed crayfish, noctule bat

Additional Staffordshire Biodiversity Action Plan species: willow ptarmigan, snipe, barn owl, mountain bumblebee, pink meadow waxcap

Limited distribution: Globeflower is located in this area at its southern most limit nationally.

#### Moorland habitats:

Blanket bog, purple moor-grass and rush pastures and upland heath are Priority moorland habitats.



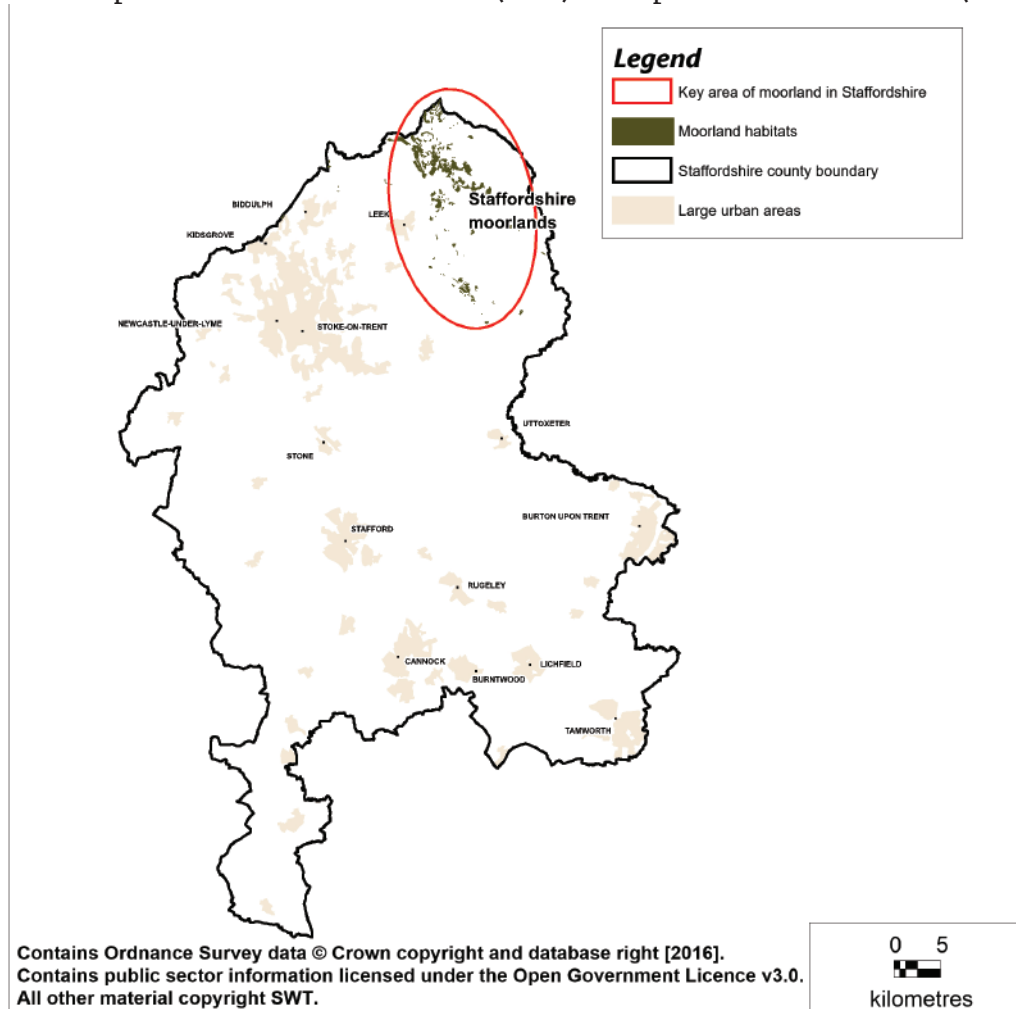
**Figure 1. Percentage breakdown of moorland habitat types recorded in Staffordshire Moorlands District**

In Staffordshire, moorland consists of a number of upland habitat types that occur on the underlying geology of millstone grit intermixed with shale beds. As well as the characteristic upland heathland dominated by heather and bilberry, blanket bog, upland flushes and acidic grassland are important constituent habitats. It is estimated that there are between two and three million hectares of upland heathland in the UK, with the UK supporting a significant amount of the global resource for this habitat type (JNCC, 2008a). Blanket bog associated with the uplands is one of the most extensive habitats in the UK, which supports around 10-15% of the global resource (Peak District National Park, 2011).

As shown in Figure 2, the moorlands of Staffordshire are largely confined to the north-eastern corner of the County at an altitude of between 300 m to 550 m. Notable sites include Middle Hills, The Roaches and areas around Swallow Moss. Whilst the majority of the habitat lies within the Peak District National Park boundary (largely within the Leek Moors SSSI, which also extends into Derbyshire and Cheshire) there are a number of other outlying isolated sites including Gun Hill (near Meerbrook), Thorncliffe Moor (near Leek), Swineholes Wood (near Ipstones) and Brown Edge (near Stanton). These outlying sites are generally considered to be remnants of moorland habitat that would have historically been more extensive.

In contrast to the extensive areas of moorland further north in Derbyshire, the moorlands of Staffordshire are characterised by an intimate mosaic of habitats, with the open moorland plateaux fringed by smaller enclosed associated in-bye habitats such as acid grassland, rush pastures and upland meadows (in-bye land is generally enclosed grassland, adjacent to and on the fringes of more open moorland).

The habitats are generally recognised as being nationally important and are designated as SSSIs. The area of moorland habitat within the Peak District National Park is also internationally recognised as being important for its mosaic of upland habitats and associated bird assemblage; South Pennine Moors Special Area of Conservation (SAC) and Special Protection Area (SPA) respectively.



**Figure 2. Key moorland areas in Staffordshire.**

## 6.1.2 Habitat changes

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding. A comparison of Local Wildlife Sites (LWSs) was also undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016. A summary of the results from these analyses as well as additional trends relating to moorland habitats are presented in Table 2. The methods used for the 1km grid square and LWS analyses are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares known of moorland habitats in Staffordshire	2108.84 ha
Hectares of moorland habitats in 1978-83 in the 68 selected 1 km grid squares	409.18 ha
Hectares of moorland habitats in 1995-2015 in the 68 selected 1 km grid squares	374.94 ha
Change in upland acid grassland analysed 1 km grid squares	-15.35 ha
Change in upland heathland analysed 1 km grid squares	-185.86 ha
Change in upland mire (bogs, flush and springs, fen and bare peat) analysed 1 km grid squares	+166.87 ha
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>• 169.86 ha of upland heathland from the first survey was classed as upland mire in the second survey</li> <li>• 16.65 ha of upland heathland was classed as neutral grassland in the second survey.</li> <li>• 5.56 ha of upland heathland was classed as upland acid grassland in the second survey</li> <li>• 5.98 ha of upland heathland was classed as deciduous woodland in the second survey.</li> <li>• 9.87 ha of upland acid grassland was classed as upland heathland in the second survey</li> <li>• 4.79 ha of upland acid grassland was classed as poor quality grassland in the second survey.</li> <li>• 3.88 ha of upland acid grassland was classed as neutral grassland in the second survey.</li> <li>• 1.46 ha of upland acid grassland was classed as deciduous woodland in the second survey.</li> </ul>	
<b>Summary of habitat changes from the Local Wildlife Site analysis</b>	
<p>At present there are 67 ha of moorland habitat under a LWS designation in Staffordshire. The extent of moorland LWS designation did not change between the original 96-2000 baseline surveys and the modern resurveys despite losses of LWS area between these surveys. Due to the fact that the majority of good quality moorland habitat in the county falls under a statutory designation there is relatively little moorland habitat under additional LWS designation.</p>	
<b>Summary of key moorland species changes</b>	
<p>Moorland birds have been well recorded over a number of years within the Leek Moors (as part of the South West Peak hotspot surveys organised by Natural England). All 3 key wader species (curlew, lapwing and snipe) have seen declines since 1985. Whilst snipe continue to decline, this reflects the national trend for this species. Lapwing and curlew however, are currently faring much better, and Staffordshire remains a 'hotspot' for populations of upland waders in the Peak District.</p>	
<b>Summary of other trends in moorland habitats</b>	
<ul style="list-style-type: none"> <li>• An increase in overgrown rush pastures</li> <li>• An increase in the extent of bracken and scrub on open moors</li> </ul>	

### Reasons for “other trends”

- The results show that the largest changes have been between categories of habitats of value; in some cases the habitats have not changed in reality, but were rather classified as different habitats (primarily upland heathland changing to upland mire).
- Wader populations are under threat due to some or all of:
  - Increased disturbance due to greater visitor pressure at honeypot locations
  - Unsuitable grazing regimes, resulting in trampling of nests or habitat becoming too overgrown.
  - Drainage and soil compaction.
  - Reduction in predator control.
- The extent of overgrown rush pastures is likely to have increased as a result of a combination of factors including milder winters benefitting rush growth. Disturbance from heavy grazing whereby rush seeds establish more widely or relaxation of grazing could also have impacted.
- Changes in traditional land use and a reduction of grazing pressure or change in grazing species are potential causes for the increase in the extent of bracken and scrub. Atmospheric pollution can also lead to the deposition of unwanted nutrients onto moorland habitats that can change the nutrient status and acidity of the soil, which can alter the plant communities found on them.

**Table 2. Summary of changes relating to moorland.**

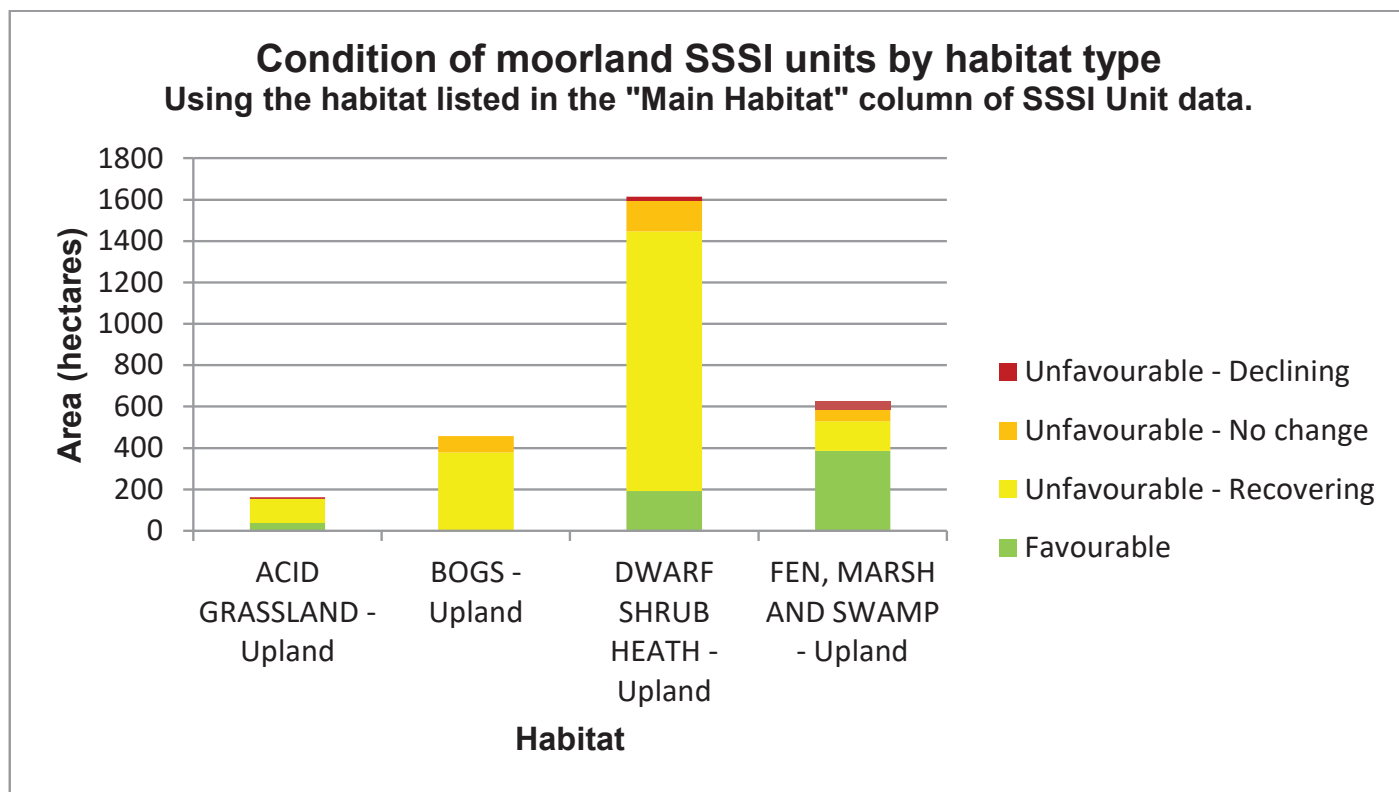
The upland habitats in Staffordshire are largely notified as SSSI or SAC and therefore receive some protection from undesirable changes. The moorlands today are generally under better management than in the 1970s. Statutory protection, combined with agri-environment schemes, has seen a reduction in grazing pressure and consequently many of our moorlands and associated habitats have been recovering.

#### **6.1.3 Habitat condition**

The upland habitats within Staffordshire are internationally important, with the majority under statutory protection at both the European and national level. The Countryside Survey 2000 found that the quantity of moorland habitats has largely remained unchanged across the UK, but habitat quality of bog and dwarf shrub heath has declined since 1990 (Haines-Young *et al.*, 2000). A repeat survey in 2007 found that habitat quality was relatively stable in England (Carey *et al.*, 2008). Despite this, only 21% of SSSI moorland in Staffordshire is currently classed as being in Favourable condition (Natural England, 2016). 66% is classed as unfavourable recovering due to the effort made in restoration management.

It is widely recognised that these moorland habitats have been adversely affected by historic factors such as over-grazing, drainage, air pollution and inappropriate burning. Whilst the causes have largely been addressed, it will take some time for the habitat to return to favourable condition, especially for those sites on peaty soils. A similar pattern is reflected across other non-designated moorland areas in Staffordshire.





**Figure 3. Condition of SSSI units in Staffordshire where the main habitat in the unit is moorland (data correct as of 4th December 2015; Natural England, 2015).**

The following factors are important for good habitat condition:

- Good structural diversity within the dwarf shrub layer with a range of shrubby species.
- Peat should be fully vegetated and wet enough to be actively creating new peat layers, with abundant Sphagnum mosses.
- Dry acid grasslands should be dominated by fine grass species with frequent forbs.
- There should be a low cover of invasive species (primarily scrub and bracken) on all habitats. However, some degree of scrub and bracken is important for a variety of species.
- Habitat size and connectivity are also important factors that affect the quality and functioning of habitats in terms of species survival and mobility.

## 6.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1, 7-9, 12, 17:** Dominant species control (scrub and bracken); inappropriate grazing – under-grazing or overgrazing, or unsuitable stock type/seasonal use; access/disturbance of sensitive habitats through recreation pressures; nitrogen deposition; land drainage.

### Additional specific issues for moorland

- Habitat fragmentation – the habitat mosaic of moorland, grassland and rush pastures is a key characteristic of the Staffordshire moorlands. However, the intervening in-between habitat in the Leek Moors is often of poor quality and habitat connectivity could be improved.
- Loss of flower-rich grasslands in pastures and hay meadows.
- Marginal economic viability for farmers; 50% of landholdings within the South West Peak Natural Character Area are smaller than 20 ha (Natural England, 2013).
- Drainage in areas of marshy grassland and gully erosion.
- Agricultural improvement and heavy grazing and compaction of wet grassland.
- Burning can be a useful management tool in maintaining moorland habitats, but inappropriate or accidental burning, e.g. on deep peat, can be damaging and encourage undesirable species leading to an increased dominance of some species such as *Molinia*.
- High recreational use resulting in eroding bare, multiple paths.
- Effects of climate change requiring programmes to increase resilience of habitats and species to avoid losing them entirely, including to the increased threat of wildfire.
- *Phytophthora pseudosyringae* (a plant pathogen) has been recorded in parts of the Leek Moors. There may be a long-term impact of this on the vegetation community with a loss of bilberry being replaced by other shrubby species, but it is too early to predict what the extent of the impact will be.

## 6.3 Conserving moorland – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to moorland:

- Staffordshire lapwing survey 2014 (bird chapter)

Case Study 1 – Brund Hill Plantation (Authors and contributors: Helen Dale)

Case Study 2 – Low intensity mixed grazing at The Roaches Nature Reserve (Authors and contributors: John Rowe, Helen Dale, Jeff Sim)

In addition to the case studies above, there are more examples of positive work that is of benefit to moorlands in Staffordshire. These include:

- Moorland restoration at the Warslow Estate moors (NPA) through drain blocking and installing appropriate grazing.
- Footpath restoration on The Roaches Estate.

## 6.4 Conserving moorland – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M4; M7-M9; M13; DM1; DM3:** Improve the following: increase habitat size and connectivity; ensure appropriate grazing; innovative management of recreation pressures (particularly relating to footpaths); consider potential recreation impacts on habitats and species when planning management; more integrated planning and management of sites across ownership boundaries; monitoring; agri-environment schemes; grants.

### Additional specific recommendations for moorland

- Increase habitat connectivity by enhancing the wildlife value of moorland fringe and associated upland habitats.
- Work at a landscape-scale to carry out management for the benefit of upland waders, including predator control.
- Support a return to mixed livestock grazing systems and use of traditional breeds.
- Identify further opportunities for drain blocking on blanket bog and grasslands to retain water, slow down run-off and to help restore peat habitats to increase resilience to climate change (especially drought and wildfire), and enhance habitats for waders.
- It will take time for Staffordshire's moorland habitats, especially the peatlands, to become fully functional again, although there have been a large number of projects carried out in recent years to block drains and re-wet important areas. It is important to continue the phased monitoring system, currently being developed and trialled by the RSPB, to provide information on habitat changes under restoration and to guide future management.
- Implement footpath improvement works in some key locations to prevent the widening and erosion of paths, which can have adverse effects on adjacent habitats.
- Consider legal predator control as part of a holistic programme of works with the aim of increasing breeding success for key moorland birds. Landscape-scale partnership working between private landowners and conservation organisations is required to tackle issues relating to predator impact.
- Identify further opportunities for grip blocking to retain water, slow down run-off to help to restore peat habitats and drained grassland, and adopt a catchment based approach to using the moorlands to improve water quality and address downstream flooding issues.
- Implement a specific monitoring programme for *Phytophthora pseudosyringae* to assess the rate and spread of the disease and its impact upon native moorland vegetation.
- Increase habitat connectivity by enhancing the wildlife value of moorland fringe and associated upland habitats.

## Brund Hill Plantation

### Habitats & species:

**Habitats:** Moorland, plantation woodland.

**Species:**



**Photo:** View over Brund Hill mid-restoration, SWT

### Key messages

- 14 hectares (ha) of upland moorland and rush pasture have been restored and 16 ha of broadleaf woodland created to date.
- Annual bird surveys have been carried out since 2005, prior to the first felling. Although the restored habitats are still developing the surveys will provide an important dataset for monitoring future changes.

### Overview

Staffordshire Wildlife Trust acquired the 55 ha of conifers at Brund Hill in 1996, with the intention of restoring the plantation to a range of habitats more appropriate to the upland location of the south west Peak District.

Planted in the mid-seventies, the site was surrounded by land of national and international importance for the range of upland habitats. Plans were developed for the felling of the plantation that would see the restoration of heather moorland and rush pasture, as well as creating new areas of broadleaf woodland.

Between 2011 and 2014 Staffordshire Wildlife Trust embarked upon stage 1 of a programme of works. A range of different felling techniques were trialed to ensure the restoration was as cost effective as possible.

### Contact

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Staffordshire Wildlife Trust  
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### Partners

The project was led by Staffordshire Wildlife Trust.

### Funding

The restoration of habitats was carried out over a number of years and has been supported by various partners including Heritage Lottery Fund, Natural England and Sita Trust. Tree planting was funded through the Forestry Commission's Woodland Grant Scheme.

## Objectives

- Restore 55 ha of conifer plantation to a range of upland habitats more in keeping with the upland landscape.
- To achieve long-term benefits to the upland and woodland bird communities as restoration progressed.

## Approach

Consent for the works was received in 2011 following a full Environmental Impact Assessment. The works were licensed to be carried out in 2 stages, with stage 1 completed so far. Subsequent habitat restoration has been through tree planting on the lower lying areas of the site and through natural regeneration of the open habitats. Ditches have been blocked and wader scrapes created to complement wader habitats on adjoining land.

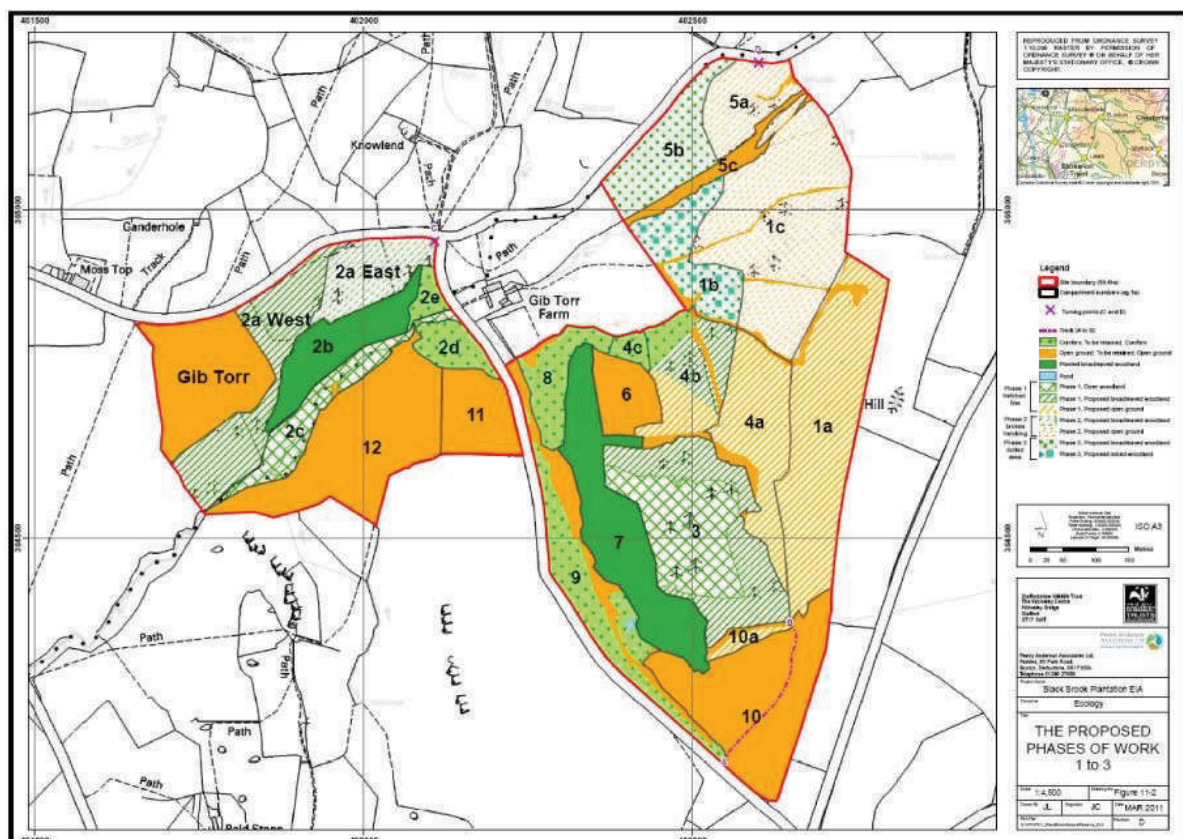
## Outcomes

To date, 14 ha of former conifer plantation has been restored to open habitat and a further 16 ha of upland broadleaf woodland has been created. Stage 2 will restore a further 7 ha of open ground habitats and create 1.5 ha of woodland. Birds are being used as a key indicator group of success, along with ongoing vegetation monitoring, although it is still early on in the process of habitat change.

## Future work

Consent for stage 2 of the works is dependent upon satisfactory establishment of habitats and is likely to commence in the next few years, subject to funding. Annual bird surveys continue and will provide an important data set and indication of long-term changes as a result of the management of the site.

**Figure 1.** Map showing the phased felling work on Brund Hill, SWT/Penny Anderson Associates



Low intensity mixed grazing at The Roaches Nature Reserve

**Habitats & species:**

**Habitats:** Moorland, blanket bog, acid grassland.

**Species:** Flora: heather, cowberry, crowberry, cranberry, bilberry, cotton grass, sphagnum spp, purple moor grass, sedge spp.; Invertebrate spp.; Birds: meadow pipit, stone chat, red grouse, curlew, merlin, short-eared owl, cuckoo.



**Photo:** Shorthorn cattle grazing on The Roaches, Scott Petrek

**Key messages**

- Positive change in moorland vegetation structure and species dominance is being observed following the cessation of heather burning and a subsequent change in grazing regime, including a reduction in sheep density and the addition of rare breed cattle grazing.
- Sheep breeds were changed to Swaledale and Derbyshire Gritstone, which are both better suited to the upland conditions.
- The grazing has resulted in the creation of tussocks within the sward that are important for invertebrates.

**Overview**

Staffordshire Wildlife Trust began their management of 'The Roaches' in May 2013. One of the first actions taken was to stop burning, lower sheep stocking density and include a cattle element into the grazing regime.

Sheep and cattle have two very different grazing approaches: sheep can be very selective and graze by nibbling with a pruning or mowing effect on vegetation; cattle use their dextrous tongue to grab and pull clumps of vegetation in a less selective approach – rare breed cattle in particular do a better job at tackling coarse swards.

Due to the two different feeding actions, low intensity mixed grazing creates a more varied vegetation structure and aids the natural cycling of dwarf shrub on the moor through the trampling of over mature or moribund heather *Calluna vulgaris* and by promoting new growth.

**Contact**

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**Partners**

Natural England and Peak District National Park

**Funding**

Higher Level Stewardship through Natural England

## **Objectives**

- Introduce native breed cattle grazing to The Roaches and Five Clouds Moor, and lower the grazing density of sheep from 160 ewes to 115 upland native breed ewes.
- Introduce cattle grazing to Back Forest Moor while excluding grazing from the woodland.
- Monitor vegetation and bird species over time to track changes.

## **Approach**

Livestock began to graze at the current rate in May 2013. The current grazing regime was discussed and agreed with Natural England and Peak District National Park. On the formation of a mixed grazing regime the grazing of The Roaches was put out to tender and a grazier was appointed and a licence granted. An underground fence system was also installed along the interface between Back Forest Moor and Forest Wood.

## **Outcomes**

Three years of the current mixed grazing scheme have seen pleasing results: there are areas that show clear formation of tussock vegetation in key locations with areas of shorter swards providing a good mosaic of sward height across the moor. The effects of the cattle on the mature heather stands is clear to see with some localised impact and trampling of dead woody material allowing young heather to flourish. Gaps can be seen within the dwarf shrub vegetation that are important for the continued cycling of dwarf shrub across the moor and providing the varied habitat required by upland species. Saplings and scrub growing on the moor also show signs of cattle browsing which in the long term will aid in their control and limit their spread.

## **Future work**

Continued surveys are planned including an annual bird census, vegetation surveys and photo monitoring to guide future stock densities and grazing schemes. A greater understanding of the movements of the livestock will be useful to the overall management of the site and may see the introduction of more underground fencing and the use of mineral licks to encourage movement of both sheep and cattle in order to aid the control of bracken and scrub. In time, the stocking densities may need to be altered again as the vegetation structure changes.

## 7. Wetlands

Authors: Nick Mott (Staffordshire Wildlife Trust), with contributions from Andrew Crawford (Environmental Agency).

### Wetlands headlines

#### Overview of habitat

Despite being completely landlocked, Staffordshire is home to a wide range of wetland habitat types. These include a series of internationally-important meres, mosses, blanket bog and inland salt marsh sites, as well as rivers, lakes, streams, reservoirs, reedbeds, fens, marshes, swamps, wet woodland and canals. In the early 1970s, sections of Staffordshire's main rivers were pronounced 'biologically dead'. Improvements in the quality of Staffordshire's watercourses since then are attributed in part to reductions in pollution and river restoration schemes, however many threats are still present and setbacks do occur.

#### Key species

Wetlands in Staffordshire support a range of Priority Species including grass-wrack pondweed, Freiberg's screw moss, white-clawed crayfish, great crested newt, Atlantic salmon, brown trout, European eel, the Southern iron blue mayfly and the Northern yellow splinter crane-fly.

#### Headlines

- There are over 3,740 hectares (ha) of wetlands habitats in Staffordshire (SER, 2016). 2,112 ha are designated with SSSI status (Natural England, 2015).
- It is estimated that over 85% of the UK's rivers and streams have been severely modified from their natural state; the picture in Staffordshire is similar (Raven *et al.*, 1998).
- 5% of waterbodies in Staffordshire are in Good Overall Status, 49% are in Moderate, 35% are in Poor and 11% are in Bad Overall Status (EA, 2016).

#### Key threats

- Habitat destruction, including dredging and drainage.
- Removal of bankside vegetation.
- Pollution and nutrient enrichment from industry (including heavy metals), agriculture and urban areas.
- Habitat fragmentation and isolation.
- Drainage and habitat conversion for agriculture.
- Climate change, atmospheric pollution, acid rain and increasing river water temperatures.
- Invasive non-native species and the spread of animal and plant diseases.

#### Successes

- The Water Framework Directive introduced a target for all 'waterbodies' (including rivers, streams, canals and lakes) to be in 'Good Ecological Status' or 'Good Ecological Potential' by 2015.
- An increase in the coordination of gravel pit restoration and other quarry sites through Mineral Plans, Local Plans and the Central Rivers Initiative.
- Implementation of landscape-scale habitat restoration projects.

#### Recommendations

- The formation of a partnership coalition to produce and launch a 50-year vision for 'Staffordshire's Wild Rivers and Wetlands'.
- Promote the establishment of wider vegetation corridors for watercourses.
- Raise the profile of the ecosystem services that wetlands provide.
- Increase community-led initiatives and citizen science.
- Continue to protect, restore and create new wetlands.



## 7.1 State of wetlands in Staffordshire

### 7.1.1 Overview

Wetland figures	Amount (ha)
<b>Current known coverage of habitat in Staffordshire</b>	<b>3740.30 (SER*)</b>
Running Water	522.96
Standing Water	1976.76
Swamp, marginal and inundation	316.20
Lowland Mire (Bogs, Flush and Springs, Fen, Bare Peat)	33.80
Upland Mire (Bogs, Flush and Springs, Fen, Bare Peat) **	792.90
Inland Saltmarsh	1.67
Wet woodland ***	96.01
*a total of 53% of the county is mapped on the SER system	
** Upland Mire is also included in the figures for the Moorland Chapter	
*** Wet woodland is also included in the figures for the Woodland Chapter	
<b>Total known habitat with statutory designation</b>	<b>2182.83</b>
Total known habitat with Ramsar designation	237.1
Total known habitat with SAC designation	698
Total known habitat with SPA designation	1085.25
Total known habitat with SSSI designation	2112
Total known habitat with NNR designation	208.73
Total known habitat with LNR designation	70.83
<b>Total known habitat with non-statutory designation</b>	<b>792.78</b>
Total known habitat with LWS designation	790.51
Total known habitat with LoGS designation	2.27

**Table 1. Coverage of wetland habitats and designated wetland sites in Staffordshire.**

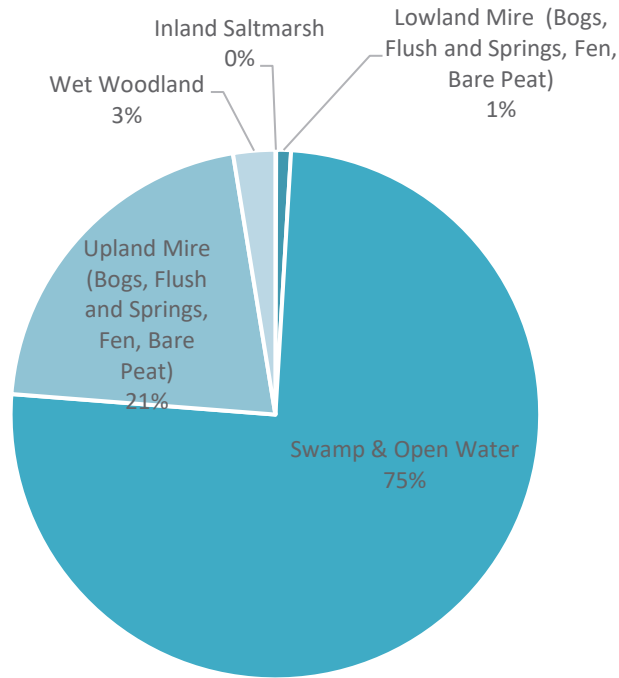
#### Wetland species:

Wetlands in Staffordshire support a range of Priority Species including grass-wrack pondweed, Freiberg's screw moss, white-clawed crayfish, great crested newt, Atlantic salmon, brown trout, eel, the Southern iron blue mayfly and the Northern yellow splinter crane fly.

#### Wetland habitats:

UK Priority / BAP habitats that occur in Staffordshire include floodplain grazing marsh, lowland wet grassland, wet woodland, valley mire, reedbed and standing water.

Lowland wet grassland, wet woodland, inland saltmarsh, mosses, reedbed, rivers and streams, and ponds, lakes and canals are listed as Priority habitats on the Staffordshire Biodiversity Action Plan.



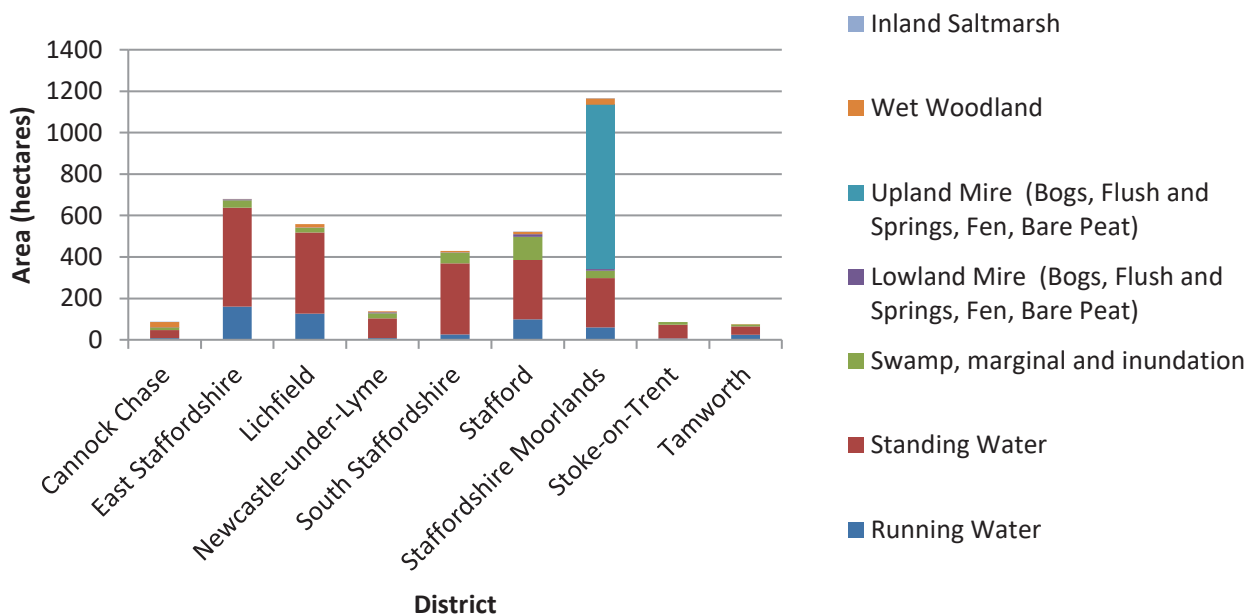
## Wetland habitats

Total area = 3740 ha

Note: Data from Staffordshire Ecological Record (SER) (June 2016). 53 % of Staffordshire is mapped on the SER system. Some habitats are also included in graphs in other chapters. Many wetland habitats are linear features and have not been incorporated in these figures.

Figure 1. Percentage breakdown of wetland habitat types recorded in Staffordshire.

## Area of wetland habitats in Staffordshire by Local Authority area



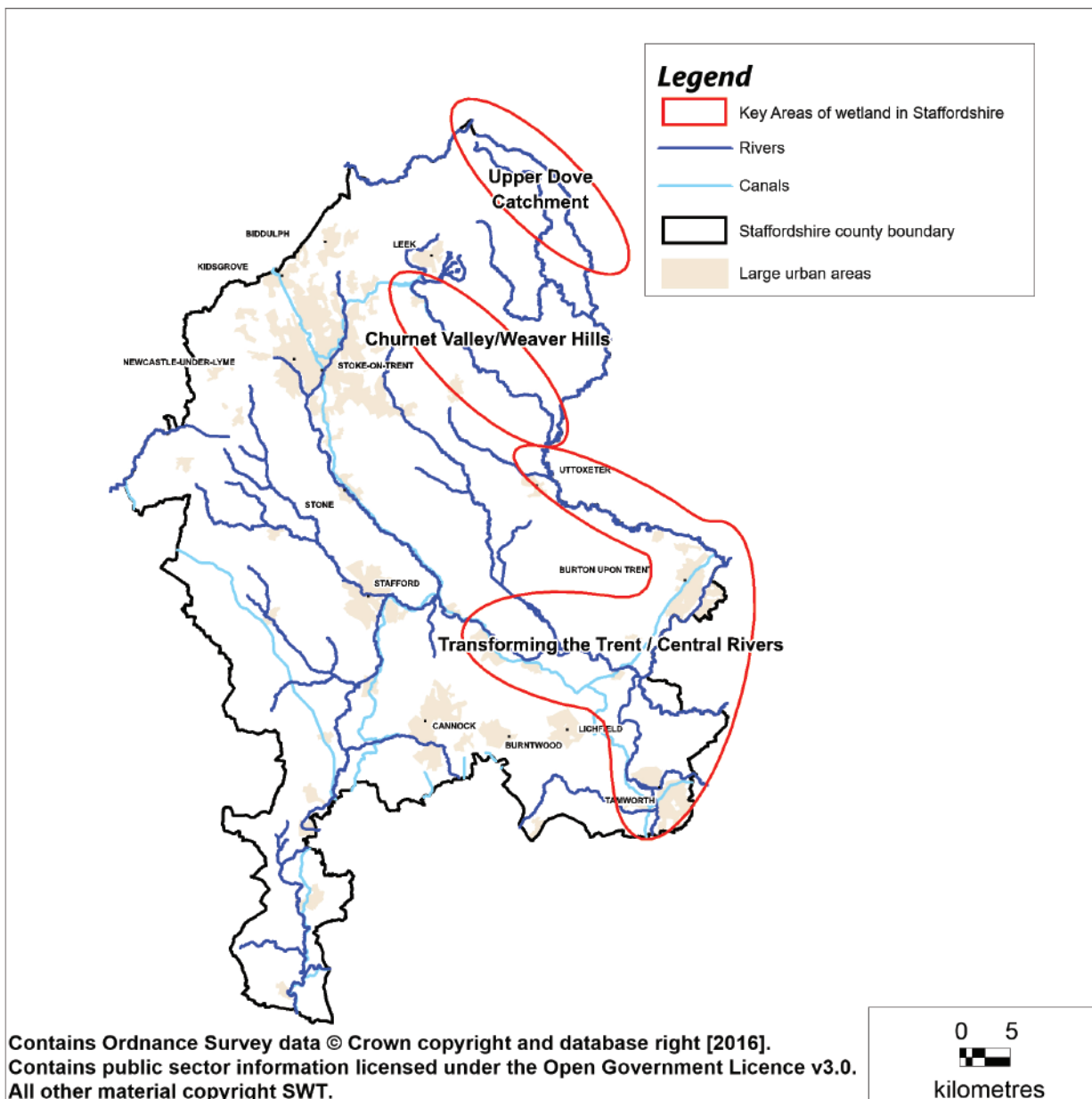
Note: Data from Staffordshire Ecological Record (SER, 2016). 53% of Staffordshire is mapped on the SER system.

Figure 2. Area of wetland habitats in Staffordshire by Local Authority area.

Staffordshire is unusual in that it covers three separate river basins, namely the Trent (draining to the North Sea via the Humber), the Weaver (draining to the Irish Sea via the Mersey) and the Severn (draining to the Bristol Channel and Atlantic Ocean). Thus, land use in Staffordshire has implications for a wide range of estuarine and marine environments elsewhere. The range of rivers and streams, resulting from complex patterns of geology, topography, hydrology and land use, include limestone streams, forest streams, woodland streams, hill streams and large floodplain rivers. Many of woodland streams in the county, locally as Drumbles, Dingles, Pingles & Sprinks, are true surviving 'biodiversity hotspots'.

The main wetland habitats found in Staffordshire include:

- Flowing water and associated habitats
  - o Headwaters and tributary streams and their associated habitats
  - o Large floodplain rivers and their associated habitats
- Standing water
  - o Sand and gravel pits - 'new' wetlands are being created at post-industrial sites, most notably the complex of sand and gravel pits in the Tame, Trent, Dove and Black-Bourne Brook valleys (e.g. Middleton Lakes, Croxall Lakes and Branston Water Park).
  - o Canals and their associated corridor habitats as well as marinas, redundant canals at various stages of habitat succession, and canal feeder lakes.
  - o Ponds
  - o Lakes
  - o Reservoirs
- Meres & Mosses, Peatlands and Blanket Bog
- Inland Saltmarsh - between Stafford and Great Haywood, parallel with the river Trent, an underlying saline component in the geology, has given rise to some areas of inland salt marsh, although this represents only a fraction of the former coverage.
- Other wetland habitats
  - o Fen, marsh, swamp, mire
  - o Wet woodland (also see woodland chapter)
  - o Drumbles (also see woodland chapter)



**Figure 3. Main rivers and key wetland areas in Staffordshire.**

### **7.1.2 Habitat changes**

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding. A comparison of Local Wildlife Sites (LWSs) was also undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016. A summary of the results from these analyses as well as additional trends relating to wetland habitats are presented in Table 2. The methods used for the 1km grid square and LWS analyses are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares known of wetland habitats in Staffordshire	3740 ha
Hectares of wetland habitats in 1978-83 in the 68 selected 1 km grid squares	87 ha
Hectares of wetland habitats in 1995-2015 in the 68 selected 1 km grid squares	244 ha
Change in lowland mire analysed in 1 km grid squares (including bogs, flush and springs, fen and bare peat)	-18 ha
Change in upland mire analysed in 1 km grid squares (including bogs, flush and springs, fen and bare peat)	+167 ha
Change in swamp and open water analysed in 1 km grid squares (including open water, running water, swamp, marginal and inundation categories)	+8 ha
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>• 5.48 ha lowland mire changed to deciduous woodland in the second survey.</li> <li>• 5.73 ha of lowland mire changed to lowland heathland in the second survey.</li> <li>• 169.86 ha of upland heathland changed to upland mire in the second survey due to re-classification rather than change in actual habitat.</li> <li>• Although 3.91 ha of swamp and open water changed to deciduous woodland and 3.43 ha to neutral grassland in the second survey, 9.28 ha of rock exposures and 5.8 ha of poor quality grassland had changed to swamp and open water.</li> </ul>	
<b>Summary of habitat changes from the Local Wildlife Site analysis</b>	
<p>At present there are 753 ha of wetland habitat under a LWS designation in Staffordshire. Approximately 10 ha of wetland LWS was de-scheduled in Stafford Borough and East Staffordshire between the original 96-2000 baseline surveys and the modern resurveys of the same sites.</p>	
<b>Summary of key wetland species changes</b>	
<ul style="list-style-type: none"> <li>• Increase in number of otter sites from 1977 – 2015.</li> <li>• Critical declines in water vole and white-clawed crayfish.</li> <li>• Suspected declines in all native amphibian species.</li> </ul>	
<b>Summary of reasons for changes</b>	
<ul style="list-style-type: none"> <li>• The main change in wetland habitat identified in the 1km surveys was due to habitat re-classification rather than an actual change in habitat.</li> <li>• Water quality improvements and improved legislation has helped otter recovery.</li> <li>• Introduction and subsequent establishment of introduced, non-native species that predate or outcompete native species or spread disease such as the American mink predated on water vole, and the American signal crayfish that has spread disease amongst the native white-clawed crayfish population.</li> <li>• Natural succession / neglect and infilling of ponds has impacted upon amphibian populations</li> </ul>	

**Table 2. Summary of changes relating to wetlands.**

The quality of Staffordshire's watercourses and wetlands suffered significantly in the 20th Century, with urbanisation, flood defence schemes, pollution, agricultural intensification and drainage, resulting in a catastrophic decrease in the area and complexity of Staffordshire's wetland heritage. Natural processes, such as the seasonal inundation of floodplain wetlands and dynamic river habitats, have been largely arrested by river engineering works, the establishment of settlements and infrastructure on floodplains, and the construction of dams, weirs, sluices, culverts and bridges. The deepening and straightening of rivers made it possible to drain large areas of wetland that was converted into more productive farmland for grazing livestock or growing cereals. In some areas, rivers were further disconnected from their traditional floodplains through the construction of embankments. The nadir for Staffordshire's main rivers (most notably the Tame, Trent and Churnet) was the early 1970s when sections of them were pronounced 'biologically dead', and a cause of major pollution into the North Sea.

The loss of the majority of our 'keystone species' has seen the profound impoverishment of our wetlands in terms of complexity, abundance and richness. The extinction of beaver, wolf and bear as 'landscape architects' is obvious when looking at modern Staffordshire's surviving wetlands and their overall natural functioning states. Frequent human intervention (management), which mimics the roles of these missing species is often required to maintain these habitats in Favourable Condition (e.g. coppicing, raising water levels, pond creation, vegetation cutting and removal, deer culling, grazing). Other surviving keystone species, such as indigenous river mussels and crayfish, have suffered catastrophic declines since the 1980s and deliberate or accidental introduction of competitor species. The ecosystem services that these species provide (benefitting water quality and overall watercourse health) is therefore being lost. Evidence to date indicates that their replacement by an influx of non-indigenous bivalves and crustaceans in recent decades is of further detriment to our freshwater ecosystems. In 2010, the estimated annual cost of invasive non-native species to the British economy was approximately £1.7 billion (Williams *et al.*, 2010), with wetlands being particularly vulnerable to their impacts. A vast increase in Himalayan balsam, Japanese knotweed and American skunk cabbage was recorded between [Eades & Hawksford \*et al.\*](#)

There have, however, been continuous improvements in the state of Staffordshire's rivers since the 1970s with, for example, reductions in pollution, increases in river restoration schemes, and developments and flood defence schemes planned to minimise impacts or benefit wetlands. Management of rivers and streams is often about providing the space for natural processes to re-assert themselves. However, it is often necessary to 'kickstart' these natural processes through river restoration 'interventions' such as the re-profiling of meanders, river widening, returning gravels to the channel, or re-creating islands using live willow trees. Exciting opportunities to help redress the balance do exist.

'New' wetlands are also being created at post-industrial sites, most notably the complex of sand and gravel pits in the Tame, Trent, Dove and Black-Bourne Brook valleys (e.g. Middleton Lakes, Croxall Lakes and Branston Water Park). Former hard rock quarries (e.g. Dosthill Quarry Pool, Moneystone and Kevin Quarry) and open cast sites (e.g. Bleakhouse) also provide high quality wetland habitats. Additional post-industrial wetlands include canal feeders (e.g. Belvide SSSI, Chasewater SSSI and Greenway Bank Country Park), redundant canals (e.g. Cannock Extension Canal SAC) and engineered water meadows (e.g. Trent Vale, Rugeley Fen and Wychnor). Additional permanent and ephemeral wetlands are being created through urban and rural SuDS (e.g. swales, ponds, balancing lakes, reedbeds, and rain gardens) via the planning system. However, many more opportunities need to be secured to help offset developments on wetlands, watercourses, floodplains and wider catchment areas. Further opportunities for creating wetland habitats need to be grasped via the planning system at landfill sites.

### 7.1.3 Habitat condition

Water quality has increased year on year since tough legislation was first introduced in the 1970s and former 'dead rivers' started to come back to life in the 1980s. Now, 5% of waterbodies in Staffordshire are in Good Overall Status, 49% are in Moderate, 35% are in Poor and 11% are in Bad Overall Status (EA, 2016). Despite the general trends of improvements since the 1970s however, major setbacks still occur, often due to major pollution incidents and from more insidious incidents such as diffuse agricultural production with pesticide residues impacting water quality in certain sub-catchments, e.g. Tittesworth.

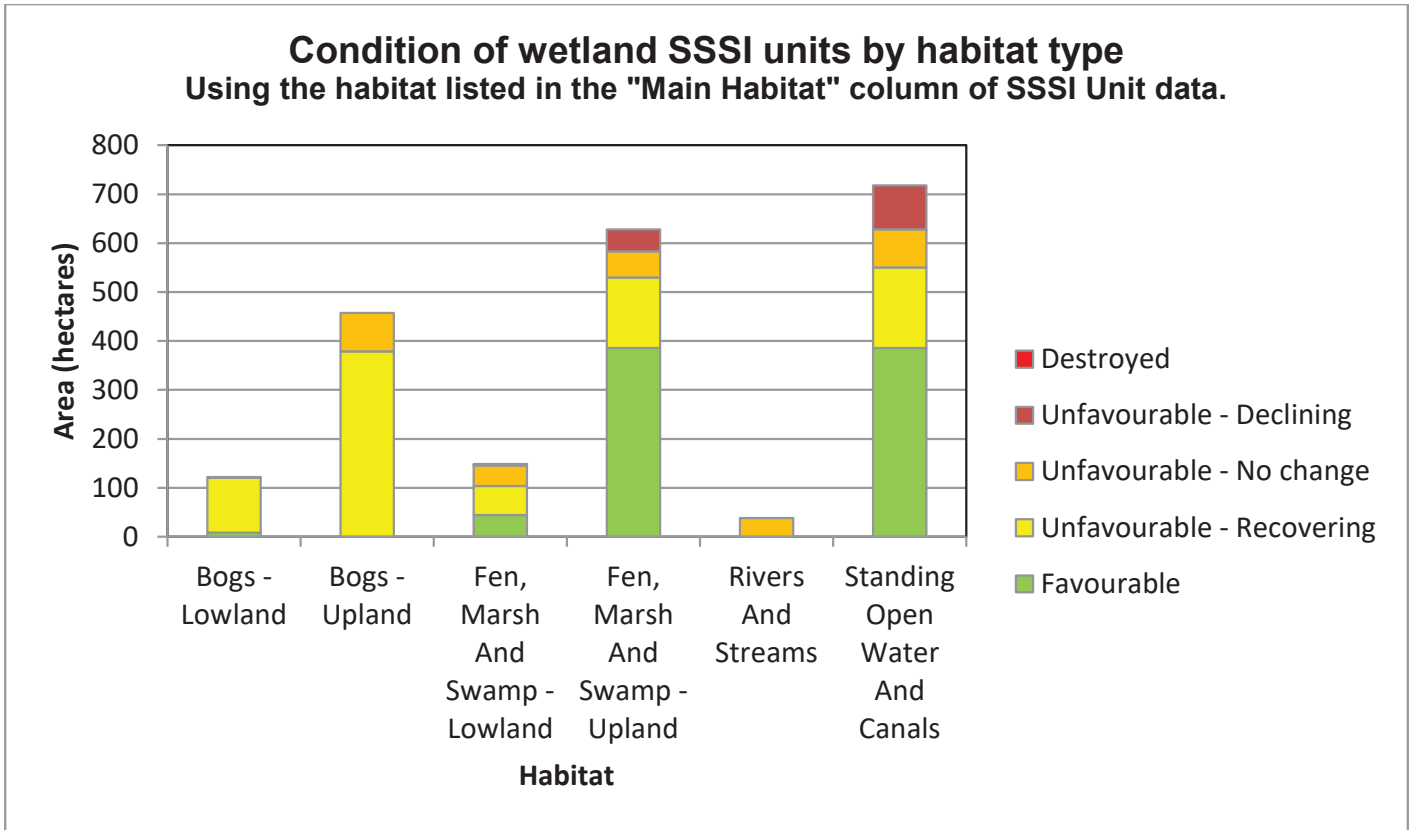


Figure 5. Condition of SSSI units in Staffordshire where the main habitat in the unit is wetland (data correct as of 4th December 2015; Natural England, 2015).

## 7.2 Threats

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers 1-6, 8-18:** Dominant species control, pollution, nitrification, runoff (roads, land uses, chemical) overgrazing, access / disturbance, habitat fragmentation and severance, resources, nitrogen deposition, neglect (ponds and early-mid successional habitats), inappropriate management, intensive agriculture, habitat loss, land drainage, invasive non-native species

### Additional specific recommendations for wetlands

- Habitat fragmentation and isolation.
- Habitat connectivity of watercourses disrupted by dams, weirs, sluices, poorly designed bridges and culverts, and online fishing or ornamental lakes.
- Habitat destruction, including dredging and drainage for agriculture.
- Removal of riparian vegetation for land drainage, agricultural intensification and development.
- Reduction in the number of clean water ponds (due to being infilled/siltation, drainage, neglect, pollution).
- Pollution (point source and diffuse) and nutrient enrichment from industry (including heavy metals), agriculture (including pesticides) and urban areas.
- Nitrate and/or phosphate pollution from overstocked online stillwater fisheries especially in headwater areas, that are not routinely monitored.
- Salt pollution from urban areas (urea) and road run off (gritted slopes).
- Removal of Nitrate Vulnerable Zone status from Staffordshire.
- Acidification from conifer plantations.
- Oxidation of bare peat at blanket bog sites and degraded meres and mosses.
- Climate Change, atmospheric pollution, acid rain and warming river water temperatures.
- Maize cultivated on slopes leading to loss of top soils and accompanying diffuse pollution.
- Invasive non-native species, in particular Himalayan balsam, *Crassula helmsii*, Japanese knotweed, giant hogweed, skunk cabbage, New Zealand pygmyweed, water fern, floating pennywort, American signal crayfish, Asian clam, Zebra mussel, several species of carp and American mink.
- The spread of animal and plant diseases (e.g. crayfish plague).
- Canal bank steel piling and concrete lining programmes.
- Funding reductions for direct habitats and species' work.
- Historic lack of set criteria for identifying the best examples of rivers, streams and their corridor habitats has impacted upon our ability to protect them.



### 7.3 Conserving wetlands – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies below:

CASE STUDIES
Case studies elsewhere in the report relevant to wetlands: <ul style="list-style-type: none"><li>• Friends of Motte Meadows (grassland chapter)</li><li>• Love Your River – Stoke and urban Newcastle (built environment chapter)</li><li>• Logjammer hoverfly (invertebrate chapter)</li><li>• Forest Streams: Cannock Chase crayfish project (invertebrate chapter)</li><li>• Otters in Staffordshire (mammal chapter)</li><li>• Gayton Brook Catchment Partnership 2010-2014 (fish chapter)</li><li>• Himalayan balsam control (plant chapter)</li></ul>
Case study 1 - Friends of the Wom Brook (Authors and contributors: Anita Ferguson)
Case study 2 – Wetland restoration – Perkins Engines Limited (Authors and contributors: Shaun Rimmer)

In addition to the case studies above, there are more examples of positive work that is of benefit to wetlands in Staffordshire. These include:

- Extensive water company investment via Asset Management Planning (AMP), including the modernisation of waste water treatment facilities.
- Introduction of EU Directives that have helped set ambitious targets for the protection of habitats, species, water quality, and air quality. The Habitat Directive and the Birds Directive led to the creation of additional or upgrade of existing protected areas (SSSIs) including Special Area of Conservation (SACs) and Special Protection Areas (SPAs). The Water Framework Directive introduced a target for all 'waterbodies' (including rivers, streams, canals and lakes) to be in 'Good Ecological Status' or 'Good Ecological Potential' by 2015.
- Increased coordination of gravel pit restoration and other quarry sites through Mineral Plans, Local Plans and CRI.
- River reach re-naturalisation schemes.
- River valley projects and the establishment of landscape partnerships (e.g. Tame Valley, South West Peak, Trent Valley Washlands and Transforming the Trent Valley Landscape Partnership Project).
- Notification of River Mease SSSI / SAC in 2000.
- Farming Floodplains for the Future initiative successfully implemented 2007-2010.
- Large Woody Debris campaigns' work (e.g. Tittesworth National demonstration project 2009 onwards).
- Habitat restoration on a landscape scale (e.g. Cannock Chase Forest Streams 2006 onwards).
- Advent of ecosystem services and recognition of the crucial role wetlands play in modern society (flood attenuation, filtering for increased water quality, soil protection and carbon storage).
- White-clawed crayfish Ark sites' work (2012 onwards), e.g. Cannock Chase.

## 7.4 Conserving wetlands – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M2 – M6; M9-M10; M13; M17; DM1 – DM4:** Improve the following: habitat size and connectivity; manage for structural habitat diversity; increase resources; ensure appropriate grazing; improve planning and use of chemicals; implement sustainable drainage systems (SuDS); integrated planning and management of sites across ownership boundaries; integrated use of volunteer groups; survey and monitoring; increase research; agri-environment schemes; habitat creation through the planning system; grants; guidelines for planning

### Additional specific recommendations for wetlands.

- Continue to protect, restore and create new wetlands.
- Promote the establishment of wider vegetation corridors for watercourses.
- Raise the profile of ecosystem services that wetlands provide and link these to ongoing habitat protection, re-naturalisation and creation schemes, Natural Flood Management, soil protection, groundwater recharge and water temperature regulation.
- Increase community-led initiatives and citizen science - these are crucial to continue making a big impact. River rangers, citizen science (e.g. Riverfly volunteer networks), 'Friends of' groups, schools, colleges and universities all need to take charge of their patches and areas of influence.
- Develop a partnership coalition to produce and launch a 50-year vision for 'Staffordshire's Wild Rivers and Wetlands' with partner organisations.
- Develop a partnership coalition to launch a 'Make Room for Rivers' campaign to promote the establishment of wider buffer zones for watercourses, canals and their corridor wetlands and to encourage natural processes such as river migration, erosion, deposition and the establishment of associated habitats such as riverine woodland, ox-bows, backwaters and scour pools.
- Develop partnerships between stillwater fisheries managers and users and conservation partners to undertake water quality self-assessments.
- Consider the importance of south-north orientated river valleys (e.g. the Penk and the Tame-Trent) as important national 'climate corridors' for species adapting to changing phenology patterns. The Trent/Tame/ Warwickshire Blythe corridor is a vital flyway for migrating wetland birds.
- Designate additional Drinking Water Protection Zones.
- The criteria for identifying the best examples of rivers, streams and their corridor habitats has recently been set and resources are required to undertake systematic surveys to designate river LWSs and additional clean water pond SBIs throughout the county.
- Review spot and reach dredging work on canals and navigable sections of rivers to introduce new best practice for promoting the conservation of indigenous mussels and other freshwater species.
- Undertake a comprehensive review of sites in Staffordshire to consider the feasibility of re-introducing Eurasian beaver.
- Continue to deliver the specific Water Framework Directive programme of measures required to make sure that all Staffordshire's waterbodies are in GES / GEP by 2027.
- Continue to develop the Living Landscapes' / Landscape Partnerships' wetlands' work in the Churnet Valley (and Weaver Hills), Tame Valley, Trent Valley Washlands (includes Lower Tame and Lower Dove river valleys), South West Peak and Stoke & Urban Newcastle.
- Continue to host and support the Staffordshire Trent Valley Catchment Partnership (part of the national Catchment-based Approach [CaBA]) and actively support other CaBA hosts elsewhere (e.g. Trent Rivers Trust for the Dove Catchment).
- Continue the Cannock Chase Forest Streams project and research work to benefit globally endangered populations of white-clawed crayfish, fish and a number of Red Data Book invertebrates.
- Restoration of sand and gravel quarries provides a significant opportunity for wetland creation and river restoration in the Trent and Tame valleys.
- Further opportunities for creating new post-industrial wetland habitats need to be grasped via the planning system at mineral and landfill sites.

## Friends of the Wom Brook

### Habitats & species:

**Habitats:** Wetland.

**Species:** Mammals: water vole, otter; fish: bullhead, stone loach, stickleback; Birds: grey wagtail, kingfisher, dipper; Butterflies: common blue, small copper, small and Essex skipper.



Photo: Water vole, Derek Crawley

### Key messages

- The water vole population of Wom Brook continues to be considered one of the best sites for water vole in Staffordshire.

### Overview

The Wom Brook flows east to west through Wombourne for approximately 1 3/4 miles, and passes through habitats with distinguishable characteristics along its course, including areas that are fully tree-lined and shaded, areas that are tree-lined on one side only, and areas that are open. This diversity benefits that wildlife that use the area.

Continual management of this area by the Friends of Wom Brook group (FWB) has been based on research and on-site observations since 2004. The Friends group is a voluntary group.

### Contact

Anita Ferguson  
Friends of Wom Brook  
[anita28@fsmail.net](mailto:anita28@fsmail.net)

### Partners

Friends of Wom Brook, South Staffordshire District Council (SSDC)

### Funding

Initial funding was via a large donation from a County Community Fund. Additional funding has come from South Staffordshire District Council, McCains, local donations, and membership payments.

## Objectives

- To maintain and enhance the nature conservation potential of the Wom Brook for the education and enjoyment of the public, working in partnership with SSDC.
- To manage the banks of the Wom Brook as buffer zones for water voles.

## Approach

Work parties meet twice monthly, or weekly from June to October, to undertake practical work to benefit the conservation of the site. This includes tackling the non-native, invasive plant Himalayan balsam, litter picking, and removal of larger objects including manageable branches. Management of bankside vegetation is also carried out, primarily to benefit water voles, and FWB have also created three wildflower areas using plug plants and seed.

## Outcomes

Management work has, to date, proved very successful in maintaining a healthy population of water voles. The management of the bankside vegetation and creation of wildflower areas has also increased floral diversity and has therefore had positive knock on effects on insect abundance and diversity - at least 15 species of butterflies have been recorded each year since monitoring started.

## Future work

Management works are planned to continue in order to maintain the water vole population and further improve the biodiversity of flora and fauna in the area. It is also important to further reduce the abundance of Himalayan balsam.



**Photo:** Wom Brook, Kate Dewey

Wetland restoration - Perkins Engines Limited

**Habitats & species:**

**Habitats:** Wetland, alder carr.

**Species:** Long-tailed tit, barn owl, badger, nine-spined stickleback, emperor dragonfly, harvest mouse.



**Photo:** Wetland restoration on the Perkins site, Shaun Rimmer

**Key messages**

- Advice and support given to Perkins Engine Company Ltd (Stafford) to support the management and enhancement of on-site habitats.
- Volunteer working group supported by Staffordshire Wildlife Trust to carry out future site management.
- Fen restoration works delivered on area of floodplain of the River Sow on the eastern outskirts of Stafford.

**Overview**

In 2010 works were carried out to restore an area of relict fen that lies within the floodplain of the River Sow on the eastern outskirts of Stafford, and that was owned by Perkins Stafford, an engine production company. After these works were completed, Perkins were given a management plan created by Staffordshire Wildlife Trust. To meet management objectives Perkins had the support of staff and Staffordshire Wildlife Trust's 'Wild About Stafford' project to help implement on site management. As part of this management, a third of the fen was cut with Stafford College and Perkins Engine Ltd Staff in 2014.

In September 2015 Perkins contacted Staffordshire Wildlife Trust in regards their renewed commitment to the management of the site. As a result, further fen restoration was introduced in 2016, with support and delivery managed by Staffordshire Wildlife Trust.

**Contact**

Shaun Rimmer  
Staffordshire Wildlife Trust  
Email: [s.rimmer@staff-widllife.org.uk](mailto:s.rimmer@staff-widllife.org.uk)

**Partners**

The project was managed by Staffordshire Wildlife Trust, with Perkins Engines Ltd (Stafford)

**Funding**

The project was funded by Perkins Engines Company Ltd and the Caterpillar Foundation

## Objectives

- To engage with local businesses to enhance local biodiversity.
- To restore fen land and adjoining on-site habitats.
- To support the development of long term wetland management with employee support.

## Approach

After initial meetings with Perkins in 2010 and the resulting fen restoration works delivered by Staffordshire Wildlife Trust's (SWT) Wetland Officer, the SWT Wild About Project Officer continued the relationship by implementing funded events for employees and the local community to conserve and promote the wildlife interest in the site. This support also helped to galvanise a core of Perkins volunteers who were keen to enhance their site for employees and the wider local community. After this initial funding finished, Perkins continued utilising SWT to deliver events and develop further wetland restoration works.

## Outcomes

The advice and support given to the company by SWT led to the restoration of 6 ha of fen land and its ongoing management with local volunteers. The work has also seen the management of a wildflower meadow located on-site and site surveys/studies completed by Stafford College. Barn owl boxes have been installed that have been successful in attracting a breeding pair. Overall since 2014 there have been 20 wildlife conservation themed events attracting over 250 people.

## Future work

Though funding for the initial project has ended, the relationship between Perkins and SWT continues, with plans in the pipeline to draw up an agreement to continue site management and for the delivery of more educational events.



**Photo:** Students from Stafford College helping to manage the Perkins site, Shaun Rimmer

## 8. Built environment

Authors: Rhona Goddard (Butterfly Conservation), with contributions from Bernadette Noake (Staffordshire Wildlife Trust), Mike Shurmer (RSPB), Craig Slawson (Staffordshire Wildlife Trust) and Ali Glaisher (Staffordshire County Council)

### Built environment headlines

#### Overview of habitat

The built environment is a network of habitats associated with the built and industrial environment including roadside verges, railway embankments, parks, cemeteries, gardens, street trees, buildings with wildlife features, previously developed land (brownfield sites) and quarries. Not all of these habitats occur within urban areas.

#### Key species

Due to the variety of habitats that can be found within the built environment, a large variety of species are associated with them, including many rare, protected and Priority Species including great crested newt, house sparrow and soprano pipistrelle.

#### Headlines

- Staffordshire has approximately 24,000 hectares (ha) of urban area (9.1% of the county) (SER, 2016a).
- There are 227 ha of open mosaic brownfield habitats mapped in Staffordshire, approximately 1,200 ha of urban broadleaved woodland and approximately 600 ha of urban meadows (SER, 2016a).
- Over 100 roadside Local Wildlife Sites have been designated in Staffordshire to date (SER, 2016b).

#### Key threats

- Habitat loss and fragmentation.
- Lack of awareness and information about the wildlife value of built sites and their associated habitats.
- Developments not incorporating habitats and features for wildlife.
- Lack of monitoring and enforcement on development sites.
- Poor habitat management, e.g. cutting regimes of roadside verges.

#### Successes

- Community projects and citizen science involving local residents in improving urban environments such as Love Your River and the Burton Tree Project.
- Sustainable Drainage Systems (SuDs) are being increasingly incorporated into planning.

#### Recommendations

- Work with HS2 Ltd to create new habitats, retain and enhance connectivity and ensure habitat losses are mitigated.
- Improve understanding of habitats and species, particularly brownfield sites.
- Connect isolated habitats.
- Continue best practice restoration of quarries to wildlife habitat and secure long-term management.
- Ensure appropriate management and protection of habitats within the built environment.
- Incorporate habitats and features for wildlife in developments.

## 8.1 State of the built environment in Staffordshire

### 8.1.1 Overview

Built environment figures	Amount
Current known coverage of habitat in Staffordshire	<b>24,000 ha (SER*)</b> (9.1% of the county)
*a total of 53% of the county is mapped on the SER system	

**Table 1. Coverage of the built environment in Staffordshire.**

#### Built environment species:

The diversity of habitats found within the built environment provide a wide range of resources which support many different species including rare, protected and Priority Species such as house sparrow, great crested newt and soprano pipistrelle. Around 30 species of butterfly are associated with built environment habitats, with key species including grizzled skipper, which is only known from two sites in Staffordshire, wall brown and dingy skipper, which has strongholds in the Stoke-on-Trent and Churnet Valley areas. Unusual assemblages of plant species are also often present due to past human activities including soil and rock disturbance.

#### Built environment habitats:

Open mosaic habitats on previously developed land (OMPDL) is a Priority Habitat listed under Section 41, Natural Environment and Rural Communities Act 2006. Canals, ponds and open water as well as ex-industrial land, such as old factories or brickworks, form important habitats. OMPDL otherwise known as brownfield habitats are a distinctive characteristic of historical industrial towns e.g. Stoke-on-Trent, which often support rare plants and invertebrates not found in the wider countryside. Limestone, sand and gravel quarries have excellent potential for habitat restoration and creation whilst the verges and embankments along Staffordshire's network of transport routes also provide valuable wildlife corridors, including roads, tracks, towpaths and abandoned railway lines.

Staffordshire's built environment supports a range of habitats that are important for both wildlife and the health and wellbeing of people. The built environment includes open mosaic habitat, brownfields, urban, gardens and linear transport networks (canals, roads, railways).

Brownfield habitats are a distinctive characteristic of historical industrial towns e.g. Stoke-on-Trent, which often support rare plants and invertebrates not found in the wider countryside. The historical Planning Policy Statement 9 (PPS9), acknowledged that brownfield land or "previously developed land" can support "significant biodiversity", and where it does so "local authorities should aim to retain such interest or incorporate it into any development on the site. Due to the industrial legacy of Staffordshire, built environment brownfield sites or artificial habitats can be found almost throughout the county and have a high potential to benefit biodiversity through:

- Supporting a number of priority terrestrial and aquatic habitats that can support a diverse and wildlife rich landscape with many rare, protected and Priority Species.
- Providing micro-habitats through having complex and structurally diverse habitats, with lots of edge habitats.
- Providing floral diversity with a variety of successional stages (early successional stages are associated with many rare species).
- Acting as a wildlife corridor, linking areas of habitat and enabling species to move through the landscape.
- Mimicking natural habitat features, e.g. bird nest boxes.
- Providing recreational, educational and accessible wildlife resources.



The verges and embankments along Staffordshire's network of transport routes also provide valuable wildlife corridors. For example, several disused railways in Staffordshire have been converted to cycleways and footpaths. Some of these have an important role as ecological corridors, especially where they run through agricultural or urban landscapes, connecting habitats as well as providing recreational benefits. Disused railways tend to be tree and scrub lined but can also support other habitats such as species-rich grassland and tall herb communities on cuttings or embankments.

Significant species recorded on disused railways include bats found in tunnels and bridges, brown hare, grass-snake, glow-worm, white-letter hairstreak and wall butterflies, mountain currant, and meadow thistle. Disused railways managed by Staffordshire County Council include the Stafford-Newport Greenway, the Leek to Rushton Railway, the Churnet Valley (Denstone to Oakamoor) Railway and the Manifold Track. Some disused railways are designated Local Wildlife Sites along all or some of their lengths.

To increase understanding of the species that utilise the built environment, the protected and Priority Species information held by Staffordshire Ecological Record was analysed against a GIS layer showing the dominant urban areas in Staffordshire.

The species records were tagged if they were within the urban areas, and then this was translated to a percentage of the total number of records for that species (this reduced the effects of recording effort). The area of the urban layer was just under 9% of the total area of Staffordshire, hence a species with no urban bias should register around 10% of records in the urban environment.

Additionally the following filters were placed on the records, again to reduce the effects of sampling errors:

- Only species with greater than 50 sightings were included in the analysis
- For 1km precise records they were only included if the whole of the 1km square fell within the urban area

The analysis resulted in 250 species being recorded within the urban area out of a total of 1,307 recorded in Staffordshire, but only 168 were recorded more than 50 times. Of these 168 species a significant number were moths (53 species), indicating a clear bias for running moth traps in urban/suburban gardens with 40 moth species in the top 50 urban species. As a result these were excluded from these results.

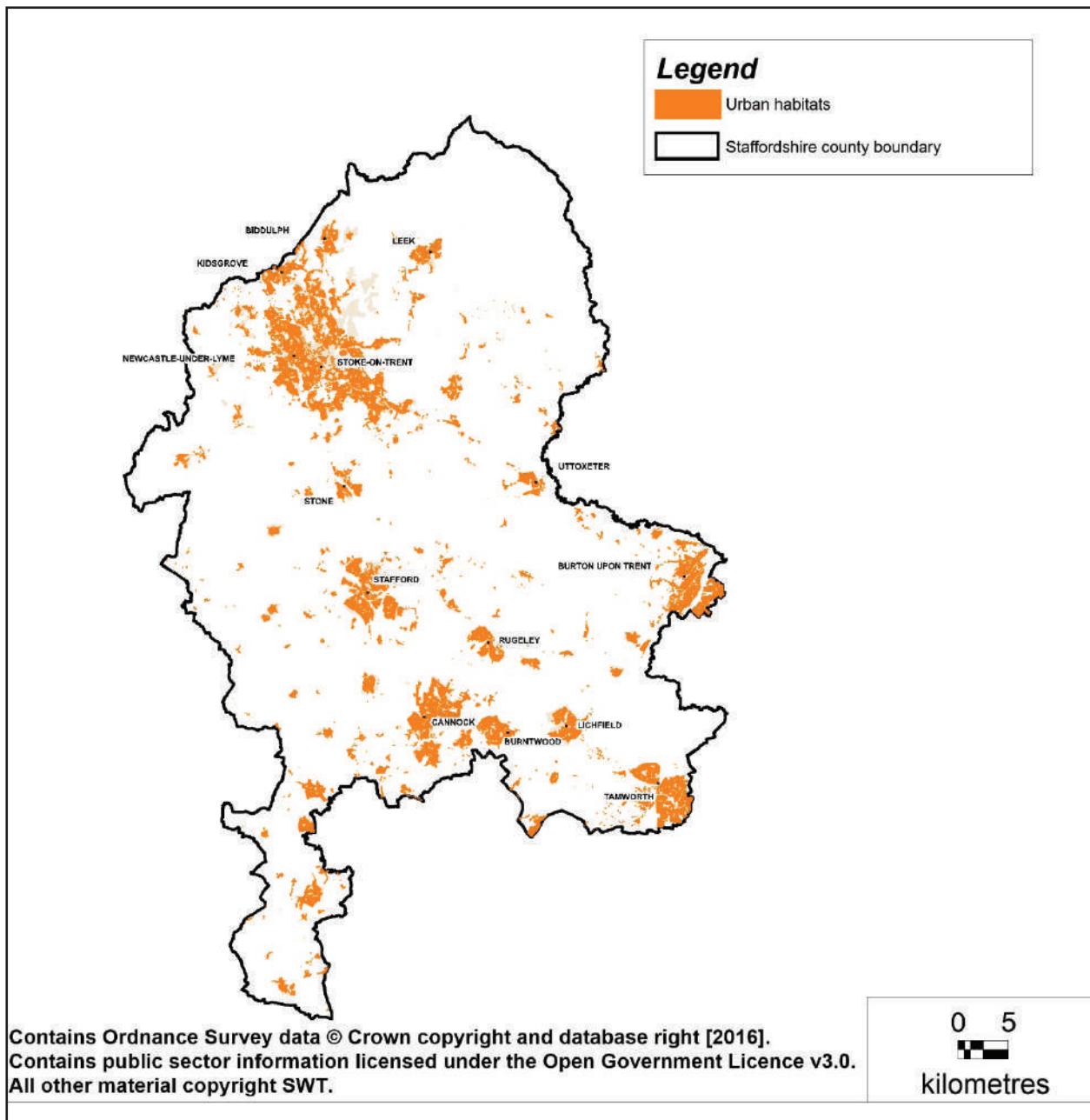
The resulting 'top ten' urban species, excluding moths, was:

1. Tree Bumblebee (62%)
2. Hedgehog (44%)
3. "A bat" (39%) (most of these will be pipistrelles)
4. A pipistrelle bat (*Pipistrellus pipistrellus* sl) (36%)
5. Red Mason Bee (36%)
6. A pipistrelle bat (*Pipistrellus* sp.) (34%)
7. Common Pipistrelle (27%)
8. Lesser Noctule or Leisler's Bat (21%)
9. Brown Long-eared Bat (19%)
10. Common Wasp (19%)

The bias towards urbanity was not considered significant below 2x the average. There is not a top ten rural species as over 1,000 species were not found in the urban areas.

This analysis seem to show more about the general public's habits regarding biological recording rather than the actual status of any species:

- Bats are more likely to be perceived as a problem in urban areas, so are more likely to be reported or surveyed for through development.
- People notice invertebrates when they are in their garden or house and are more likely to record them, whereas they tend not to not record them in the wider countryside (with the exceptions of organised surveys).
- Most moth traps are run in urban gardens.



**Figure 1. The urban areas of Staffordshire.**

### 8.1.2 Habitat changes

An analysis of habitat change took place for 68 1km grid squares comparing survey data from 1978-1983 against 1995-2015. The selection of 1km grid squares focused on those with a high proportion of designated sites (e.g. SSSIs) due to their higher mapping coverage, and data should be interpreted with this understanding. A summary of the results from this analysis is presented in Table 2. The methods used for the 1km grid square analysis are presented in Appendix C.

<b>Summary of habitat changes from the 1km grid square analysis</b>	<b>Amount</b>
Total current hectares known of open mosaic habitat in Staffordshire	24,000 ha
Number of hectares analysed in 1 km grid square analysis	3387 ha
Hectares of built-up habitat, including buildings and gardens, in 1978-83 in the 68 selected 1 km grid squares	6.57 ha
Hectares of built-up habitat, including buildings and gardens, in 1995-2015 in the 68 selected 1 km grid squares	23.69 ha
Change in analysed 1 km grid squares	+17.12 ha
<b>Further explanation of habitat changes in 1km grid squares</b>	
<ul style="list-style-type: none"> <li>• 3.92 ha of built-up habitat changed to scrub in the second survey.</li> <li>• 2.04 ha of built-up habitat changed to farmland in the second survey.</li> <li>• 7.30 ha of neutral grassland changed to built-up habitat in the second survey.</li> <li>• 8.16 ha of poor quality grassland changed to built-up habitat in the second survey.</li> </ul>	
<b>Summary of reasons for changes</b>	
<p>It is not easy to provide trends on changes in the built environment due to a lack of survey data, however there are many examples where development has resulted in the loss of important habitats, with the approach to biodiversity in developments and by local planning authorities being varied. Many habitats suffer from inappropriate management and watercourses are threatened by pollution.</p> <p>Despite this, there are positive examples of habitat protection and creation (see case studies). There are opportunities to create and improve habitats through the planning process such as at Redhill Business Park, Stafford, and initiatives such as the Blooming Stoke project that created a series of wildflower meadows linking habitat through Stoke-on-Trent, show what can be achieved.</p>	

**Table 1. Summary of changes relating to the built environment.**

### **8.1.3 Habitat condition**

The Denstone to Oakamoor railway provides an example of how features in the built environment can provide high quality habitat for wildlife. This railway is a section of the Churnet Valley line which ran from North Rode in Cheshire to Uttoxeter. It was opened in 1849 and generally followed the route of the old Uttoxeter canal, as it was built to carry freight formerly carried via the canal.

It closed to passengers in 1965. It now forms a multi-purpose public footpath known as the Denstone to Oakamoor Greenway and runs approximately 7km northwest between the two villages. Habitat surveys in 2013 showed that the disused railway mainly consists of a thin belt of broadleaved woodland of varying density with scattered open areas dominated by grasses and herbaceous species.

A ditch runs parallel to the trackway for most of its length and broadens in places into more extensive ponds. Along the edges of the footpath and in the transition zone between this and the woodland or tall ruderal habitat lies an interesting grassland community. Rich in small herbaceous species, it shows characteristics of unimproved grassland. Species such as harebell, meadow cranesbill, meadow vetchling, red clover and common knapweed are all present. Oakamoor tunnel is an important bat roost site.

## 8.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 2, 4-5, 9-11, 14, 16, 18;** pollution, runoff (roads, urban), access / disturbance, habitat fragmentation, lack of resources, inappropriate management, habitat loss, e.g. to development, invasive non-native species.

### Additional specific issues for the built environment

- Lack of appropriate habitat management of both habitats and habitat corridors or links leading to succession and therefore loss of habitat diversity, e.g. inappropriate cutting regimes of roadside verges.
- Lack of awareness and information about the wildlife value of built sites and their associated habitats, leading to the built environment being undervalued in regards to wildlife and not seen as providing 'natural habitats'.
- Developments not incorporating habitats and features for wildlife.
- Inappropriate restoration works leading to a loss of habitat mosaic.
- Contaminated land restoration.
- Invasion of non-native species, including spread from gardens and accidental/purposeful releases.
- Closure of industry (brickworks, quarry etc).
- Redevelopment.
- Lack of monitoring and enforcement on development sites.
- Lack of species and habitat survey data and therefore lack of informed management.
- Changes to current planning policy, i.e. the clarification of high environmental value.

## 8.3 Conserving built environment habitats – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to the built environment:

- Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (designated sites chapter)
- Doxey and Tillington Marshes SSSI flood compensation works (designated sites chapter)
- 25 years of The National Forest (woodland chapter)
- Restoring species-rich grassland at Cauldon Quarry (grassland chapter)
- Blooming Stoke (grassland chapter)
- Redhill Business Park (amphibian and reptile chapter)
- Amphibian Translocation at i54 (amphibian and reptile chapter)
- Burntwood Milestone Way Strategic Development Allocation (area chapter)
- Wetland Restoration – Perkins Engines Limited (why nature is changing & what needs to happen chapter)
- Whittington Heath Golf Course, HS2 phase 1 Biodiversity Offset Scheme (why nature is changing & what needs to happen chapter)

Case Study 1 - Burton Tree Project (Authors and contributors: Victoria Liu, Dianne Hewgill, Sarah Bentley, Chris Jones, Phil Metcalfe)

Case Study 2 - Love Your River – Stoke and Urban Newcastle (Authors and contributors: Stephen Cook, Matthew Lawrence, Richard Schneider)

Case Study 3 - Wild About Tamworth (Authors and contributors: Shelley Pattison)

## 8.4 Conserving built environment habitats - recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M2-M3; M6-M10; M13; M14-M15; DM2-DM5:** Improve the following: increase habitat connectivity, manage for structural habitat diversity, increase resources, implement Sustainable Drainage Systems (SuDS), innovative management to recreation pressures, consider potential impacts on habitats and species when planning management, more integrated planning and management of sites across ownership boundaries, integrated use of volunteer groups, survey and monitoring, instate suitable mowing regime (road verges), manage hedgerows by rotational winter cutting, habitat creation through the planning system, increase uptake of grants, guidelines for planners, use the National Forest Company as an example of a large-scale habitat creation project.

### Additional specific recommendations for built environment habitats

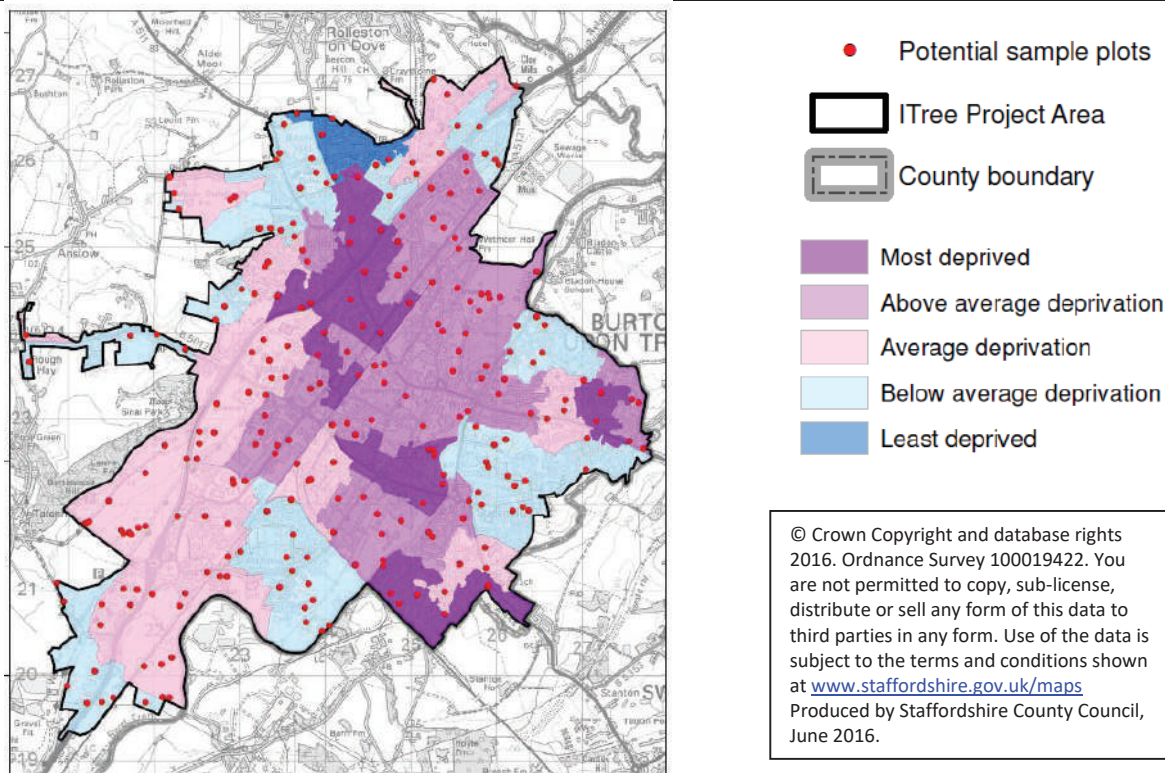
- Improve understanding of habitats and species, particularly brownfield sites, and use them to provide a valuable education and recreational asset to the community.
- Connect isolated habitats.
- Ensure appropriate management and protection of habitats within the built environment.
- Continue best practice restoration of quarries to wildlife habitat and secure long-term management.
- Work with HS2 Ltd to create new habitats, retain and enhance connectivity and ensure habitat losses are mitigated.
- Incorporate habitats and features for wildlife in developments.
- Increase habitat and species monitoring (especially those that do not blend into the landscape), which will lead to informed site management. When managed/monitored correctly, these sites could act as valuable “stepping stones” and “corridors” within a landscape, linking exemplar wildlife sites.
- Uptake more habitat creation/restoration opportunities following the redevelopment of sites.

## Burton-upon-Trent i-Tree Project

### Habitats & species:

**Habitats:** Woodland and trees, built environment.

**Species:** Trees: European beech, common hawthorn, sycamore, silver birch and European ash.



**Figure 1.** Distribution of survey plots across Burton-upon-Trent, evenly distributed by deprivation class based on The Health Deprivation and Disability Domain.

### Key messages

- 236 0.04 ha randomly chosen plots were surveyed across Burton-upon-Trent in summer 2016.
- There are an estimated 102,400 trees in Burton-upon-Trent.
- Burton-upon-Trent's urban forest provide a carbon storage value of £1.19 million.
- Burton's trees were found to give additional benefits worth £43,300 in carbon sequestration, £52,600 in avoided runoff and £43,800 in pollution removal.

### Overview

The Burton-upon-Trent i-Tree project was an exciting first for Staffordshire, having been implemented successfully in other towns in the UK and internationally. It was a community project developed to assess the benefits of trees and the urban forest and to find out how much value they provide to the community. By understanding what trees Burton has and the benefits they provide, they can be used to better inform investment, policy and future tree management.

### Contact

Dianne Hewgill  
Staffordshire County Council

### Partners

The project was delivered in partnership by Staffordshire County Council, Staffordshire Wildlife Trust, East Staffordshire Borough Council, Burton Conservation Volunteers and the National Forest Company.

### Funding

The project was funded by the National Forest Company.

## Objectives

- To determine the effect the urban forest has on ecosystem services including carbon storage, carbon sequestration, flood alleviation, and air quality.
- To put a value on the urban forest of Burton-upon-Trent, and use this information to influence future management and policy in the town.

## Approach

A sample plot inventory was undertaken, where 236 0.04 ha plots representing five classes of deprivation were randomly selected across Burton-upon-Trent. Teams of volunteers were trained in survey methods to survey the plots looking at factors including land use, ground cover, hedge cover and tree cover, and where trees were present they recorded further measurements relating to tree size and condition. The data collected during summer 2016 was analysed using i-Tree Eco, an internationally used peer-reviewed software suite designed to help quantify urban forest structure, function and values.

## Outcomes

The i-Tree Eco software predicted that Burton-upon-Trent has a population of 102,400 trees with European beech, common hawthorn, sycamore, silver birch and European ash being the dominant species. Over 70% of the trees had a diameter of less than 15.2cm. The structural value, or cost of replacement, of the urban forest was calculated at £54.2 million, with the urban forest providing a carbon storage value of £1.19 million. It was also estimated that every year the urban forest of Burton provided the equivalent benefits of £43,300 in carbon sequestration, £52,600 in avoided runoff and £43,800 in pollution removal.

## Future work

We are developing a management plan for Burton's urban forest that will explore how to maximise its benefits for people and wildlife through determining what species to plant and where planting should be targeted. It will aim to address health and wellbeing outcomes, such as reducing pollution impacts and contributing to urban regeneration, as well as facilitating the wildlife and residents of Burton in adapting to the changing climate. In addition, the results will provide a benchmark for future monitoring.



**Photo:** Volunteers undertaking tree surveys in Burton-upon-Trent, Lawrence Oates

## State of Staffordshire's Nature Report - Case Study Number 2

### Love Your River - Stoke and urban Newcastle

#### Habitats & Species discussed:

**Habitats:** Built environment, rivers



**Photos:** Volunteers and school children involved with the project, GWK WM

#### Key messages

- Working with local communities can be a successful way to tackle urban diffuse pollution and improve river habitats.

#### Overview

The headwaters of the River Trent drain the urban conurbation of Stoke-on-Trent and Newcastle-under-Lyme. The river and many of its tributaries have been urbanised and although water quality has significantly improved since the early 1990s they are still suffering from the effects of urbanisation.

The Lyme Brook is a small urban tributary of the River Trent. Under the Water Framework Directive (WFD) it was failing to meet Good Ecological Status (GES) primarily due to urban diffuse pollution and physical modifications that impact on fish and invertebrate populations.

Through the project we are using a variety of methods to engage the local community with their waterway. This includes interactive school sessions, misconnection workshops and practical habitat improvement projects as well as encouraging individuals to volunteer long term by becoming a 'River Warden'.

#### Contact

Stephen Cook  
Groundwork West Midlands  
[Stephen.cook@groundwork.org.uk](mailto:Stephen.cook@groundwork.org.uk)

#### Partners

Environment Agency, Wild Trout Trust, a range of schools, NCS, Friends of Lyme Valley Parkway, Newcastle Borough Council, Staffordshire Wildlife Trust.

#### Funding

The project was funded by Groundwork West Midlands and Environment Agency



## Objectives

To make people aware of their local waterways and provide them with information, and the opportunities, so they can become part of improving the waterways long term.

## Approach

Starting with the Lyme brook itself we ran a number of activities designed to engage people in their waterway including:

- Sessions with a number of schools. These started in the classroom but then continued outside with learning around the brook and yellow fish awareness spraying on local drains.
- Volunteer habitat improvement projects on the brook looking at reintroducing meanders, creating spawning areas and adding in a variety of new plants and shelter areas (woody debris, tree kickers etc.).
- River Warden recruiting and training. Leaving a long term legacy of care for the brook.
- Misconnection awareness and training sessions. Helping people understand how their everyday actions affect their brook.

## Outcomes

The work on the Lyme Brook is a great example of partnership working with the project being delivered by Groundwork West Midlands with a multitude of partners offering expertise and support, including practical help from the Environment Agency, Friends of Lyme Valley Parkway, Wild Trout Trust, help with permissions and tree identification from Newcastle Borough Council to name a few. A stretch of the Lyme Brook is now a better physical habitat for invertebrates and fish. Additionally the local community is more connected to their waterway and informed as to how their everyday actions can affect it and what they can do to improve it (following the Healthy River Code).

## Future work

The project has formed the base of future delivery with an aim to replicate the Lyme Brook model on Causley Brook and other urban waterways. We have also expanded the project into retrofitting sustainable urban drainage into community settings creating new habitat areas, reducing flood risk and improving water quality. This has included a new rain garden at Middleport Pottery Summerbank

and green wall at Primary.



**Photo:** Green wall installed at Summerbank Primary, GWK WM

**Notes**

- 1) All works shown on this plan are to be carried out in accordance with the contract documents and any relevant legislation.
- 2) All works shown on this plan are to be carried out in accordance with the contract documents and any relevant legislation.
- 3) All works shown on this plan are to be carried out in accordance with the contract documents and any relevant legislation.
- 4) All works shown on this plan are to be carried out in accordance with the contract documents and any relevant legislation.
- 5) All works shown on this plan are to be carried out in accordance with the contract documents and any relevant legislation.

**Scale** 1:1000

**Client** Environment Agency

**Project** Lyme Brook Watercourse Modification

**Site** Skeith Scheme

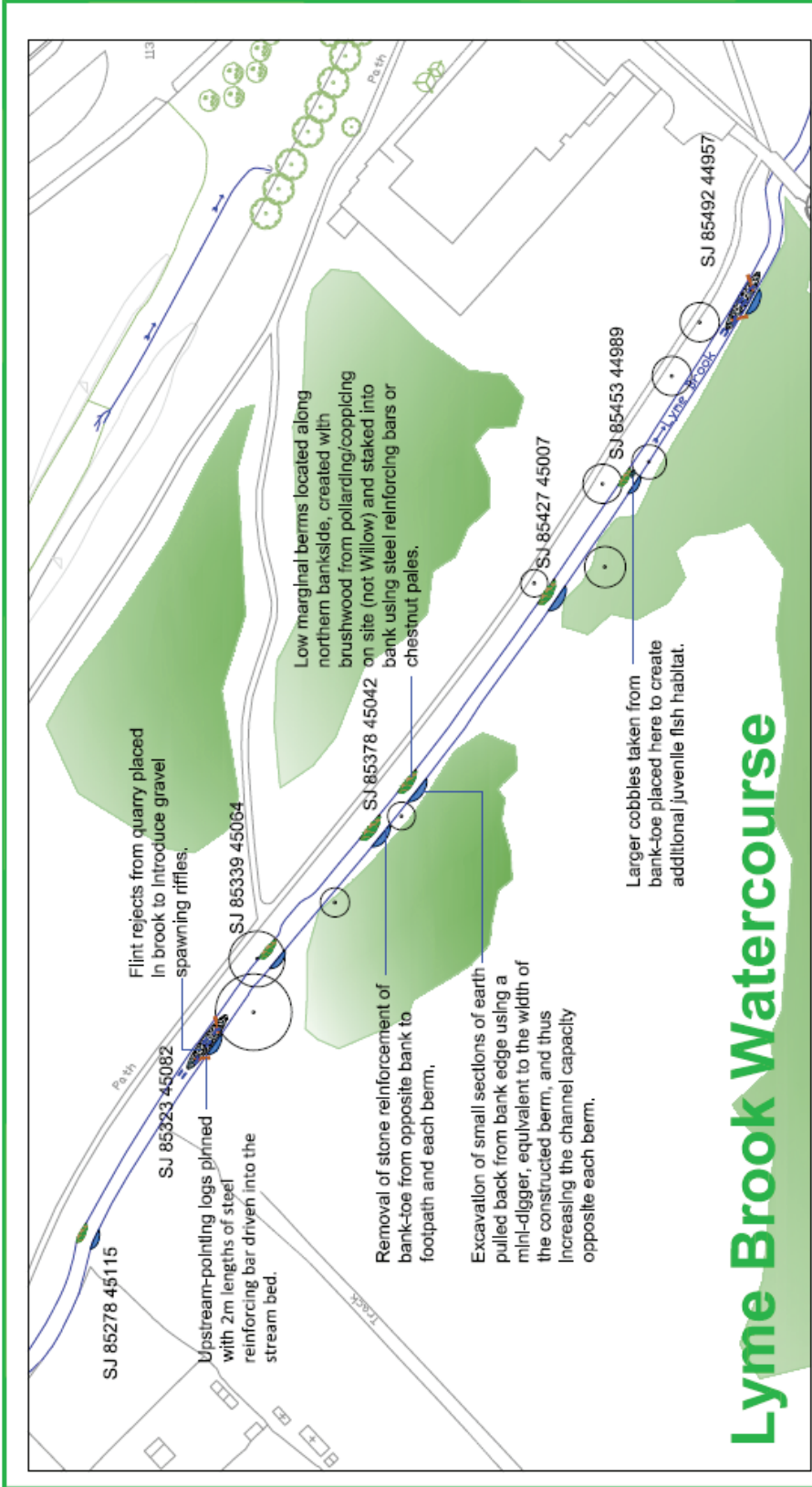
**Scale** Main Plan 1:1000 DATE Dec 2014 DRAWING LBW/M01

**Drawn by** LM CHECKED BY PRODUCT CODE 000

**DATE** **REVISIONS** **DATE** **BY** **CHKD**

**DESIGN** **PLANNING** **TOOLS** **CONTRACT**

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## Scale 1:200

Scale 1:200

Scale 1:200

**KEY**

- Existing Woodlands
- Existing trees
- Low marginal berms created with brushwood
- Excavated out bankside to increase channel capacity
- Upstream pointing logs and gravel using flint rejects
- Cobbles from bankside re-used
- Grid referenced locations

Scale 1:200

Scale 1:200

**Wild About Tamworth**

**Habitats & species:**

**Habitats:** Woodland, meadow, wetland, built environment.



**Key messages**

- The Wild About Tamworth (WAT) project began in 2004 and is a partnership between Tamworth Borough Council (TBC), Staffordshire Wildlife Trust (SWT) and the local community
- A project officer, employed by SWT, supports groups of local people to manage their local TBC owned sites.
- The project now covers 9 volunteer groups and 8 sites, 7 of which are designated as Local Nature Reserves

**Overview**

Originally the WAT project was funded as a 3 year pilot project by Tamworth Borough Council and Wildspace to create 3 Local Nature Reserves, each with their own self-sufficient volunteer group to manage the sites.

The pilot was successful and well received and as a result has been extended multiple times, with various sources of additional funding to match the funding provided by Tamworth Borough Council.

Currently the project officer is funded almost entirely by Tamworth Borough Council and is responsible for sourcing additional funding to support the role and the plans for the sites.

**Contact**

Shelley Pattison  
 SWT  
 Email: [Tamworth@staffs-wildlife.org.uk](mailto:Tamworth@staffs-wildlife.org.uk)

**Partners**

The Wild About Tamworth project is a partnership between Tamworth Borough Council, Staffordshire Wildlife Trust and the local community

**Funding**

The project is primarily funded by Tamworth Borough Council. Additional funding has been provided by Heritage Lottery Fund, Staffordshire Environmental Fund, Tesco/Groundwork, Tame Valley Wetlands Partnership, UPS and others.

## Objectives

- To designate and manage LNRs.
- To bring 8 TBC owned sites into active conservation management.
- To support the development of sustainable community volunteer groups to manage the sites.

## Approach

A project officer has been employed by SWT since 2004 to deliver WAT. They support groups of local people to manage their local TBC owned sites. Together the volunteers, officer, SWT and TBC develop a management plan agreement and the officer assists the group with grant applications and trains them in practical conservation and volunteer management skills in order that they may manage the sites.

## Outcomes

There are currently 9 volunteer groups working on 8 sites, 7 of which are designated as Local Nature Reserves. Nearly 200 volunteers volunteer regularly with the project, with approximately 600 volunteers involved at 120 events per year. Around 1000 children are reached through the education programme each year. In recent years the project has brought an average of £22,000 in external funding to the Borough per year, but since the start of the project in 2004 the amount of external funding brought in exceeds £250,000.

## Future work

Future plans on the most recently designated site, Broad Meadow LNR, are at the fore. In addition, an update of all site management plans has led to funding applications to continue to improve existing sites and keep infrastructure up to date and in good condition. The more recently formed volunteer groups will continue to get support to increase self-sufficiency and increasing the number of volunteers who regularly engage with the project remains a key aim.



**Figure 1.** Artists interpretation of Tamworth highlighting the key green spaces and Wild About Tamworth sites, Mandy Austin.

## 9. Farmland

Authors: Nigel Baskerville (Campaign for the Farmed Environment), Sue Lawley (Independent expert) and Bernadette Noake (Staffordshire Wildlife Trust), with contributions from Mike Shurmer (RSPB)

### Farmland headlines

#### Overview of Farmland

Farming provides vital breeding and feeding habitats for many species, with specialist farmland birds largely reliant on these habitats. Approximately 71% of Staffordshire is agricultural land, with arable representing about 31% of this, dairy 25%, other grazing livestock 32% and mixed farming 10%. Horticulture represents 1%, with several large market gardening and fruit farm enterprises.

#### Key species

Farmland birds including grey partridge, lapwing, yellow wagtail, snipe, skylark, barn owl, curlew, corn bunting, and tree sparrow, Mammals such as brown hare, harvest mouse and bats, great crested newts and many different kinds of invertebrates including pollinating insects.

#### Headlines

- Approximately 71% of Staffordshire is in agricultural production (DEFRA 2014).
- Specialist arable plants, insects and birds are declining; the UK farmland bird indicator reached its lowest ever level in 2013, just 45% of the 1970 baseline value (Hayhow *et al.* 2015).
- 15,610 ha (6% of Staffordshire) was under Higher Level Stewardship (HLS) agreements in 2016 (this includes non-agricultural land) (Natural England 2016). There is evidence that UK farms under HLS have greater abundance of farmland birds (Hayhow *et al.* 2015).

#### Key threats

- Difficulty of producing food efficiently and profitably, whilst carrying out conservation management for wildlife and meeting environmental commitments.
- Uncertainty regarding future farm subsidies and agri-environment funding following the vote to exit the EU.
- Diffuse water pollution.
- Soil erosion and loss of micro-organism diversity.

#### Successes

Since the advent of agri-environment schemes in the 1990s, a significant amount of farmland has been brought into improved environmental management, with evidence of positive benefits to farmland wildlife and habitats.

#### Recommendations

- Provide a supportive framework for farmers to adopt best environmental practice through promotion of initiatives such as the Campaign for the Farmed Environment.
- Continue and evolve agri-environment schemes to maximise environmental benefits and ensure they are practicable.
- Promote farmer involvement in wildlife recording.
- Enhance semi-natural habitats and provide wildlife corridors and networks.
- Expand existing and develop new schemes to improve water quality.

## 9.1 State of farmland in Staffordshire

### 9.1.1 Overview

Farmland figures	Amount
Current percentage of land in agricultural production in Staffordshire	71%
Current amount of land in Higher Level Stewardship	15,610 ha (6% of Staffordshire)

**Table 1. Coverage of farmland in Staffordshire.**

#### Farmland species:

Farmland in Staffordshire supports a range of Priority Species including:

**Birds:** Farmland supports several specialist bird species associated with both lowland and upland grassland and arable habitats including grey partridge, lapwing, yellow wagtail, snipe, skylark, barn owl, curlew, corn bunting, and tree sparrow.

**Mammals:** brown hare, harvest mouse and bats.

**Other:** great crested newt. Pollinating insects are also key for ecosystem services, with a wide range of invertebrates supported by farmland habitats.

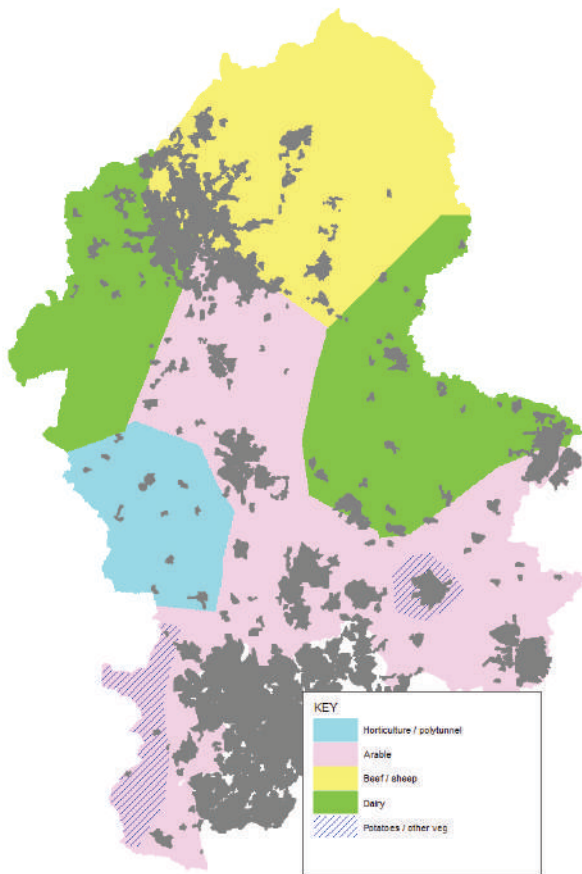
**Plants:** Specialist 'weed' species of arable fields. Diversity in plant species associated with unimproved grasslands which support plants with more restrictive habitat requirements.

#### Farmland habitats:

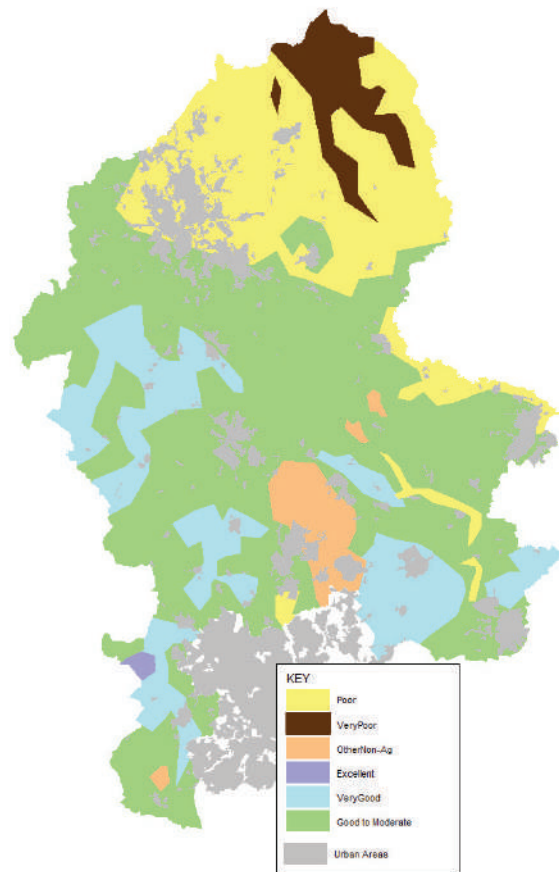
Farmland accounts for a range of both our natural and modified countryside habitats, with a diverse range of species supported in these habitats. Broadly this includes semi-improved and unimproved grasslands, wetlands, ponds and hedgerows, mature trees in hedgerows and in fields, arable field margins, farm woodlands and drystone walls.

Agriculture comprises about 80% of the land-use in Staffordshire (Staffordshire Biodiversity Action Plan 2017, Hölzinger, O. and Everard, M. 2014), compared to 71% agricultural land use for the UK (Department for Environment, Food and Rural Affairs (DEFRA) *et al.*, 2015). In Staffordshire, nearly half (47%) of the agricultural land is made up of permanent pasture (figure 1). Dairying still remains the major enterprise in Staffordshire despite a decline in the industry in recent years. About a third (31%) of the agricultural land area is in arable production, mainly in south Staffordshire which also includes several large market gardening and fruit farm enterprises. At the northern end of the county, as it meets the uplands of the Staffordshire moorlands, holdings are mainly small livestock farms.

In terms of agricultural quality, most agricultural land in the Staffordshire Biodiversity Action Plan area is described by DEFRA as being Grade 3 (average quality), with small amounts of Grade 2 land (very good quality) in the south and west. Significant amounts of Grade 4 (poor quality) and Grade 5 (very poor quality) land are also present (figure 2). This is concentrated in the north-east of the SBAP area, in Staffordshire Moorlands District and the northern part of East Staffordshire District. This land has severe limitations, restricting the range of crops that can be grown.



**Figure 1 - Map Schematic representation of the main types of agriculture in Staffordshire.**



**Figure 2 - Map Schematic representation of broad agricultural land quality (based on Natural England's 1:250k series agricultural land classification).**

Farming is of fundamental importance to our wildlife. It provides breeding and feeding habitats for a range of wildlife, with many species, such as specialist farmland birds, relying on these habitats. Important farmland habitats for wildlife include:

- Wetlands, ponds.
- Boundary features; hedgerows, drystone walls.
- Farm woodlands.
- Veteran trees, mature trees, infield trees, hedgerow trees.
- Arable field margins, conservation headlands, overwinter stubble and management options such as wild bird seed mixtures, beetle banks, low-input spring cereals and nectar flower mixtures.
- Semi-improved and unimproved grassland (see chapter 4 Grasslands)

Some of these habitats are discussed in more detail in other chapters of the report.

Many of our most important sites for nature conservation in Staffordshire rely on a degree of traditional agricultural practice, e.g. grazing, hay cuts etc. In Staffordshire, the most important areas for wildlife within agricultural production include unimproved and semi-improved grasslands of the Churnet Valley, Weaver Hills and the South West Peak, and scattered lowland hay meadows, most notably Mottey Meadows Special Area of Conservation (SAC) near Wheaton Aston.

Some of these habitats are discussed in more detail in other chapters of the report.

Many of our most important sites for nature conservation in Staffordshire rely on a degree of traditional agricultural practice, e.g. grazing, hay cuts etc. In Staffordshire, the most important areas for wildlife within agricultural production include unimproved and semi-improved grasslands of the Churnet Valley, Weaver Hills and the South West Peak, and scattered lowland hay meadows, most notably Mottey Meadows Special Area of Conservation (SAC) near Wheaton Aston.

Agriculture has changed dramatically since the post-war era. Farming policy has driven food production and the UK now has sophisticated and productive farming methods meaning that food shortages are a thing of the past. The unintended consequences of this agricultural intensification have been declines in populations of farmland wildlife.

The impacts of agricultural intensification in the 20th Century has been well documented, for example, it has been estimated that by 1984, 97% of semi-natural grassland (including meadows) in England and Wales had been lost over the previous 50 years. Declines continued in the 1980s and 1990s (Biodiversity Reporting and Information Group (ed. Ant Maddock) 2010). Roughly half of all bird species occurring on farmland, with seed-eating species being particularly affected, have experienced population declines since 1968 (Robinson & Sutherland 2002). Declines in mammals such as hedgehogs, weasels and field voles and lepidoptera of restricted distributions such as unimproved grassland specialists are also noted by Robinson & Sutherland (2002) as well as general declines in many invertebrate groups.

Many farmers have entered agri-environment schemes, improving farmland habitats for wildlife. Agri-environment schemes have made a positive contribution to the provision and quality of farmland habitats, with many options available for habitats and features to benefit wildlife. These schemes are designed in particular to benefit statutory protected Priority Species and Habitats which were deemed most at risk by the UK government.

Higher Level Stewardship schemes have shown successful creation of new Priority Habitats and restoration of existing Priority Habitats and similar options are available in the higher tier of the Countryside Stewardship scheme. The new Wild Pollinator and Farm Wildlife Package in Countryside Stewardship contains management activities that can be tailored to a variety of farming systems and has compulsory options designed to improve the survival of wild pollinators and farmland birds.

Despite some excellent work carried out on many farms across Staffordshire, issues remain, including pollution of watercourses, loss of ponds, over/under management of hedgerows, loss of habitats through agricultural intensification and fragmentation of semi-natural habitats is still occurring.

### 9.1.2 Habitat changes and reasons

The table shows general trends noted by local experts in specific farmland habitats. These reflect national trends. These trends have not been further analysed as the data was not available at the time of publishing.

<b>Summary of habitat changes</b>
Loss of hedgerows Loss of farm ponds Loss of species-rich unimproved/semi-improved grassland and general plant diversity Improved management of many hedgerows (reduced trimming intensity under ELS) Increased uptake of environmental options in agri-environment schemes. Increases in field margins through agri-environment schemes
<b>Explanation of habitat changes</b>
<ul style="list-style-type: none"> <li>Loss of hedgerows - many hedgerows have been lost with the intensification of agricultural practices and the removal of hedgerows to create bigger field units. Much of these losses occurred between 1984 and 1990 with estimated 20%-25% of hedgerows lost in England and Wales (Barr <i>et al.</i> 1993). Since 1990 these losses have slowed (Barr <i>et al.</i> 1993) although the benefits that an well managed ancient hedgerows gives to biodiversity takes a long time to</li> </ul>



replace in terms of wildlife value. These losses are reflected across Staffordshire. The loss in losses can be accounted for in newly planted hedgerows, although this isn't always equal to having a good quality hedgerow habitat. Various boundary options have been taken up in agri-environment schemes. A combination of boundary options within an intensively managed landscape has had variable results in natural biodiversity with gains only seen in some wildlife groups associated with boundary features (M'Gonigle *et al.* (2015), Facey *et al.* (2014) Broughton *et al.* (2014), Caro *et al.* (2016) & Burgess *et al.* (2015)). It is considered that future work should put additional influence in increasing the biodiversity of boundaries which had the best outcome for a variety of species groups (Wolton *et al.* 2014).

- There is insufficient survey information to give an indication of the status of all ponds in Staffordshire, however, investigation of maps and surveys/site visits that have taken place indicate that many ponds have been lost. The rate of loss has been rapid (J. Hawksford *pers. comm.* 2016) A high proportion of ponds occur within farmland. There are however some excellent examples of pond conservation on farmland. Open water has been created for water storage, flood attenuation and water treatment on farmland (Jones 2010). Environment Impact Assessments, and agri-environment schemes have also made a positive contribution reducing the loss of ponds, although losses are still occurring albeit at a lower rate. The water quality in ponds has also changed; many ponds are affected by run-off, are not managed, are stocked with high densities of fish or have become shaded and overgrown.
- In the lowlands many semi-natural grazing habitats are now arable, rye-grass leys or have been modified by fertilizer, herbicides and/or lime. Occasional relict plots of land can give an indication of the former plant diversity of neighbouring grasslands.
- In the uplands a greater proportion of semi-natural grazing lands remain. However even here similar threats remain to plant species diversity through ploughing up, applications of fertilizer, selective herbicide treatments, land drains and variation in farm animal stocking levels in response to various economic factors. High stocking levels, particularly by sheep, results in a closely-nibbled sward whilst a lack of regular grazing may result in a domination of coarse, taller-growing species or invasion by scrub, all of which may reduce floral diversity. Agri-environment schemes have made a positive contribution to the provision and quality of farmland habitats, with many options available for such habitats and features.

## Summary of key farmland species changes

**Farmland Birds** - declining numbers in roughly half of all bird species occurring on farmland.

**Barn Owls** - increasing in areas of good habitat, but not on arable land.

**Brown Hare** – population declines between 1960 and 1980 but the current population appears to be stable.

**Arable weeds** - other than in a few isolated sites, cornfield weeds have declined due to better herbicides, cleaner seed sources, cover crops for birds tend to be non-native species and tend to suppress interesting arable species.

**Invasive species** - least duckweed seems to favour (but is certainly not confined to) shaded water bodies whilst new zealand pigmyweed seems to have arrived in the shallows and on exposed mud in many ponds and lakes even in more remote sites.

**Invertebrates** – In south Staffordshire the arable margins, particularly those rich in flowering species such as poppies and crucifers, has recently been found to support a solitary bee *Andrena nigrospina*, a Red Data Book 1 species (A. Jukes 2009).

*Andrena nigrospina* in turn supports a very rare species-specific parasite; *Nomada subcornuta* which is a newly recognised bee species identified through DNA work by A. Jukes (2009 - 2016).

## Summary of “other trends” relating to farmland

The impacts of agricultural intensification in the 20th Century has been well documented, for example, it has been estimated that by 1984, 97% of semi-natural grassland (including meadows) in England and Wales had been lost over the previous 50 years. Declines continued in the 1980s and 1990s. (Biodiversity Reporting and Information Group (ed. Ant Maddock) 2010).

Other habitats have also been lost, for example it was estimated in 1990 (Adams, M.B.) that we had lost just under 90% of lowland heathland in Staffordshire since 1775, due to a number of factors, one of them being agricultural intensification.

Early studies into European Agri-environment schemes (AES) have found that 54% of assessed species groups have increased on land with a scheme, 23% has experienced no change, 6% have decreased and 17% have experienced both increases and decreases for different species within the species group (Kleijn & Sutherland 2003). Most robust monitoring methodology is needed to further investigate the impact of AES on the biodiversity and conservation of target species (Kleijn & Sutherland 2003).

There has been a reduction in the diversity of specialist ‘weed’ species of arable fields. Several species were lost during the last century. Modern agricultural practices led to a reduction in quantity of those that remained. During the current decade, there has been a further losses (probably due mainly to ‘cleaner’ crop seeds) and some fields now have no such species at all. For arable weed species the decline has been even more marked - stinking chamomile was noted by Edees in his 1972 Flora (albeit largely based on a recording effort made in the 1940s and 1950s) as being ‘frequent and locally common’. It would be very difficult to claim it as such today (Hawksford *et al.* 2011). A very few species such as Rye-brome may have reappeared, but this seems due to such a species being a weed from where the sown

cereal seed originates. Specialist arable ‘weeds’ tend to be overlooked as they are usually short-lived and don't usually appear in natural/semi-natural habitats. Herbicide use and the change in practice to ploughing after harvest is certainly proving detrimental even for such arable species as remain. Some conservation headland strips are cultivated and sown with non-native species such as Sunflower and Phacelia that produce oil-rich seeds, but such areas do not seem to necessarily favour many of the more traditional arable species.

### Summary of reasons for changes

- Habitat fragmentation
- Intensive farming practices
- Agricultural pollutions changing water quality
- Erosion
- Uptake of stewardship schemes
- A move away from mixed farming to more specialised enterprises.
- Agricultural intensification including increased fertiliser and pesticide use.
- Improved technology allowing bigger machinery, requiring larger field units.
- More efficient farming, less opportunities for foraging wildlife e.g spilled grain, but better control over nutrient inputs (DEFRA 2015).
- Move from spring to winter cropping has probably negatively impacted on arable plants/weeds.
- Switch from traditional hay making to silage.

**Table 2. Summary of changes relating to farmland habitats.**

### 9.1.3 Habitat condition

The condition of farmland habitats varies greatly, there are many excellent examples of good farmland management for wildlife, but there are also many examples where there are issues (see issues section) which alongside limited resources can prevent favourable habitat condition being met.

Many of the good practices of wildlife conservation and enhancement on farmland have been delivered through agri-environment schemes which set out management prescriptions.

Many of the most important sites for wildlife on farmland are designated as SSSIs and Local Wildlife Sites. It is not possible to extract SSSI habitat condition just for habitats which occur on farmland. The SSSI habitat condition for some of the habitats which occur on farmland are discussed in the relevant chapters in more detail:

- Semi-improved and unimproved grasslands (Chapter 4)
- Woodlands (Chapter 3)
- Wetlands (Chapter 7)

The factors which are important for good habitat condition are discussed below

**Semi-improved and unimproved grassland** - traditional methods of managing farmland grasslands, including hay making, grazing cattle and sheep in low densities, are key for the conservation of many of our most important grasslands. A good proportion of these sites are in Higher Level Stewardship agreements. Key factors are maintaining low soil nutrients, not applying fertiliser, removal of hay (where appropriate) at the right time of the year, allowing plants to set seed, and/or getting stocking densities and timings correct.

**Arable** - there are many features which can improve habitats for wildlife on arable farmland. Many of these have been supported by agri-environment schemes. Important features include:

- Cultivated margins for rare arable plants, which are not treated with herbicides and are not sown with non-native species.

- Field edges and/or marginal land can include a range of habitats such as nectar plots providing pollen and nectar for insects, tussocky grass, providing foraging habitat for barn owls/ habitat for small mammals and barn owls, and overwintering habitat for hibernating insects, cultivated margins for rare arable plants, wild bird cover which provides an important winter food source for farmland birds.
- Within fields, overwintered stubble, conservation headlands and beetle banks.
- Hedges, dry stone walls and ponds.
- Farmland birds have three main needs to survive and flourish: A safe place to nest, food in spring and summer for their growing chicks, food and shelter over the winter (RSPB 2016).
- The Wild Pollinator and Farmland Bird Package in Countryside Stewardship will deliver flexible options to work on a variety of farming systems in both the mid-tier and higher-tier level of the scheme.

**Improved grassland** - This makes up the majority of farmland grassland, particularly in lowland Staffordshire where it is cut for silage. Improved grassland has little value for wildlife, however, there are many features which can improve such farmland for wildlife which can be supported through agri-environment options, but more work is probably needed to maximise the benefits during implementation. Features of benefit for wildlife include protection of trees, particularly mature trees, ponds, hedges, allowing grass to go to seed provides a winter food source for yellow hammer, improving floristic composition, e.g. including clover for nectar sources for insects.

**Ponds** - Ponds are important features on farmlands for a range of aquatic plants and animals, however, they are often in poor condition and are being lost through neglect and by shading/silting up (often due to growth of surrounding trees). Non-native species are also an increasing problem, even on remote sites. Ponds with a high number of species in the marginal vegetation support more invertebrates and those which are generally open and not too shaded are generally better quality. The density of ponds can impact species dispersal, in particular pond networks with closely spaced water bodies in a suitable terrestrial environment improves prospects for breeding populations of Great Crested Newts (Natural England 2011). Dew ponds are an important historical landscape feature within the Staffordshire Moorlands, artificially created on hill tops and serving as a source of water fed primarily by rainfall for livestock.

**Trees** - Both infield and hedgerow trees are important habitats for a wide range of species, providing food, nesting and cover. Mature and veteran trees are of particular importance. Deadwood invertebrates often rely on isolated veteran trees in the landscape, rather than just parkland & woodland habitats - (J. Webb pers. comm. 2016). Agri-environment schemes support the protection of such trees for example protection of tree routes by providing protective margins.

**Hedgerows** - Hedgerows are not only important for a range of species for food, nesting and shelter, but they are vital corridors for wildlife to move through the landscape, particularly when they link up semi-natural habitats such as woodlands. The number of species in the hedge, ground flora, hedgerow structure and associated features such as banks are all important aspects. Appropriate timing and frequency of hedgerow cutting are vital in particular for nesting birds. The provision of buffers next to hedgerows allows the growth of ground flora and helps prevent against herbicide / fertiliser application/drift onto hedgerows and associated ground flora.

**Dry Stone Walls** - Dry stone walls are a particular feature in the uplands of Staffordshire. They are important historical and landscape features. Gap in drystone walls are a refuge for many species including lizards, stoat, weasel (ref staffs mammal atlas) birds, while the stones themselves may support mosses and lichens.

**Woodlands** - Woodlands on farm landholdings are usually quite small and are usually under managed. However, despite this many can be of ancient origin but not necessarily on the ancient woodland inventory due to their small size, but are of very good quality. Drumbles are of particular interest as they are narrow woods situated along streams in steep valleys, and often represent the best examples of ancient woodland in an area. In many cases they are not listed on the Ancient Woodland Inventory because they fall under the size threshold. On some of the bigger farms/estates, woodlands are sometimes used for pheasant rearing, which can have a negative effect on ground flora, shrub and

tree regeneration where located inappropriately. Important features of good habitat condition are site specific, but generally include varied ages of woodland, management on a rotational basis, open space in glades and woodland rides and protection of veteran trees.

**Wetlands** - There are a variety of farmland wetland habitats. These features are generally not adequately protected and enhanced, with problems such as pollution of watercourses, straightening of river channels, weirs, culverts etc. There are however many examples of beneficial works from river restoration to buffering of watercourses, both through agri-environment schemes and work delivered under the Water Framework Directive and initiatives such as Catchment Sensitive Farming, Natural Flood Management and Rural Sustainable Drainage Systems. Watercourse pollution still remains an issue, although there have been improvements in water quality since the 1970s, the county statistics indicate that 5% of waterbodies in Staffordshire are in Good Overall Status, 49% are in Moderate, 35% are in Poor and 11% are in Bad Overall Status (Crawford, 2016) (See wetlands chapter for more detailed information). Diffuse agricultural runoff remains a significant influence in some catchments.

## 9.2 Threats

Generic issues that apply (see Appendix A for more detail)
<p><b>Numbers 1 – 3, 5, 7 – 8, 10 – 15, 17;</b> Invasive scrub control; pollution; nutrification; runoff from agricultural land use; lack of or under grazing; overgrazing; habitat fragmentation and severance; resources to carry out management; nitrogen deposition; neglect; inappropriate management; intensive agriculture; land drainage.</p>
Additional specific issues for farmland.
<ul style="list-style-type: none"> <li>• Following the decision for the United Kingdom to exit the European Union there is uncertainty around the continuation of Environmental Stewardship Schemes or the form that that will take if they do continue. There is confirmation that landholdings which currently hold a live scheme will continue to be funded until 2020, but there is no certainty on what will happen beyond this. The issue of new schemes at this point is dependent on the available budget.</li> <li>• Decline of specialist arable plants.</li> <li>• Insufficient funding to make protecting and enhancing environmental features economically viable on all farmland.</li> <li>• The need for economically viable farming has led to the loss of many semi-natural habitats through applications of fertilizer, herbicide treatments, land drains, higher stocking ratios, ploughing of land for crops.</li> <li>• Many ponds have been lost, others are not managed, become overgrown and shaded and are affected by run-off from fields. Rate of loss of such aquatic habitats probably still exceeds newly created water bodies.</li> <li>• Various invasive non-native species are increasingly likely to be encountered in wetland habitats, even in remote areas.</li> <li>• Threats remain to plant species diversity through ploughing up, applications of fertiliser, selective herbicide treatments, land drains and variation in farm animal stocking levels.</li> <li>• High stocking levels, particularly by sheep, results in swards which are too heavily grazed, whilst a lack of regular grazing may result in a domination of coarse, taller-growing species or invasion by scrub, all of which may reduce floral diversity.</li> <li>• Pollution and run-off from farmland entering watercourses.</li> <li>• Under/over management of woodlands. Some are negatively affected by pheasant rearing.</li> <li>• Loss of small/mixed farms.</li> <li>• Loss of pollinators and insects on farms.</li> <li>• Resource protection (soil and water)</li> <li>• Climate change</li> <li>• Loss of hedgerows, infield trees, hedgerow trees. Loss of deadwood habitat from mature trees.</li> </ul>

### 9.3 Conserving farmland habitats – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted as case studies below:

CASE STUDIES
<p>Case studies elsewhere in the report relevant to farmland:</p> <ul style="list-style-type: none"> <li>• Staffordshire Barn Owl Action Group (bird chapter)</li> <li>• Staffordshire lapwing survey 2014 (bird chapter)</li> <li>• Harvest mice (mammal chapter)</li> </ul>
<p>Case Study 1 – Motte Meadows Rural Sustainable Drainage Systems (RSuDS) (Authors and contributors: Anna Maxwell)</p>

In addition to the case studies above, there are more examples of positive work that is of benefit to farmland in Staffordshire. These include:

- Clive Farm, near Wolverhampton, is an excellent example of profitable farming and wildlife conservation. The farm is predominantly arable with grassland grazed by livestock. The farm has been in HLS since 2012, which has enabled sympathetic management. Pollinators benefit from beetle banks, field margins and pollen and nectar flower mixtures. Bird counts are carried out by the landowner with species including lapwing, corn bunting and grey partridge.

### 9.4 Conserving farmland habitats – recommendations

Generic recommendations that apply (see Appendix A for more detail)
<p><b>Numbers HC1; M2 – M6, M9, M13 – M17; DM1, DM3:</b> Improve the following: Increase habitat size and connectivity; manage for structural diversity; increase resources; ensure appropriate grazing; improve planning and use of chemicals; implement Sustainable Drainage Systems (SuDS) near watercourses and sensitive habitats; more integrated planning and management of sites across ownership boundaries; survey and monitoring; instate suitable mowing regimes; manage hedgerows by rotational winter cutting; manage woodlands for age and habitat diversity; increase research and links with universities, colleges and schools.</p>
Additional specific recommendations for farmland
<ul style="list-style-type: none"> <li>• Schemes such as Campaign for the farmed environment should be continued and expanded to promote good environmental practice.</li> <li>• Promote options to improve farmland habitats.</li> <li>• Promote farmer involvement in wildlife recording such as big farmland bird count.</li> <li>• Further mapping and surveys of ponds and designation as Local Wildlife Sites where applicable.</li> <li>• Maintain and enhance all semi-natural habitats, focusing on linking habitats of importance through corridors such as hedgerows and field margins.</li> <li>• Increase uptake of agri-environment schemes.</li> </ul>

Motley Meadows Rural Sustainable Drainage Systems (RSuDS)

**Habitats & species:**

**Habitats:** Wetland, farmland.

**Species:** Birds: redshank; Flora: yellow iris, bulrush and reed canary-grass are colonising the newly created areas.



**Before (November 2015)**



**After (July 2016): Wetland pond with reedbed**



**Before (November 2015)**



**After (August 2016): Improved trackway**

**Key Messages**

- Following the project, ongoing monitoring shows average phosphate levels are declining in the ditch.
- Damselflies and dragonflies, such as broad-bodied chasers, have been using the wetland pond during summer 2016. The pond will also provide ideal habitat for amphibians.
- A mid-tier application was submitted for the 330 ha landholding to tackle agricultural diffuse pollution and buffer the neighbouring Motley Meadows SAC into the future.

**Overview**

Motley Meadows, located near Wheaton Aston, is designated as a Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI) and a National Nature Reserve (NNR). It is one of the UK's best examples, and largest remaining areas, of lowland wildflower-rich hay meadow.

The Motley Meadows Brook, a tributary of the Whiston Brook, runs through the SAC. It has been noted that the brook exhibits elevated phosphate levels, which are primarily due to diffuse pollution from agricultural sources. Monitoring suggests that parts of the SAC are suffering from phosphate enrichment from the brook.

The main aim of the project, which began in September 2015 and ended in March 2016, was to improve the water quality of the Motley Meadows Brook using Rural Sustainable Drainage Systems (RSuDS)

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**Partners**

The project was managed by Staffordshire Wildlife Trust with co-operation from the landowner and collaboration with the Environment Agency.

**Funding**

The project was funded by the Environment Agency through the Environment Programme (EP).

## Objectives

- Improve the water quality of the Motty Meadows Brook.
- Engage and collaborate with the adjacent landowner to Mottey Meadows SSSI, SAC, and NNR.
- Design and implement two RSuDS schemes across the landholding.

## Approach

Two main areas on the intensive dairy landholding were identified for RSuDS works. RSuDS are a collection of physical structures and techniques where the natural environment is used to help reduce diffuse agricultural pollution and flood risk. Furthermore, continued water quality monitoring of the brook is being carried out by the Friends of Mottey Meadows (see case study xxx).

## Outcomes

Work has been carried out within the 330 ha landholding; a series of reedbeds have been created along a dirty water ditch; a large wetland pond and reedbed have been created in an intensive grassland field; pipework, areas of track and headwalls were upgraded to allow cattle and machinery better access to other areas of the farm; and a cattle drinking trough was relocated to reduce cattle poaching around the brook. All works have created and restored wetland habitats providing new opportunities for a range of wetland wildlife, as well as trying to reduce the amount of phosphates entering nearby watercourses.

## Future work

Though funding for this project has come to an end, SWT has been successful with the Countryside Stewardship Facilitation Fund 2016 application for the Whiston Brook Catchment. This project will enable us to work with land managers to improve the local natural environment, tackling diffuse pollution at a landscape-scale over a 5 year period.



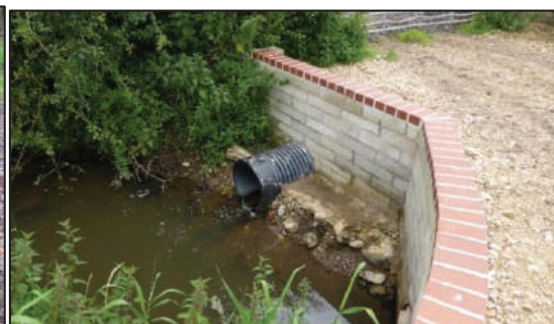
**Before (April 2016)**



**After (August 2016): A series of new reedbeds**



**Before (January 2016)**



**After (July 2016): New pipework and headwalls**

**All photos:** Before and after pictures showing the benefits that the project has had on the site, Anna Maxwell and David Cadman.



# 10. Invertebrates

Chapter Author: Andy Jukes (Chair of Staffordshire Invertebrate Group; County Recorder for Grasshoppers Orthoptera and Bees, Wasps and Ants Hymenoptera), Nick Mott (Staffordshire Wildlife Trust), with contributions from Bernadette Noake (Staffordshire Wildlife Trust).

## Invertebrate headlines

### Overview

Invertebrates are possibly the biggest taxonomic group in Staffordshire with 5,559 species being recorded since 1990 (SER, 2016a). Of these, 385 are Priority Species and two are legally protected (SER, 2016b). This rich group occupies all broad habitat types from lowland heathland and hay meadows to moorland, woodland, rivers, streams, wetlands and urban gardens. Invertebrates are one of the most effective barometers of ecological and environmental change.

### Key species

Selection of NERC Action Section 41 Species:

Tormentil mining bee *Andrena tarsata*, Grizzled skipper *Pyrgus malvae*, Dingy skipper *Erynnis tages*, Red-shanked carder bee *Bombus ruderarius*, Large garden bumblebee *Bombus ruderatus*, Yellow splinter craneflies *Lipsothrix species*, Argent & sable *Rheumaptera hastata*

### Headlines

- There are newly discovered grizzled skipper colonies in mid-Staffordshire.
- Invertebrates that require habitat features such as old-growth trees with deadwood, arable margins and bare ground with pioneer vegetation have declined.
- Four bumblebee species have become extinct since 1920, with the colonisation of one species.

### Key threats

- Land use change, including insufficient or inappropriate management and agricultural intensification.
- Destruction and deterioration of habitats including the isolation and loss of wildflower-rich habitats, early stage successional habitats and veteran tree features.
- Insufficient mitigation on development sites.
- Modification of watercourses.
- Pollution and pesticides (particularly neonicotinoid pesticides).

### Successes

- Increased coarse woody debris installations in strategic locations resulted in positive impacts on Logjammer hoverfly (*Chalcosyrphus eunotus*).
- Bare ground creation has resulted in positive impacts on ground nesting bees and wasps, such as *Methocha articulata*.

### Recommendations

- Promote landscape-scale connectivity through corridors and stepping stones, targeting both arable and pasture landscapes and threatened/vulnerable species.
- Increase habitats of importance, particularly features such as woody debris in watercourses, bare ground with pioneer vegetation, veteran trees and deadwood.
- Increase consideration for invertebrates in developments.
- Increase survey, monitoring and research to inform conservation, incorporating citizen science.

## 10.1 State of terrestrial invertebrates in Staffordshire

### 10.1.1 Overview

Terrestrial invertebrates figures	Staffordshire	UK
Species recorded in Staffordshire since 1990 (SER, 2016; Buglife, 2016)	5,559	-
Species recorded from Staffordshire in total (SER, 2016)	6,817	40,000

Table 1. Number of invertebrate species recorded in Staffordshire.

#### Key Species:

Staffordshire Biodiversity Action Plan Priority Species: Bog-bush cricket, ground nesting solitary bees and wasps, small pearl-bordered fritillary, white-faced darter dragonfly, white-clawed crayfish.

Other notable species include:

Common name	Scientific name	Designations
Red wood ant	<i>Formica rufa</i>	
Scarce black mining bee	<i>Andrena nigrospina</i>	Provisional Red Data Book 2
Kirby's nomad bee	<i>Nomada subcornuta</i>	Provisional Red Data Book 2
Tormentil mining bee	<i>Andrena tarsata</i>	NERC Act Section 41
Grizzled skipper	<i>Pyrgus malvae</i>	NERC Act Section 41
Dingy skipper	<i>Erynnis tages</i>	NERC Act Section 41
Bumblebee hoverfly	<i>Pocota personata</i>	Nationally Scarce
Logjammer hoverfly	<i>Chalcosyrphus eunotus</i>	Nationally Scarce
Violet oil beetle	<i>Meloe proscarabaeus</i>	
Brown-banded carder bee	<i>Bombus humilis</i>	
White admiral	<i>Limentis camilla</i>	NERC Act Section 41
Red-shanked carder bee	<i>Bombus ruderarius</i>	NERC Act Section 41
Large garden bumblebee	<i>Bombus ruderatus</i>	NERC Act Section 41
Yellow splinter craneflies	<i>Lipsothrix species</i>	NERC Act Section 41
Argent & sable	<i>Rheumaptera hastata</i>	NERC Act Section 41
Wet woodland hoverfly	<i>Xylota abiens</i>	Nationally Scarce
(A dolyfly)	<i>Dolichopus lineatocornis</i>	IUCN Vulnerable
Wall butterfly	<i>Lasiommata megera</i>	NERC Act Section 41
Southern iron blue mayfly	<i>Baetis niger</i>	NERC Act Section 41

Table 2. Notable invertebrate species in Staffordshire.

Invertebrates are particularly useful indicators as to the health and condition of both the rural countryside and built-up urban areas at the broad habitat level such as those listed above and also at a tighter, more specific ecological niche level that is more often occupied by high fidelity and “fussy” species. These niches or “specific assemblage types” (Drake *et al*, 2007) include sap runs (most often found on old trees), spring-fed seepages (where water is clean), flowery grasslands (with low nutrient inputs) and open short swards over bare ground (early successional vegetation).

The way in which invertebrates live and interact with their surroundings therefore means that they can provide us with a lot of information about the relative strengths and weaknesses of the landscape in any particular area and at any particular level (broad landscape to small feature). In addition, as invertebrates reproduce at faster rates than higher organisms, they often respond very quickly and can feedback information concerning changes in the landscape or to a change in the climate, either in a positive or negative way.

The principal areas for invertebrates in Staffordshire are wide ranging depending upon the specific target groups (taxa) and habitat. In the south of the County, the sandy dry ground favours thermophilic assemblages (species which require higher temperatures) and in particular those associated with lowland heath and bare ground/early successional mosaics. The most studied group is the aculeate hymenoptera of which Highgate Common SSSI stands out as a flagship site for this group. There are however other, less well known “bee and wasp” sites in the south of the County and a number of these are in private ownership and have restricted access. These sites, although rich and important at a County level, are all under threat from development and change of use.

Also of some value, and a much under-studied landscape are the valley “dingle” woodlands of the extreme south of the County, near Enville. These small woodlands could present a great wealth of species previously un-recorded for the County, such as the NERC Act Section 41 long-horned bee *Eucera longicornis*. They are also, currently home to species found nowhere else in the County such as the Nationally Scarce woodland hoverfly *Vollucella inflata*.

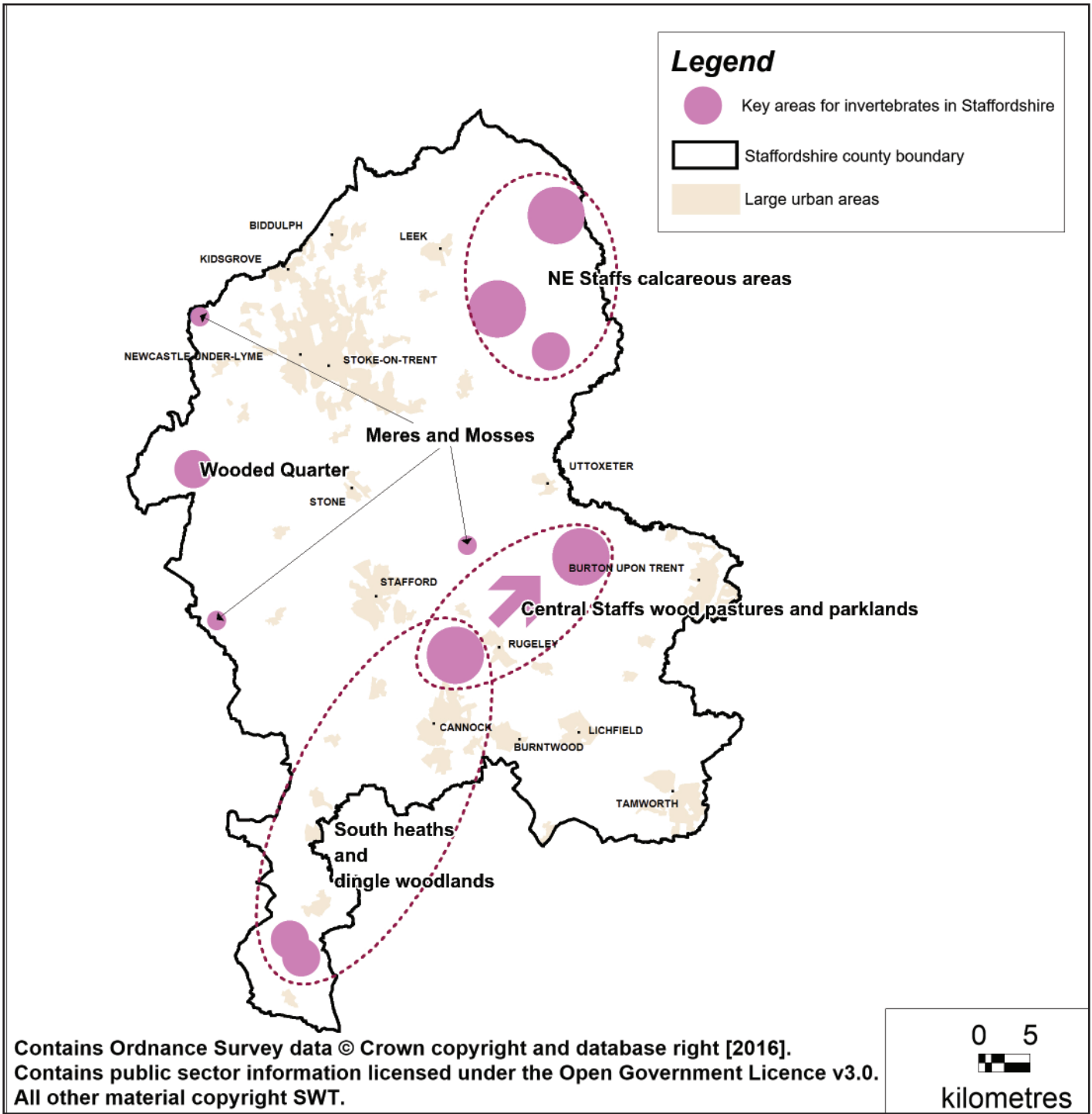
In mid-Staffs there is a rising importance of wetland sites and river catchments that includes headwater stream systems, particularly Cannock Chase where the IUCN globally endangered white-clawed crayfish *Austrophotamobius pallipes*, Nationally Scarce logjammer hoverfly *Chalcosyrphus eunotus* and IUCN Vulnerable (IUCN, 2015) dolyfly *Dolichopus lineatocornis* are found. Based on surveys of some tributaries of the Trent, for example, the Scotch Brook and the Gayton Brook, these sub-catchments can be considered to be biodiversity hot spots for wetland and aquatic invertebrates such as river shingle beetles and the iron blue mayfly.

The wooded habitats of from Cannock Chase to Needwood Forest, including the parkland and wood pasture sites, are some of the most important in the County’s inventory of key invertebrate sites. Brocton Coppice SSSI and Brankley Pastures stand out as key nuclei for several important populations of saproxylic invertebrates such as the bumblebee hoverfly *Pocota personata* and giant sabre comb-horn crane fly *Tanyptera atrata*.

The woodlands of northwest Staffordshire, the wooded quarter, are important for a range of invertebrates, such as important populations of southern wood ant and argent & sable. The Meres and Mosses in Staffordshire are important for a number of specialist invertebrates, such as the giant sabre comb-horn crane fly, white-faced darter and emerald dragonfly.

Northeast Staffordshire, including the Weaver Hills, the Churnet Valley and the Peak District, is most notable for its moorland and calcareous habitats and these include a suite of species found nowhere else in the County. The mountain bumblebee *Bombus monticola* is indicative of the high moorland landscape north of Leek and across eastwards to the Derbyshire border near Warslow. On the calcareous ground the alkaline soils and in particular the spring-fed calcareous seepages provide a home for species not found elsewhere in Staffordshire including the Nationally Scarce soldierfly *Oxycera pardalina*. These seepages undoubtedly hold other species not currently recorded from elsewhere in the County.

The results of macro invertebrate surveys in the Peak District, show a mixed picture of aquatic and riparian habitats; many areas have been impacted by changing land uses and heavy pollution, whilst other areas some surviving very high quality habitat. For example sites with indicator species such as large dark stonefly *Dinocras cephalotes* demonstrate truly excellent water quality and habitat at certain sites. Non-native aquatic species such as American signal crayfish, zebra mussel, and the recently arrived demon shrimp, Asian clam, are already showing signs of detrimental impacts on the freshwater ecosystems of Staffordshire.



**Figure 1: Key areas for invertebrates in Staffordshire**

## 10.1.2 Population trends

### Examples highlighting invertebrate population changes

#### **Highgate Common** – loss of early succession habitat on lowland heathland (Jukes, 2010b)

The historic cessation of common land grazing, lack of suitable management to retain open character and restricted access to vehicular movements on Highgate Common (for safety reasons) has resulted in fewer open and sandy areas being created and maintained. Management to create early successional habitat has been successful in recent years and this will be continued.

#### **Bumblebee declines (SER, 2016)**

The wholesale historic changes in agriculture meant that traditional small-scale farming was replaced by increasingly efficient methods of producing crops and meat, which resulted in a negative impact on species associated with patchworks of low nutrient flower-rich fields and structurally diverse habitats and landscapes. Four species of bumblebee have become extinct since the 1920s.

#### **Gayton Brook Case Study Site**

Baseline aquatic macroinvertebrate surveys were carried out in 2010, and repeated in 2014, after habitat works had been carried out in the intervening period. Results were able to demonstrate positive responses to the works from key species at several sites.

#### **Churnet Valley Case Study Site - decline in heartwood rot**

Through an analysis of invertebrate data dating back to 1970 (total of 31,263 records, SER, 2016) a current study of the Churnet Valley Living Landscape has noted that there is a significant lack of old woodland features, in particular the presence of heart rot decay (Table 3). This is due to the historic usage of the Churnet Valley as a resource to fuel industry. There are now very few old trees in the valley and the woodlands are populated by young trees. The corresponding heartwood decay (saproxylic) fauna is also low. Table 3 below highlights the assemblages present in the valley and those in bold are those of particular note. The bark and sapwood decay assemblage is deemed to be in favourable condition. This micro-habitat includes a range of species and groups from bees to beetles that are relatively mobile and exploit new features. Species associated with fungal fruiting bodies and heartwood decay assemblages, however, are distinctly lacking from the assessments indicating a lack of suitable features in the valley woodlands. These assemblages are highly valued due to their associated scarce fauna and woodland management should aim to retain such key features.

The study was carried out using systematic methodologies and results were analysed in the computer application ISIS (Invertebrate Species – habitat Information System). This application can be used to identify assemblages of importance from inputting species lists into the computer software. Further information about ISIS analysis can be found in the methods chapter.

The rows in bold are those associated with trees and deadwood. The bark and sapwood decay assemblage is in good “favourable” condition but those that require longer periods of time to develop and are most strongly associated with old and large trees are currently lacking in the valley woodlands. Work is currently under way (2016 onwards) to increase the deadwood resources of the woodlands in the Churnet Valley to safeguard the limited fauna and hopefully increase the resource and robustness of the assemblage over time.

Specific Assemblage Type	No. spp.	Condition	% of national species pool
Fast flowing streams and waterfalls	5	Favourable condition	23
<b>Bark and sapwood decay</b>	<b>42</b>	<b>Favourable condition</b>	<b>8</b>
The following assemblages did not reach the threshold for Favourable condition:			
Stream and river margin	4		7
<b>Fungal fruiting bodies</b>	<b>5</b>		<b>6</b>
Shingle banks	2		4
Seepages	2		4
Scrub edge	6		3
Rich flower resource	7		3
Scrub-heath and moorland	8		2
<b>Heartwood decay</b>	<b>4</b>		<b>2</b>

**Table 3: Summary of species changes/trends in the Churnet Valley.**

### 10.1.3 Species assemblages

The groups below are key indicators of a range of habitats, assemblages and features. These are the groups used in assessments based on the suggestions in Drake *et al.*, 2007, and others can be used as flagship species for specific Biodiversity Action Plan habitats. The value of these species or groups of species is that they have specific requirements from a habitat and most often occupy a tight and well defined ecological niche, meaning that using them for assessment gives an insight to the relative health of the habitat or assemblage in which they, and other species live.

- Ground nesting bees and wasps - open mosaics and lowland heathland
- Saproxyllic assemblages (beetles and flies) - deadwood features and landscapes
- NERC Act Bumblebees - Flowery grassland landscapes
- *Chalcosyrphus eunotus*, *Xylota florum*, *Lipsothrix* spp - Coarse woody debris/headwater streams
- Soldierflies, hoverflies, craneflies, dolyflies - seepages
- Water beetles, aquatic heteroptera - waterbodies

### 10.1.4 Key species changes

The table below depicts a range of species from various habitats that have had varying histories in the County and which have been impacted, either positively or negatively, by a wide ranging set of circumstances, be it site management or a changing climate.

The information in the table is based on expert knowledge, and interpretation of available data on the species listed. Ideally, the information would be based on systematic monitoring over a number of years and then used to describe changes into defined categories. However, for Staffordshire Distribution Change, the specific defined limits/criteria were not identified, but instead is based on the expert knowledge of the chapter author using available data. A “Staffordshire Status” for each species has also been allocated by the chapter author.

Species	Status	Staffordshire Distribution Change	Survey / monitoring effort	National Trends
Scarce black mining bee <i>Andrena nigrospina</i>	Provisional Red Data Book 2 (Staffordshire Threatened)	Significant decline	1 monitored site	Currently unknown - but threatened
Broad banded nomad bee <i>Nomada signata</i>	Red Data Book 2 (Staffordshire Threatened)	Stable	2 monitored sites	Fluctuating depending upon location. Overall, possibly stable but not increasing so remains threatened
Tiger beetle wasp <i>Methocha articulata</i>	Nationally Scarce (Staffordshire Scarce)	Increased	3 monitored sites	Possibly increased
Bog bush-cricket <i>Metriopectera brachyptera</i>	Nationally Scarce (Staffordshire Rare)	Stable	2 monitored sites	Possibly climate assisted and slight increase
Spring robberfly <i>Lasiopogon cinctus</i>	Nationally Scarce (Staffordshire Scarce)	Probable overall increase	Several surveyed sites	Possibly climate assisted increase
Kirby's nomad bee <i>Nomada subcornuta</i>	Unknown (possibly Red Data Book 2) Staffordshire threatened	Probable significant decline in line with its host ( <i>A.nigrospina</i> )	1 monitored site	Unknown but likely to be threatened
Southern England widespread bees and wasps such as Pantaloon bee ( <i>Dasypoda hirtipes</i> ) and the Clover Melitta ( <i>Melitta leporina</i> )		Increase	Several surveyed sites	Probably climate assisted species
Logjammer hoverfly ( <i>Chalcosyrphus eunotus</i> )	Nationally Scarce	Increase	5 monitored sites	Increase partly due to more comprehensive targeted recording.
White-clawed Crayfish		Declining (Significant decline since 1970s, now under threat of extinction)	23	Declining (significant declines since 1970s, with several county extinctions confirmed)

**Logjammer hoverfly** *Chalcosyrphus eunotus*

Prior to 2009, *C. eunotus* was a very scarce hoverfly. It was regarded as Red Data Book 2 due to its restricted distribution and lack of records. After the autecological studies by A.Jukes (2009b, 2010c), more information was gained on the specific habitat requirements of the fly. From this point forward, more sites were found. Also, due to long term efforts by Nick Mott of SWT, suitable habitat was created for the species alongside wider coarse woody debris (CWD) projects. The results of the inputs of CWD to strategic locations such as the Churnet Valley and Cannock Chase has resulted in stronger populations of the fly over a wider area.



© A.Jukes

**Black oil beetle** *Meloe proscarabaeus*

The black oil beetle was last recorded in Staffordshire in 2000 at Highgate Common SSSI, south Staffordshire. Subsequent searches of the site yielded no results for a number of years. A re-assessment of the scarce species associated with Highgate Common undertaken in 2010 (Jukes, 2010b) re-found the species. Subsequent bare ground creation on the site has provided new nesting areas for the mining bee hosts, which also seems to have benefitted this parasitic oil beetle.



© A.Jukes

**Scarce black mining bee** *Andrena nigrospina* and  
**Kirby's nomad bee** *Nomada subcornuta*

*A. nigrospina* is a nationally threatened species. It has a disjunct distribution in the UK with a metapopulation in south Essex and on the borders between Staffordshire and Worcestershire where it is at risk of regional extinction. Its only Staffordshire location is Highgate Common SSSI where it was once described as a frequent species (1996-2000). Changes to the agricultural landscape around the common and lack of suitable nesting sites on the common have led to its collapse. Detailed autecological studies of the species (Jukes, 2009a, 2010a) now provides an understanding of why it is likely to have collapsed and now efforts are being made to conserve this bee and its parasite, Kirby's nomad bee (*N. subcornuta*), an equally if not scarcer species of bee.



© A.Jukes

**Tiger beetle wasp** (*Methocha articulata*)

*Methocha* is a species of ant-mimicking wasp that predated tiger beetle larvae. It has always been a scarce species in Staffordshire being mainly confined to the sandy, open heaths of south Staffordshire and isolated sites in sandy quarries in central Staffordshire. In recent years, due to greater awareness of bare ground as an important feature on heathlands, scrape creation on all major heathlands such as at Shoal Hill LNR and the Connecting Cannock Chase project has been initiated. The creation of new bare ground areas has improved the habitat quality for green tiger beetles, and subsequently enabled *Methocha* to colonise new sites.



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### 10.1.5 Habitat condition

Invertebrates are the true barometer of the quality of habitats. Analysis such as ISIS and biometrics allow us to give an accurate assessment of the quality of individual sites or landscapes.

The countryside was once a varied matrix of small fields, many of which were on low nutrient soils that gave rise to flower-rich communities and patchy bare ground. The woodlands were widespread and structurally diverse with plentiful deadwood and scrubby edges. In contrast, the modern landscape favours large monocultural fields and landscapes with little variation, much of which is enriched with nitrogen and phosphorus and therefore suits coarse and aggressive grass growth rather than slow-growing perennial flowers. Woodlands are fragmented and in small units with little structure or edge, and many of the large trees have been felled.

Research and site assessments are increasingly showing that invertebrates require varied and structured landscapes with plentiful “edge” and transitional zones between habitats. That is to say, they like to be in the transitional zones between woodland and grassland or grassland and bare ground. This “scruffy” zone is often erased from most landscapes in favour of clean lines to maximise economical crop yields or neat hedgerows and field margins. Very few watercourses and wetlands have been unmodified, which has further impacted on invertebrate fauna. There are some very high quality surviving habitats, but need these need to be protected and connected through the continued improvement of water quality and connecting terrestrial habitats.

Overall, the condition of the modern landscape is extremely challenging for invertebrate diversity and abundance; there needs to be more recognition of the vital importance invertebrates play in ecosystems and the impacts this has on our wellbeing and the economy. There are excellent examples of ambitious habitat projects for pollinators and connecting landscapes across counties elsewhere in the country that could be emulated in Staffordshire. For example the B-Lines project, highways agencies, and linear transport network projects.

## 10.2 Threats

<b>Generic issues that apply (see Appendix A for more detail)</b>
<b>Numbers 2, 4-6, 10, 13, 14, 16, 18;</b> pollution, runoff, habitat fragmentation and severance, neglect, inappropriate management, habitat loss, invasive non-native species.
<b>Additional specific issues for invertebrates</b>
<ul style="list-style-type: none"><li>• Destruction and deterioration of habitats including the isolation and loss of wildflower-rich habitats, early stage successional habitats and veteran tree features.</li><li>• Land use change.</li><li>• A homogenous landscape with a lack of habitat niches, transitional habitats and zones</li><li>• Changes in legislation and agri-environment schemes.</li><li>• Nutrient enrichment.</li><li>• Agricultural intensification.</li><li>• Insufficient mitigation on development sites.</li><li>• Modification of watercourses.</li><li>• Pollution and pesticides (particularly neonicotinoid pesticides).</li><li>• Climate change and weather extremes.</li></ul>

### 10.3 Conserving invertebrates – successes

There are a number of examples of projects underway that are attempting to address some of the issues which have been described in the threats section. Some of these are highlighted in the case studies below:

CASE STUDIES
Case studies elsewhere in the report relevant to invertebrates: <ul style="list-style-type: none"><li>• Blooming Stoke (grassland chapter)</li><li>• Heathland restoration at Kinver Edge (lowland heathland chapter)</li><li>• Butterfly surveys in the Churnet Valley (Lepidoptera chapter)</li><li>• Gayton Brook Catchment Partnership (fish chapter)</li></ul>
Case Study 1 – Increasing opportunities for nesting solitary bees and wasps (Authors and contributors: Hayley Dorrington, Andy Jukes, Jeff Sim)

### 10.4 Conserving invertebrates – recommendations

Generic recommendations that apply (see Appendix A for more detail)
<b>Numbers M1 – M7; M9;M10;M13;M14;M16;M17; DM2-DM4:</b> Improve the following: increase bare ground habitat; manage for structural habitat diversity; increase resources; ensure appropriate grazing; improve planning & use of chemicals; implement Sustainable Drainage Systems (SuDs); Innovative management of recreation pressures; more integrated planning and management of sites across ownership boundaries; integrated use of volunteer groups; survey and monitoring; instate suitable mowing regime; manage woodlands for age and habitat diversity; increase research, and links with universities, colleges and schools; habitat creation through the planning system; increase take up of grants; guidelines for planners.
Additional specific recommendations for invertebrates
<ul style="list-style-type: none"><li>• Protect key invertebrate features, namely veteran trees, over mature trees, seepages and springs, wetlands (including meres and mosses) and early successional stage habitats.</li><li>• Create habitat to benefit invertebrates including bare ground, early successional mosaics and saproxylic features (deadwood).</li><li>• Connect fragmented woodland units including edge habitat.</li><li>• Reinstate wood pasture and open structure woodland character at key sites and across landscapes in all districts.</li><li>• Promote creation of appropriate native wildflower areas in developments and public open spaces or through environmental schemes at strategic locations to increase habitat connectivity.</li><li>• Manage early and mid-successional habitats to prevent scrub encroachment.</li><li>• Protect and optimise situations for veteran trees; promote “veteranisation” of trees, such as ring barking and drilling to create dead standing wood, rot holes and promoting heartwood decay; assess veteran trees in shaded situations to target haloing and woodland management to protect trees of high conservation value.</li><li>• Recognise the value of connectivity across the wider landscape using watercourse corridors, hedgerows and arable margins.</li><li>• Increase invertebrate surveys for ponds - there are species that are unrecorded and may not have been recorded in Staffordshire to date, for example the pond mud snail (<i>Omphiscola glabra</i>).</li><li>• Re-assess all previous lowland heathland invertebrate surveys to identify trends and changes and adjust management accordingly.</li><li>• Assess Needwood Forest saproxylic fauna, including looking for opportunities for connectivity and creation.</li><li>• Raise awareness with local planning authorities on the importance of invertebrates in the planning system and requirements to fulfil NERC Act obligations for all species.</li></ul>

Increasing opportunities for nesting solitary bees and wasps

**Habitats & species:**

**Habitats:** Lowland heathland, lowland acid grassland.

**Species:** Solitary bees and wasps.



*Andrena nigrospina*, a very rare solitary bee found at Highgate Common, © A.Jukes

**Key messages**

- Solitary bees and wasps show a preference for bare earth with varied characteristics, e.g. south easterly slopes, micro-cliffs, flat areas.
- They will also use bare earth that has early successional growth in and around it, showing that small sandy scrapes have a habitat value beyond their first year of being created.

**Overview**

Highgate Common Nature Reserve is a 320 acre site comprised of a habitat mosaic of lowland acidic grassland with dwarf shrub, lowland heathland, secondary birch and oak woodland, and scrubby areas, with small patches of wet heath and two small-medium sized pools. The Common is underlain by a fine sandy soil that provides the free-draining, nutrient poor and acidic conditions required for the establishment of heathland vegetation and associated invertebrates. Highgate Common has been subject to much erosion in the past due to high visitor pressures. This erosion created large areas of open bare sandy earth with varying micro-topographies, which created ideal conditions for the establishment of 140 different solitary bee and wasp species that the site is designated a SSSI for. A large proportion of these are nationally rare and highly localised in their range.

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**Partners**

Natural England  
Conops Entomology  
Staffordshire Wildlife Trust

**Funding**

Highgate Common is owned and managed by Staffordshire Wildlife Trust and is under a HLS agreement with Natural England.

## Objectives

- Create a minimum of 1% bare earth areas across both Highgate Common and Gentleshaw Common.
- Continue to monitor bare earth areas that have been created, and developing best practise guidelines.

## Approach

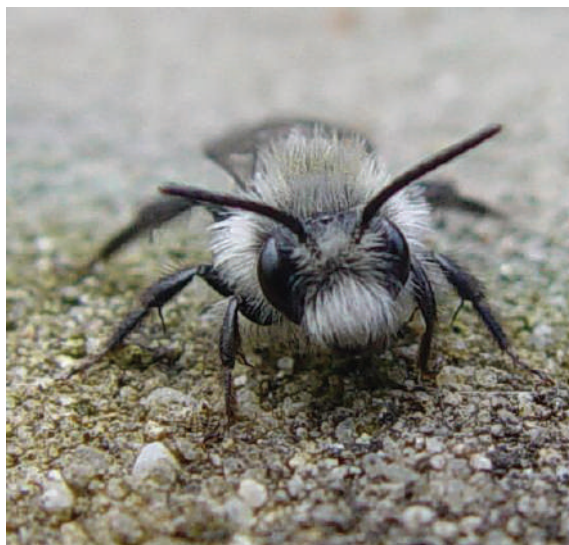
Following advice from Natural England and Conops Entomology, in addition to the normal habitat management techniques associated with lowland heath sites, areas were identified for the targeted creation of bare earth scrapes or 'bee beaches' across key parts of the SSSI. It was agreed that the bee beaches were to be created in open areas, featuring diverse micro-habitats (e.g. hollows, flat areas and micro-cliffs) and were to consist of varying shapes, sizes and orientations to cater for the different requirements of the diverse invertebrate species that use them. The site manager and regular volunteer team are undertaking the bee beach creation work, and all new bee beaches are mapped to allow further investigation into the nesting habits of the solitary bees and wasps, as well as other invertebrates.

## Outcomes

It has been observed that invertebrates will utilise bare earth of varying and different characteristics, including well-used tracks where the ground has become very compact. *Andrena nigrospina* (a red data book species) has been recorded at Highgate Common and was observed to be using steep-sided bare earth for nesting in newly-created scrapes. It has also been discovered that digging down to the sandy earth beyond the organic material is the best approach to scrape longevity, with sandy scrapes being used by more species. A secondary outcome from the creation of bare earth has been the succession of new areas of pioneer heather over time.

## Future work

Long term monitoring of species presence and abundance and the effectiveness of the bare earth that has provided needs to take place, however this is very specialised and costly. A landscape-scale approach to heathland management in the area needs to be taken and opportunities for lowland heathland creation and restoration explored to connect relict heathlands in the wider area. Areas such as Highgate Common offer a highly valuable resource for protecting threatened and declining species in the UK and provide a reservoir for future recolonisation of other nearby areas of heathland that may be restored in the future.



*Andrena cineraria* Grey Mining Bee, © A.Jukes

# 11. Invertebrates: Lepidoptera

Authors: Rhona Goddard (Butterfly Conservation), with contributions from Victoria Liu (Staffordshire Wildlife Trust) and Bernadette Noake (Staffordshire Wildlife Trust)

## Lepidoptera headlines

### Overview

Butterflies and moths are a highly diverse group. In the UK we have 59 butterfly species and 2,500 species of moth and are one of our most threatened groups of wildlife. They are indicators of biodiversity and a healthy environment, because of their sensitivity to climate change, changes in land management and the health of our environment, this makes them quick to react to change and therefore providing an early warning about the condition of our environment.

### Key species

Dingy Skipper, Grizzled Skipper, Small Pearl-bordered Fritillary, White-letter Hairstreak, Wall and Dark Green Fritillary, Argent and Sable, Welsh Clearwing

### Headlines

- 34 species of butterfly (including three migrants), and 1,295 species of moths have been recorded in Staffordshire (Duncan *et al.*, 2016; SER, 2016a).
- 60 species of butterfly (including four migrants), and over 2,500 moths have been recorded in the UK (Fox *et al.*, 2015; Fox *et al.*, 2013)
- There are seven Priority Species of butterfly in Staffordshire (SER, 2016b). Of these, six are contracting in range and one is expanding, with five decreasing in abundance, one having a stable population and one increasing in abundance in the West Midlands region (Duncan *et al.*, 2016).
- There are 76 Priority Species of moth in Staffordshire (SER, 2016c).

### Key threats

- Land use change, including insufficient or inappropriate woodland management and agricultural intensification.
- Destruction and deterioration of habitats including the isolation and loss of wildflower rich habitats.
- Climate change and weather extremes.
- Changes in legislation and agri-environment schemes.
- The impact of neonicotinoid pesticides on butterfly and moth populations is unknown.

### Successes

- Targeted management for Argent & sable.
- Increased small pearl-bordered fritillary numbers on Cannock Chase.

### Recommendations

- Increase the number of targeted species surveys to determine locations of Priority Species throughout the county.
- Ensure that established monitoring (e.g. transects) is carried out on a regular basis to provide an accurate picture of population changes.
- Continue and develop landscape-scale projects for target species, e.g. small pearl-bordered fritillary.

## 11.1 State of Lepidoptera in Staffordshire

### 11.1.1 Overview

Lepidoptera figures	Staffordshire	UK
Total number of butterfly species (SER, 2016a; Duncan <i>et al.</i> , 2016)	34	60
Total number of moth species (SER, 2016a; Fox <i>et al.</i> , 2015; Fox <i>et al.</i> , 2013)	1,295*	>2,500
Butterfly Conservation high priority butterfly species (Duncan <i>et al.</i> , 2016)	6	-
Butterfly Conservation medium priority butterfly species (Duncan <i>et al.</i> , 2016)	3	-
Number of migratory butterfly species	3	4
Number of Priority Species of butterfly (SER, 2016b)	7	-
Number of Priority Species of moth (SER, 2016c)	76	-
*Another 150 moth species have been recorded historically (before 1990)		

**Table 1. Number of important Lepidoptera species in Staffordshire.**

#### Butterfly species:

High Priority Butterfly Conservation (BC) species<sup>†</sup>: dingy skipper, grizzled skipper, small pearl-bordered fritillary (also classed as a Staffordshire BAP species), white-letter hairstreak, wall and dark green fritillary

Medium Priority BC species: green hairstreak, white admiral and small heath

Low Priority BC species: brown argus, silver-washed fritillary

#### Moth species:

High Priority BC species: Argent & sable and Welsh clearwing

<sup>†</sup>There are records indicating a colony of brown hairstreak in Staffordshire, however it has not been included here to its unknown origin. In addition, wood white has not been included as although it is recorded from Staffordshire Vice County it is not recorded from modern day Staffordshire.

Butterflies can be found in a variety of habitats present in Staffordshire including grassland (acidic and calcareous), heathland, wetlands, woodland, scrub, farmland, hedgerows, moorland and brownfield sites, including abandoned railways and quarries. Each species of butterfly and moth has very specific requirements, which are determined by the food plant of the caterpillar, nectar source for the adult and the conditions required for the butterfly or moth to complete its life-cycle.

Habitat generalist species thrive in a number of different habitats that support a variety of plant species, whereas habitat specialists have very specific requirements, e.g. the small pearl-bordered fritillary caterpillar will only feed on marsh violets and possibly common dog violets in Staffordshire. Key areas for butterflies and in Staffordshire include the Staffordshire Moorlands, the Weaver Hills, Cannock Chase, Kinver Edge, Highgate Common, Churnet Valley, woodlands near Loggerheads and the brownfield sites of Stoke-on-Trent and Newcastle.

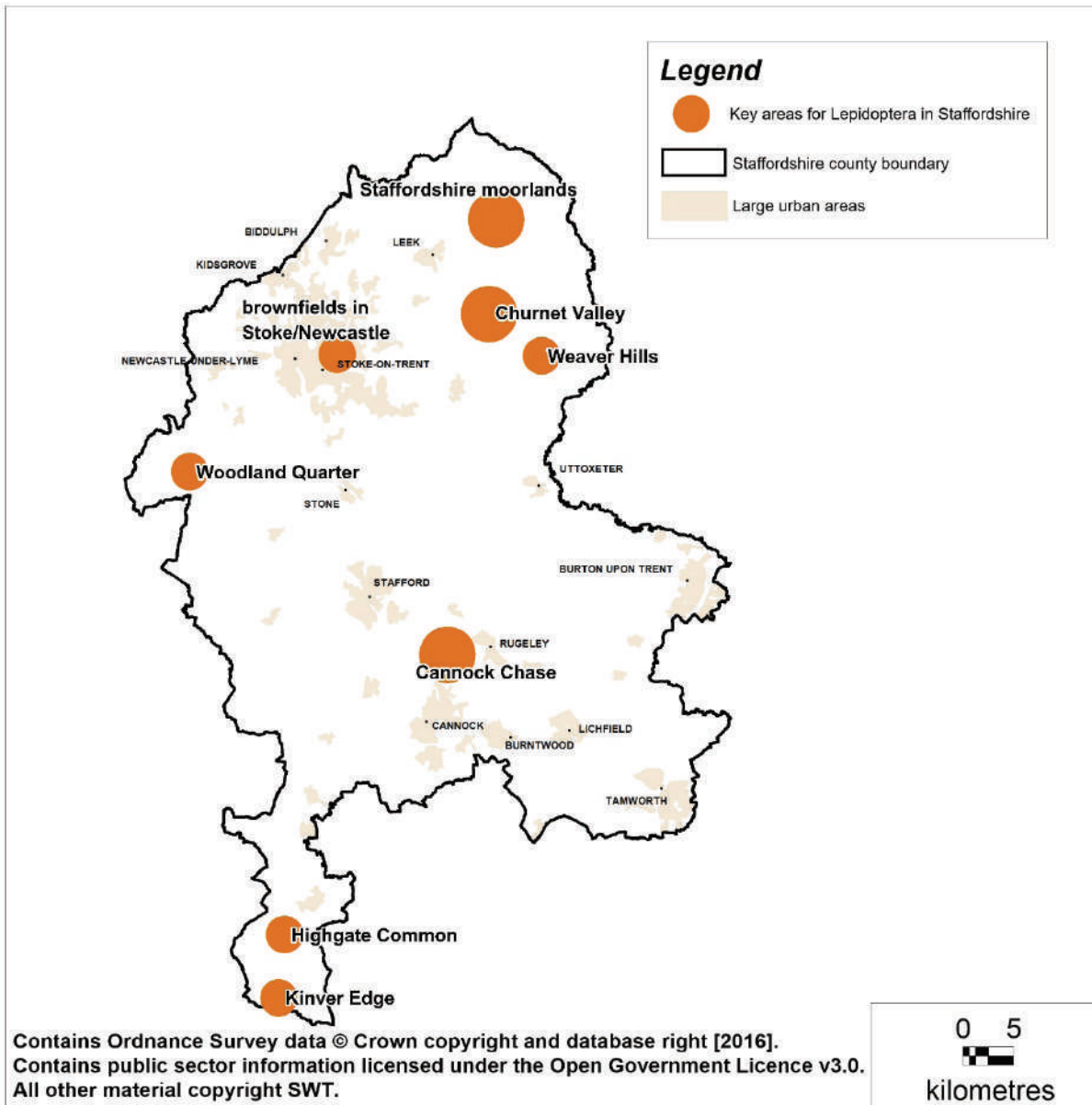


Figure 1. Key areas for Lepidoptera in Staffordshire.

Summary of changes	Number
Number of BC priority butterfly species contracting in range*	7
Number of BC priority butterfly species expanding in range*	3
Number of BC priority butterfly species with a stable range*	1
Number of BC priority butterfly species decreasing in abundance*	6
Number of BC priority butterfly species increasing in abundance*	3
Number of BC priority butterfly species with a stable population*	2
*in the West Midlands region (Duncan <i>et al.</i> , 2016)	
Summary of reasons of changes	
<ul style="list-style-type: none"> <li>• Land use change, including insufficient or inappropriate woodland management and agricultural intensification.</li> <li>• Destruction and deterioration of habitats, including the isolation and loss of wildflower rich habitats.</li> </ul>	
Other trends	
<ul style="list-style-type: none"> <li>• Long term trends show approximately 57% of UK butterflies decreased in abundance and 70% in occurrence from 1976 - 2014. 10 year UK trends show 52% of butterflies decreased in abundance and 47% decreased in occurrence from 2005 - 2014 (Fox <i>et al.</i>, 2015). This shows that things are generally improving for butterflies, however some threatened species continue to decline along with some of the more common species. (Fox <i>et al.</i>, 2015).</li> <li>• Between 1968 and 2007, the total abundance of larger moths in Britain declined significantly, by 28%. Two-thirds of 337 species of common and widespread larger moths declined over the 40-year study. One-third of species became more abundant (Fox <i>et al.</i>, 2013).</li> <li>• All high and medium Priority Species have declined nationally in occurrence and abundance between 1976 and 2014. The only exception is dark green fritillary, which has decreased nationally in occurrence but increased in abundance.</li> <li>• A recent Butterfly Conservation report states that 70% of UK butterfly species are declining in occurrence and 57% declining in population since 1976 (Fox <i>et al.</i>, 2015)</li> <li>• All seven Priority Species of butterfly species in Staffordshire show either declining abundance or distribution in the West Midlands. The picture for some species is more positive locally however; Staffordshire is a stronghold for the dingy skipper in the West Midlands and new populations are being discovered (Duncan <i>et al.</i>, 2016).</li> <li>• High brown fritillary is considered to have gone extinct from Staffordshire during the 1930s and pearl bordered fritillary since the 1950s.</li> </ul>	

**Table 2. Summary of Lepidoptera species population trends.**



### **11.1.3 Species assemblages**

Long term UK trends show that both habitat specialist butterflies and wider countryside species (generalists) decreased significantly in abundance and occurrence from 1976 to 2014. Woodland butterflies, for example, declined by 55% in England between 1990 and 2014 (Fox *et al.*, 2015). Recent studies have shown that the declines in some species have slowed, however, even for those species, remaining populations are generally smaller than they once were. In addition, annual weather patterns can have large impacts on annual butterfly populations. The picture for UK butterflies therefore remains a great concern.

Between 1968 and 2007, the total abundance of larger moths in Britain declined significantly, by 28%. Two-thirds of 337 species of common and widespread larger moths declined over the 40-year study. One-third of species became more abundant (Fox *et al.*, 2013). Best knowledge suggests that moths in Staffordshire will have followed national trends, however data and the resources to analyse the data are limited in comparison to butterflies in the region.

### **11.1.4 Key species changes**

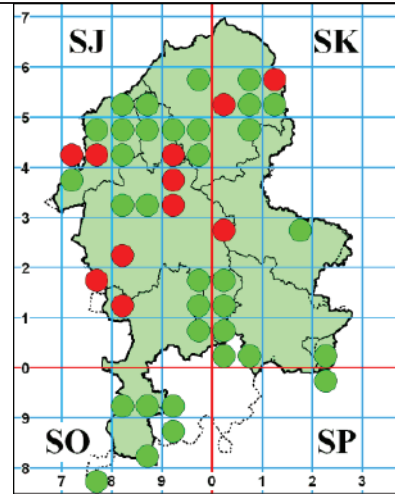
All seven Priority Species of butterfly in Staffordshire show either declining abundance or distribution in the West Midlands and nationally over the past 10 years, with many other species also showing declines (Table 3). The picture for some species is more positive locally however; Staffordshire is a stronghold for the dingy skipper in the West Midlands and new populations are being discovered (Duncan *et al.*, 2016).

Species	Status*	West Midlands range	West Midlands pop <sup>n</sup> trend (10 years)	National pop <sup>n</sup> trend (10 years)	National pop <sup>n</sup> trend (since 1976)
Dingy skipper	S41	↓	↓	69%	-19%
Grizzled skipper	S41	↓	stable	0%	-37%
Small pearl-bordered fritillary	S41; SBAP	↓	↑	3%	-58%
Wall	S41	↓	↓	-25%	-87%
White-letter hairstreak	S41	↓	↓	-77%	-96%
Small heath	S41	↓	↓	18%	-54%
White admiral	S41	↑	↓	-45%	-59%
Dark green fritillary		(?)↓	stable	18%	186%
Brown argus		↑	↑	-11%	-25%
Silver-washed fritillary		↑	↑	6%	141%
Green hairstreak		stable	↓	-34%	-41%
Brimstone		stable	↑	-1%	1%
Clouded yellow		migratory	↓	-57%	734%
Comma		stable	↓	-28%	150%
Common blue		stable	stable	1%	-17%
Essex skipper		↑	↑	-66%	-88%
Gatekeeper		stable	↓	-44%	-41%
Green-veined white		stable	↑	72%	-7%
Holly blue		stable	↓	-61%	37%
Large skipper		stable	↑	23%	-17%
Large white		stable	stable	-28%	-30%
Marbled white		↑	↓	25%	50%
Meadow brown		stable	stable	-15%	1%
Orange-tip		stable	↑	59%	10%
Painted lady		migratory	↓	-84%	133%
Peacock		stable	↑	21%	17%
Purple hairstreak		stable	↓	-10%	-54%
Red admiral		migratory	↓	-40%	257%
Ringlet		↑	↑	72%	381%
Small copper		stable	stable	-19%	-37%
Small skipper		stable	↑	27%	-75%
Small tortoiseshell		stable	↑	146%	-73%
Small white		stable	↑	9%	-25%
Speckled wood		stable	↑	4%	84%

**Table 3. Distribution and abundance changes for priority butterfly species between 2005 and 2015 within the West Midlands region (Duncan *et al.*, 2016). \*S41 indicates those listed as NERC Act 2006, Schedule 41: Species of Principal Importance in England, and SBAP indicates those listed as Staffordshire Biodiversity Action Plan Priority Species.**

**Dingy skipper** *Erynnis tages*

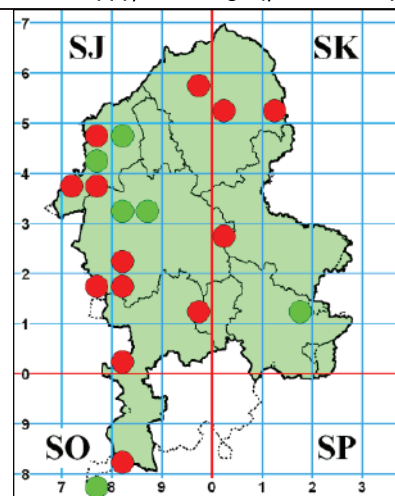
Nationally this species is found locally throughout the UK, but its range is contracting. This has also been seen in the West Midlands region. Staffordshire is a stronghold for this species with concentrations on brownfield sites and limestone sites in the north-east. Large populations can be found at Chatterley Whitfield and Swynnerton Training Area, with recent colonisations of suitable habitat in the Stoke-on-Trent area.



Distribution of dingy skipper in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Grizzled skipper** *Pyrgus malvae*

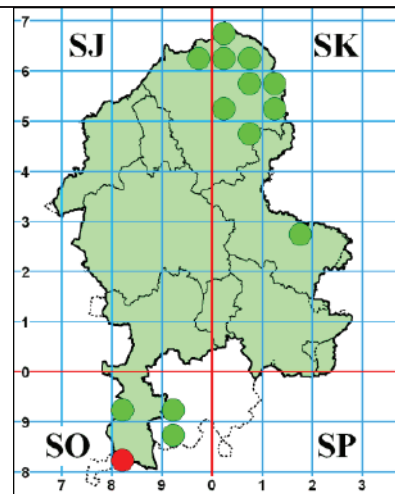
Nationally the range of this species is contracting, with the West Midlands populations remaining stable. There are only a few historical records for this species but in 2012 a colony was found in Swynnerton, one of the biggest known colonies in the West Midlands, suggesting that grizzled skipper is potentially under-recorded in Staffordshire.



Distribution of grizzled skipper in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Dark green fritillary** *Argynnis aglaja*

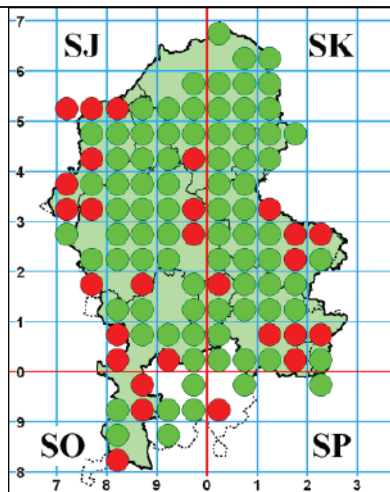
Nationally this species occurs throughout the UK but is declining in central England. In the West Midlands region it is thought that the range of this species may be decreasing, but it is also felt that this species is potentially under-recorded. Recent records for Staffordshire suggest that this species is doing well in the Staffordshire Moorlands area and Manifold Valley. Historically this species was also found in South Staffordshire.



Distribution of dark green fritillary in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Wall brown** *Lasiommata megera*

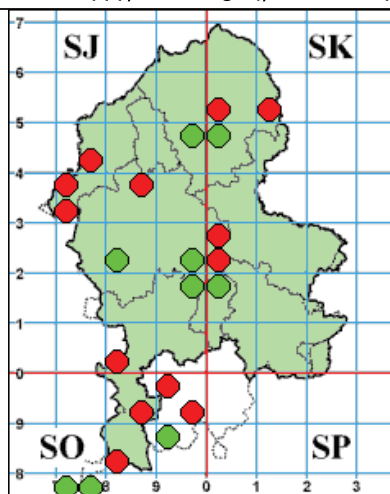
Nationally there has been a rapid range contraction of the wall brown since the 1980s. This species was recorded at a number of lowland sites in Staffordshire, but it now tends to be recorded on higher ground such as in the north-east of Staffordshire. The decline in lowland areas, but remaining presence on upland sites suggests that the decline could be due to climatic or environmental changes.



Distribution of wall brown in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Small pearl-bordered fritillary** *Boloria selene*

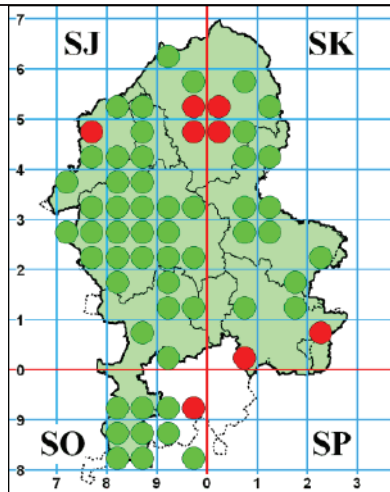
Nationally this species is contracting in range, but its population trend over 10 years has increased by 3%. In 1995, according to SER, SPBF were found at 10 sites, but now SPBF is only known to be present at one site in Staffordshire. Butterfly Conservation has been working closely with site owners to ensure that targeted site management takes place to ensure this species continues to survive.



Distribution of small pearl-bordered fritillary in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**White-letter hairstreak** *Satyrrium w-album*

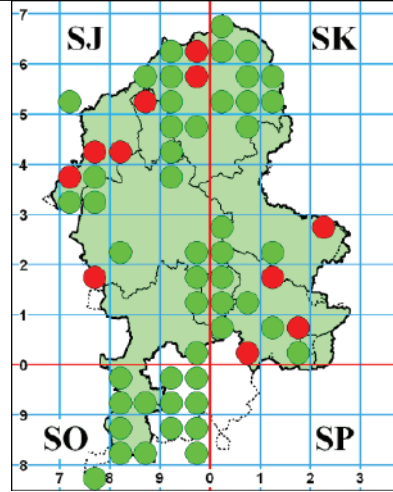
Scattered colonies are present throughout England and Wales. This species suffered a large contraction in range due to Dutch elm disease. A national decline of 77% in the last 10 years has been seen. Its range is also contracting in the West Midlands. The greatest concentration in this region can now be found in north-west Staffordshire (Duncan *et al.*, 2016). This species is very difficult to find. In 2014 a number of white-letter hairstreak eggs were found in the Stafford area.



Distribution of white-letter hairstreak in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Green hairstreak** *Callophrys rubi*

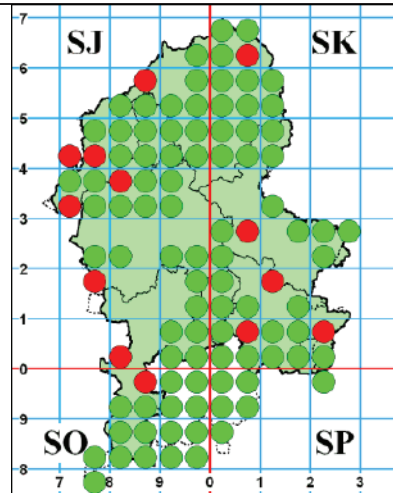
Green hairstreak is present throughout the UK but has seen some losses in recent years. Staffordshire is potentially the best county in the West Midlands for this species, with sites in the Staffordshire Moorlands, around Loggerheads, Cannock Chase, Chasewater, Burntwood, Gentleshaw Common, Kinver Edge and Highgate Common.



Distribution of green haristreak in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Small heath** *Coenonympha pamphilus*

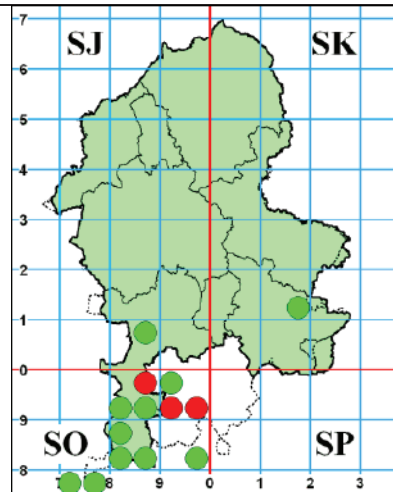
Nationally this species is widespread with a stable range. 2005 - 2014 records show this species to be found in the Staffordshire Moorlands and Cannock Chase areas as well as at Highgate Common. This preference for upland areas and well drained acidic grassland areas has been observed throughout the West Midlands region.



Distribution of small heath in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**White admiral** *Limenitis camilla*

Nationally the white admiral range has been expanding northwards rapidly over the last 30 years, but numbers seen at individual sites are declining. Two key sites in Staffordshire for this species are Kinver Edge and Highgate Common. This butterfly tends to be a canopy species that thrives in shady woodlands where its larval food plant, honeysuckle, thrives.

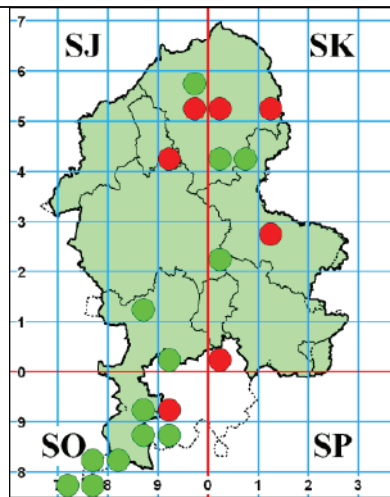


Distribution of white admiral in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

### Silver-washed fritillary *Argynnis paphia*

Nationally this butterfly is expanding its range and is probably now more common in the West Midlands region than it has ever been.

Historical records suggest that used to be found in South Staffordshire, with a few scattered records throughout the county and a couple in the Cannock Chase area. In 2014 this species was recorded in the Churnet Valley area, with a record in the Staffordshire Moorlands area in 2015.



Distribution of silver-washed fritillary in Staffordshire (SER, 2016d) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

#### 11.1.5 Habitat condition

The condition of habitats that are valuable for Lepidoptera is variable across the County. The provision of a habitat mosaic with corridors to enable species movement across and between areas of suitable breeding and/or feeding habitat is important for butterflies and moths, with invasive/dominant species managed and kept under control. As with other invertebrates, some butterflies and moths thrive in a wide variety of habitats that support a range of plant species, whilst others require specific “niche” habitat conditions and are poor fliers. For example, small pearl-bordered fritillary caterpillars only feed on marsh violet or common dog-violet. A diverse landscape with different and connecting ecological “niche” habitats is therefore key.

Open and sheltered habitats with varied structure are beneficial, and includes flower-rich grassland (acidic and calcareous), heathland, wetlands, woodlands, scrub, farmland, hedgerows, moorland and brownfield sites, such as abandoned railways and quarries. Specific important factors for good butterfly habitat in grasslands and woodlands include:

- Grassland – a mosaic of open and sheltered, flower-rich habitat that supports larval food plants and nectar sources
- Woodland – variation in age structure within the woodland with open rides with bare ground available. Short and tall grassland is valuable in rides, glades and coppice coupes with scrub/ woodland edge being important in providing shelter.

A commitment to a long-term active management plan with resources to achieve this is essential in achieving good habitat condition for Lepidoptera.

## 11.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1, 7-11, 13-16;** dominant species control, lack of grazing, overgrazing, access/disturbance, habitat fragmentation and severance, resources, neglect, inappropriate management, intensive agriculture, habitat loss.

### Additional specific issues for Lepidoptera

- Land use change, including insufficient or inappropriate woodland management and agricultural intensification.
- Destruction and deterioration of habitats, including the isolation and loss of wildflower rich habitats.
- Climate change and extremes in weather can lead to variable species' responses that are not always positive
- Pollution and pesticides (the impact of neonicotinoid pesticides on butterfly and moth populations is unknown).
- Insufficient mitigation on development sites.
- Changes in legislation, especially in regards to agricultural environment schemes.
- Also see the general Invertebrates chapter.

## 11.3 Conserving Lepidoptera – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues that have been described in the issues section, and are highlighted as case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to Lepidoptera:

- Burntwood Milestone Way Strategic Development Allocation (area chapter)

Case Study 1 – Butterfly surveys in the Churnet Valley (Authors and contributors: Rory Middleton)

Additional positive examples of Lepidoptera conservation include:

- Argent & Sable is a day-flying moth that was once well distributed in England and Scotland but has suffered recent declines (Waring & Townsend, 2009). Targeted management and natural birch regeneration have been key drivers in Staffordshire having a number of woodland sites where it has been recorded over the last decade, including Coombes Valley and a number of sites near Loggerheads.
- Following Staffordshire County Council management works in the Sherbrook Valley on Cannock Chase, an increase in small pearl-bordered fritillary numbers was observed.

## 11.4 Conserving Lepidoptera – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M1-M5; M7-M10; M13; M16-M17; DM1-DM5:** Improve the following: increase habitat size and connectivity, increase bare ground habitat, manage for structural diversity, increase resources, ensure appropriate grazing, improve planning and use of chemicals, innovative management of recreation pressures, consider potential recreation impacts on habitats and species when planning management, more integrated planning and management of sites across ownership boundaries, integrated use of volunteer groups, survey and monitoring, manage woodlands for age and habitat diversity, increase research and links with universities, colleges and schools, agri-environment schemes, habitat creation through the planning system, increase uptake of grants, guidelines for planners, large-scale habitat creation projects.

### Additional specific recommendations for Lepidoptera

- Continue and develop landscape-scale projects targeting threatened/vulnerable species, e.g. small pearl-bordered fritillary and Argent & sable.
- Increase habitat connectivity.
- Increase the number of targeted species surveys to determine locations of Priority Species throughout the county.
- Ensure that established monitoring (e.g. transects) is carried out on a regular basis to provide an accurate picture of population changes.
- Encourage the submission of species records to County Recorders/Staffordshire Ecological Record and contribution to national data sets.
- Also see the general Invertebrates chapter.



## Butterfly surveys in the Churnet Valley

### Habitats & species:

**Habitats:** Grassland, open mosaic habitats on previously developed land.

**Species:** Lepidoptera: dingy skipper, dark green fritillary, wall brown, wood tiger moth, chalk carpet moth.



**Photo:** Cauldon Low Quarry restoration area, R. Middleton

### Key messages

- 51 hectares (ha) was surveyed for butterflies in the Churnet Valley area, with dingy skipper discovered in 4 new localities, generating 45 new records in the area. Dark green fritillary was found at 2 new sites.
- Liaison with mineral companies in the area was undertaken aiming to secure habitat continuity for dingy skipper and other Lepidoptera after quarry working.

### Overview

The butterfly surveys formed part of a wider survey and monitoring project carried out in the Churnet Valley Living Landscape (CVLL) in 2015-2016 aimed at assessing the restoration success of grassland sites.

The butterfly monitoring sub-project was designed to gain a better understanding of the priority butterfly species at several specific sites and throughout the wider landscape, forming an audit of butterfly species associated with the specific habitat types of the area. The data gathered from the surveys will form a baseline from which future population change can be monitored, as well as review and inform management practices in key strategic sites within the CVLL area for the benefit of priority butterfly species contributing to the long term survival of species meta-populations.

### Contact

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### Partners

The project was managed by Staffordshire Wildlife Trust and formed part of the Churnet Valley Living Landscape Partnership.

### Funding

The project was funded by Esmee Fairbairn Foundation, as part of the Churnet Valley Living Landscape Partnership.

## Objectives

- To produce an up-to-date audit on dingy skipper in the area.
- To assess the habitat connectivity of the landscape for dingy skipper.
- To compare sites where dingy skipper were found and where they were absent.

## Approach

The survey area was chosen based on its location surrounding large mineral workings in order evidence that Priority/BAP butterfly species occurred in the locality. Timed counts and subsequent habitat assessment surveys were then carried out in the localities that supported dingy skipper. National Vegetation Classification (NVC) surveys were also carried out on some priority sites where dingy skipper was observed.

## Outcomes

- Dingy skipper, dark green fritillary, wood tiger moth and chalk carpet moth were all recorded at new localities in the Churnet Valley area.
- A total of 45 dingy skipper were recorded across 17 sites in the Staffordshire moorlands.
- Restored habitats and post-quarried habitats provide excellent habitat for dingy skipper as well as other uncommon species in the county, in some cases supporting greater populations than in undisturbed habitats.

## Future work

Future work could be concentrated on landowner liaison to secure appropriate management going forward, both in terms of grassland communities and the Priority Species which they support. Further priorities would be to ensure that current habitat connectivity remains constant through appropriate management to secure the longevity of species meta-populations.



**Photos:** dingy skipper (left), R. Middleton; wood tiger moth (right), R. Middleton

Butterfly surveys in the Churnet Valley

**Habitats & species:**

**Habitats:** Grassland, open mosaic habitats on previously developed land.

**Species:** Lepidoptera: dingy skipper, dark green fritillary, wall brown, wood tiger moth, chalk carpet moth.



**Photo:** Caudon Low Quarry restoration area, R. Middleton

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## 12. Fish

Authors: Nick Mott (Staffordshire Wildlife Trust) and Chris Grzesiok (Environment Agency), with contributions from Bernadette Noake (Staffordshire Wildlife Trust)

### Fish headlines

#### Overview

Due to a variety of types of watercourses and wetlands in Staffordshire, it continues to provide suitable conditions for a number of indigenous fish species. Fish exhibit the greatest diversity of any vertebrate group and can be found in nearly all aquatic environments. They are key indicators of changes in aquatic ecosystems.

#### Key species

Staffordshire has important populations of spined loach, bullhead, stone loach, wild brown trout / sea trout, Atlantic salmon, European eel and grayling.

#### Headlines

- 24 species of freshwater fish have been recorded in Staffordshire since 1990 (SER, 2016a).
- Four are classed as Priority Species and four are protected (SER, 2016b).
- Staffordshire has three species of invasive non-native species.
- Four additional species have not been recorded since 1990.

#### Key threats

- Introduction of non-native species.
- Illegal removal of fish e.g. poaching.
- Degradation of watercourses, including pollution and sedimentation.
- Elevated water temperatures due to lack of riparian shade.
- Channel realignment and straightening.
- Disease spread by poor biosecurity and illegal movement of fish.
- Man-made obstructions to migration routes and lack of spawning habitat.
- Habitat fragmentation.

#### Successes

- Gayton Brook Catchment partnership (2010-14) completed two weir removals at Weston and at Gayton Mill. It also carried out catchment-sensitive farming schemes at a number of key holdings.
- Atlantic salmon reintroduction in to the River Dove catchment by the Environment Agency and Trent Rivers Trust.

#### Recommendations

- Invasive species control.
- Increase run-off control, for example through Sustainable Drainage Systems (SuDS).
- Better planning of the use of chemicals.
- Improvements to river and stream habitat diversity and naturalisation of modified water courses.
- Increase biosecurity, following the Check, Clean, Dry campaign.
- Continue to improve water quality.
- Promote habitat improvement strategies, e.g. riparian tree planting schemes and bankside protection

## 12.1 State of fish in Staffordshire

### 12.1.1 Overview

Fish figures	Amount
Number of species in Staffordshire	24
Number of Priority Species	4
Number of protected species	4

**Table 1. Number of important fish species in Staffordshire.**  
**Fish Species:**

UKBAP Priority fish species that occur in Staffordshire: European Eel, spined loach, Atlantic salmon, brown/sea trout.

Staffordshire BAP species: Atlantic salmon.

IUCN Red list of Threatened species that occur in Staffordshire: Bullhead, spined loach, brook lamprey, European eel.

Annex II species: Bullhead, Atlantic salmon, brook lamprey, spined loach.

The variety of watercourses, open waters and wetlands in Staffordshire provide suitable conditions for a number of native fish species, including important populations of spined loach, Atlantic salmon, brown trout and European eel.

Staffordshire retains some fish species with life cycles that include migrations between freshwater and saltwater. These include the iconic Atlantic salmon and brown trout and the mysterious European eel. More so than perhaps any other group, for thousands of years fish have been moved about by man as important sources of food, for sport and for amenity value. In the West Midlands region angling is a particular economic driver in the region.

In 2005, licensed anglers in the region spent 4.8 million days fishing on inland waters spent an annual total of £190 million on their sport, supporting approximately 4,200 jobs in the region (Mawle & Peirson, 2009). Many habitats have been modified to account for this sport to take place. It is, therefore, sometimes difficult to ascertain the precise indigenous distribution of fish species to rivers, reaches and isolated waterbodies such as meres.

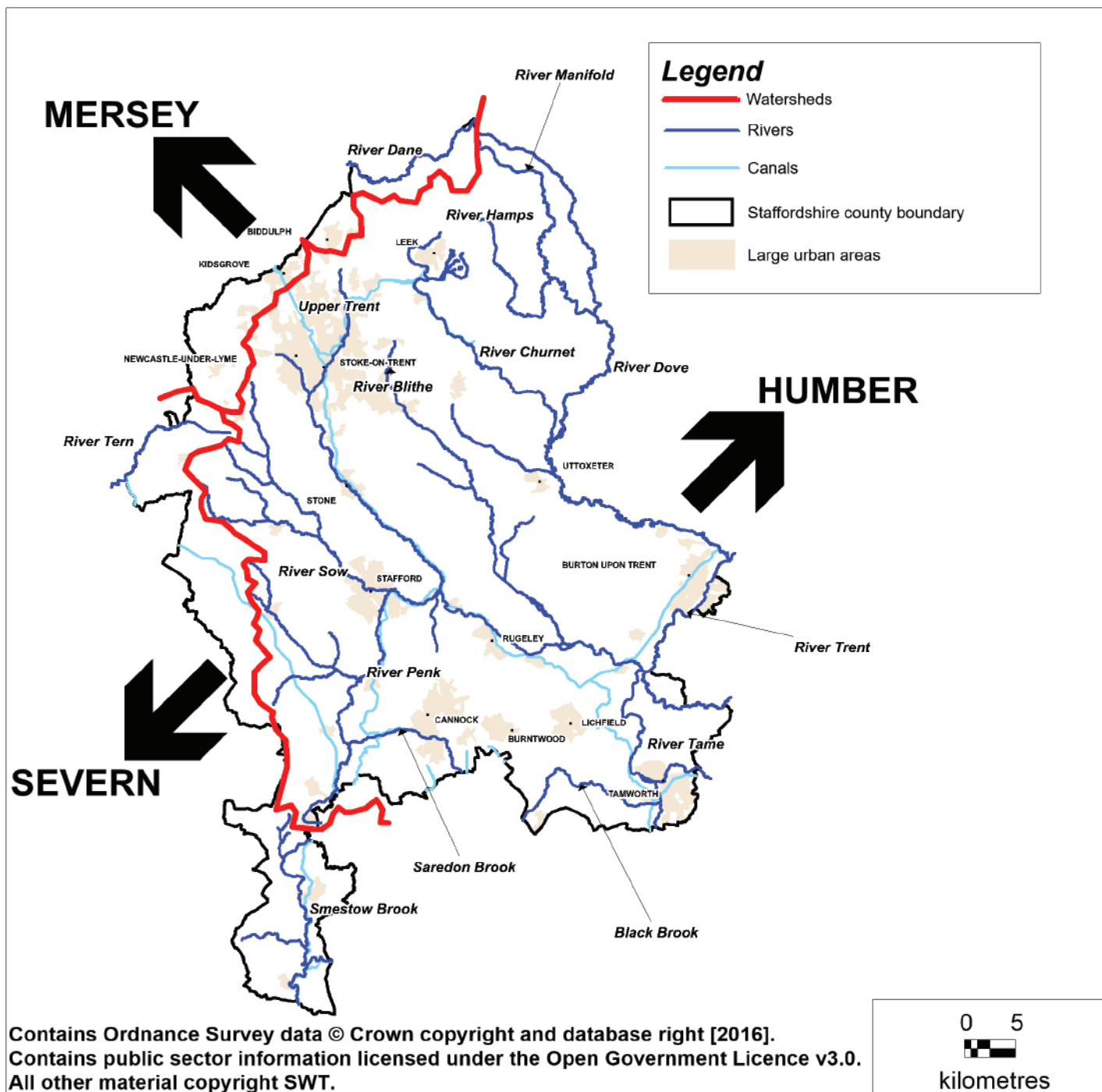


Figure 1: Map illustrating the three main river catchments in Staffordshire.

### 12.1.2 Population trends

Summary of changes	Number
Number of non-native fish species present	3 (goldfish, zander and bitterling)
Number of fish species that have become extinct since 1990	4 (barbel, ruffe, silver bream and rudd)
<ul style="list-style-type: none"> <li>Nationally, 40% of native freshwater fish are estimated to be declining, with almost all those increasing (40%) doing so at least partly due to the stocking of water courses (Burns <i>et al.</i>, 2013).</li> <li>The majority of adult Atlantic salmon counts and estimates of returning stock in monitored rivers during 2014 were below the average of the previous five years (Cefas <i>et al.</i>, 2014)</li> </ul>	

**Table 2: Summary of fish species population trends in Staffordshire.**

Increased legislation such as the Salmon and freshwater fisheries Act (1975) and the Wildlife and Countryside Act (1981) alongside Water Framework Directive targets has resulted in the improved protection of fish and their habitats. A number of habitat restoration schemes have also helped improve water quality since the 1970s and in particular these improvements have helped to reduce the amount and diversity of fish restocking required to maintain fish populations in river catchments. However, many challenges remain.

Development, historical river engineering and subsequent continued dredging has resulted in the removal and fragmentation of many fish habitats with barriers to natural fish movement and migration routes including reservoir dams, weirs, sluices, water control structures, culverts, poorly designed bridges and other structures. Developments in urban areas as well as agricultural intensification in rural areas can also lead to increased unnatural high flow events as a result of accelerated runoff.

Poor management of waterbodies and adjacent land also causes deterioration of fish habitats. For example, removing woody debris, mid-channel bars and overhanging trees can lead to higher water temperatures and less variation within the habitat structure, which leads to an overall reduction in the 'carrying capacity' of a particular reach in terms of its potential abundance and diversity of species and their likelihood of breeding success.

Pollution incidents and contaminants can impact negatively on water quality and include from slurry spills, pesticides, leachates from old mine workings or contaminated ground, septic tank overflows, heavy metals and chemical spills. Agricultural pollution can be a particular problem that can intensify at certain times of year and can have stronger impacts on different stretches of a river, with a riverfly study on the river Dove in 2015 suggesting that agricultural pollution led to poorer survey results at a headwater site during the spring (Salmon & Trout Conservation UK, 2016).

In addition, the introduction of non-native species including American signal crayfish, which eat fish eggs and spread disease amongst native white-clawed crayfish, and American mink, which predate on native species, have had major negative impacts on fish populations. The creation of hundreds of commercial Stillwater fishery lakes in the last 40 years has, in many cases, had a detrimental impact of wetlands. Many were created at sensitive sites which were high quality habitats (headwater streams, fen, marsh, flush and marshy grassland) for a host of species (water vole, snipe, lapwing, barn owl and amphibians). Ongoing problems occur at a number of on-line commercial fishery lakes where over-stocking with non-native coarse fish (especially carp) results in chronic nutrient loading into watercourses. Additionally, new dams, sluices and weirs installed to create these lakes and to maintain high water levels represent additional physical barriers for the free movement of fish, invertebrates (including white-clawed crayfish) and gravels.

### 12.1.4 Habitat condition

Fish provide multiple values in terms of ecosystem goods (fish and their by-products as food), ecosystem support (through nutrient recycling) and cultural benefits. Fish populations are able to regulate trophic structure by influencing the stability, resilience and food web dynamics of both aquatic and terrestrial ecosystems (fish are preyed upon by many birds and mammals), influence the availability of nutrients over time within a waterbody, regulate carbon flux, and regulate sediment processes through bioturbation when foraging and burrowing. As they are sensitive to many stressors such as disease or water quality changes, they can also act as bio-indicators of ecosystem integrity, showing changes in growth, distribution and abundance in response to changes in their environments. Within waterbodies such as rivers, lakes and streams, ideal fish habitat includes backwaters and pools for nursery habitat, woody debris, rocks and undercut banks for refuge areas and territory markers. Gravels for spawning and lowering water temperatures during prolonged summer flows are also important.

## 12.2 Threats

<b>Generic issues that apply (see Appendix A for more detail)</b>
<b>Numbers 2, 4-6, 10, 16, 18;</b> pollution, runoff (roads, land uses, chemicals), habitat fragmentation and severance, habitat loss, invasive non-native species.
<b>Additional specific issues for fish</b>
<ul style="list-style-type: none"><li>• ‘Tidy management’ to remove unsightly accumulations of woody debris, vegetated mid-channel bars and overhanging trees continues to be a problem, resulting in the removal of these crucial fish habitats. This leads to an overall reduction in the ‘carrying capacity’ of a particular reach in terms of its potential abundance and diversity of species and their likelihood of breeding success.</li><li>• Man-made barriers to natural fish movement and migration routes including reservoir dams, weirs, sluices, water control structures, culverts, poorly designed bridges and other structures.</li><li>• ‘Sliplining’ of perched culverts, thus prolonging fish barrier problems for further decades. Historical river engineering (e.g. channel realignment and straightening) and continued dredging resulting in removal of habitats for fish. This includes backwaters and pools for nursery habitat, woody debris, rocks and undercut banks for refuge areas and territory markers, and gravels for spawning and also to help lower water temperatures during prolonged summer flows.</li><li>• Unconsented / illegal movement of fish, e.g. poaching.</li><li>• Introductions and movement of native fish species from indigenous catchments to non-indigenous catchments.</li><li>• Introduction of non-native species such as carp, topmouth gudgeon, wells catfish, zander, sturgeon, rainbow trout, barramundi.</li><li>• Introductions of American signal crayfish and American mink have had major impacts on fish.</li><li>• Disease spread by poor biosecurity (lack of Check, Clean, Dry, Avoid) and illegal movement of fish.</li><li>• Degradation of watercourses, including pollution and sedimentation from poor land management, e.g. due to over-grazing.</li><li>• Pollution incidents and contaminants including slurry spills, pesticides, leachates from old mine workings, leachates from contaminated ground, septic tank overflows, urban run-off, heavy metals, endocrine disrupters, microplastics, chemical spills, e.g. cyanide spills, industry pollutants, thermal pollution.</li><li>• Increased silt burdens resulting from agricultural diffuse pollution, dredging, road run-off, forestry track run-off. These silts choke and bond to river gravels and reduce the likelihood of salmonid (and other species’) spawning success.</li><li>• Increased unnatural high flow events as a result of accelerated urban and rural run-off due to urban development and agricultural intensification.</li><li>• Elevated water temperatures due a lack of riparian shade.</li><li>• Poor natural recruitment means that the overall river ecosystem is disrupted and out-of-balance.</li><li>• Intensive aquaculture.</li></ul>



## 12.3 Conserving fish – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues that have been described in the issues section. Some of these are highlighted in the case studies below:

CASE STUDIES
Case studies elsewhere in the report relevant to fish: <ul style="list-style-type: none"><li>• Love Your River – Stoke and Urban Newcastle (built environment chapter)</li></ul>
Case study 1 – Gayton Brook Catchment Partnership 2010-2014 (Authors and contributors: Nick Mott.)

Additional positive examples of fish conservation include:

- Atlantic salmon reintroduction in to the River Dove catchment by the Environment Agency and Trent Rivers Trust. The project commenced in the mid-1990s and was completed by 2012.
- Salmon rehabilitation from the mid-1990s onwards has been very successful.
- Improved legislation leading to improved protection of fish (Salmon and Freshwater Fisheries Act 1975, Wildlife and Countryside Act 1981, Countryside Rights of Way Act 2000).
- Water Framework Directive targets.
- Legislation for eels.
- Technical fish passes completed on the Dove at Tutbury and Norbury.
- Technical fish pass completed on the Trent at Burton Mill.
- Technical fish passes on the Tame at Tamworth.
- Rock ramp (phase one) completed at Hoo Mill.
- Pessall Brook culvert replacement with pipe-arch design completed.
- River re-naturalisation schemes at a number of locations along the Trent, Tame, Dove, Churnet and their principle tributaries.

## 12.4 Conserving fish – recommendations

Generic recommendations that apply (see Appendix A for more detail)
<b>Numbers HC1; M2; M5-M6; M9; M13; DM1 - DM5:</b> Improve the following: increase habitat size and connectivity, manage for structural habitat diversity, improve planning & use of chemicals, implement Sustainable Drainage Systems (SuDS) near watercourses, more integrated planning and management of sites across ownership boundaries, survey and monitoring, agri-environment schemes, habitat creation through the planning system (biodiversity offsetting), take up of grants, guidelines for planners, large-scale habitat creation.
Additional specific recommendations for fish
<ul style="list-style-type: none"><li>• Invasive species control.</li><li>• Increase run-off control, for example through Sustainable Drainage Systems (SuDS).</li><li>• Improvements to river and stream habitat diversity and naturalisation of modified water courses.</li><li>• Increase biosecurity, following the Check, Clean, Dry campaign.</li><li>• Continue to study the impacts of demon shrimp on fish populations and increase awareness of how river users, e.g. anglers, can help reduce their spread and impact on native wildlife.</li><li>• Continue to improve water quality.</li><li>• Promote habitat improvement strategies, e.g. riparian tree planting schemes and bankside protection.</li><li>• Increase monitoring of tributaries and headwater streams across the county.</li></ul>

Gayton Brook Catchment Partnership 2010 - 2014

**Habitats & species:**

**Habitats:** Wetlands, rivers.

**Species:** Fish, aquatic macro-invertebrates.



**Photo:** Re-worked gravels at Wetmoor Farm, Gayton Brook, following spates during the winter of 2013 - 2014, Nick Mott

**Key messages**

- A number of river improvement works were undertaken in the Gayton Brook during the project period that appeared to lead to improvements in biological stress signatures for both flow and sediment conditions.
- Improvements in environmental stresses resulted in some improvement in overall aquatic and specific riverfly species richness at two of the project sample sites.

**Overview**

The Gayton Brook is a tributary of the River Trent rising above the village of Gayton. It is generally considered of good water quality and includes many good river features such as exposed sediments, side and mid-channel bars, and in-channel accumulations of coarse woody debris.

Macroinvertebrate communities were surveyed at a selection of sites along the Brook before and after improvement works were undertaken to assess siltation, organic pollution, flow and overall environmental stress.

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**Partners**

Partners include the Environment Agency, Staffordshire Wildlife Trust and local landowners. Aquascience Consultancy Ltd. analysed the macroinvertebrate samples and Liverpool Museum, John Spedan Lewis Trust and Buglife assisted in quality control checks.

**Funding**

The work was funded by the Environment Agency and Staffordshire Wildlife Trust.

## Objectives

- To undertake river improvement works in the Gayton Brook Catchment
- To monitor biological and ecological changes in the catchment
- To engage with landowners in Catchment Sensitive Farming methods

## Approach

Prior to any river improvement works, the Environment Agency (EA) and Staffordshire Wildlife Trust (SWT) undertook benchmark biological profiling of the Gayton Brook, against which post-project aquatic ecological data could be quantifiably compared. Siltation, organic pollution, flow and overall environmental stress were calculated based on the aquatic macroinvertebrate communities present at eight survey sites. Catchment Sensitive Farming-style advice was also given to landowners in the catchment, and EA electro-fishing surveys were undertaken along with a number of river improvement works at multiple sites along the Brook.

## Outcomes

A number of significant outcomes were achieved from the 2010 – 2014 project including weir removal at two sites to restore fish passage from the River Trent confluence to the headwaters for the first time in one hundred years; the treatment of Japanese knotweed; the creation of a reed bed treatment lagoon; and the restoration of a mill leat to provide alternative drinking areas for livestock to keep them away from the riverine corridor. Post project surveys were only undertaken at 50% (four) of the sample sites due to funding limitations, but yielded some positive results: improvement was seen at three of the study sites in terms of both flow and sediment conditions and a marked drop in organic pollution-enrichment was seen at one of the sites during the study period. By the end of the study period these improvements were also resulting in increased overall aquatic and specific riverfly species richness at two of the sample sites. The Gayton Brook was also found to support an important population of bullhead, *Cottus gobio*.

## Future work

Ongoing landowner liaison and ecological monitoring continues at key holdings. An agricultural pollution incident in 2016 resulted in a major fish kill and chronic impacts on macro-invertebrates. Follow up habitat work is currently being planned with conservation partners.



**Photos:** Weston Weir before (left; June 2010) and after (right; November 2013) removal, © Nick Mott



Gayton Mill Weir before, and after removal, April 2014, © Nick Mott

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# Gayton Brook Catchment





A brown trout (*Salmo trutta*) being checked and measured during a survey.



October 2013. Environment Agency staff conducting a repeat electro-fishing survey at a site on the Gayton Brook.



A Sonde (remote water quality recording unit) being positioned by EA staff on the upper Gayton Brook.



An example of a fenced ox-bow on the Fradswell Brook in May 2012. Notice the stock gate which allows the farmer to selectively graze this area for about two weeks a year (thus maintaining the botanical diversity of the site, but reducing the input of silt into the brook due to overgrazing and poached banks).

## 13. Amphibians and Reptiles

Authors: Phillip Playford (Staffordshire Amphibian and Reptile Group), with contributions from Paul Wilkinson (Canal and Rivers Trust), Bernadette Noake (Staffordshire Wildlife Trust) and Victoria Liu (Staffordshire Wildlife Trust).

### Amphibian and reptile headlines

#### Overview

Amphibians and reptiles are poikilothermic (cold-blooded) animals with a backbone, and include snakes and lizards amongst the reptiles and amphibians such as frogs, toads and newts. They are key features of a healthy ecosystem (Sewell & Griffiths, 2009). Key habitats include ponds and wetlands for amphibians and grass snakes, and heathland such as Cannock Chase and areas within South Staffordshire for other reptiles.

#### Key species

- Adder (*Vipera berus*)
- Great crested newt (*Triturus cristatus*)

#### Headlines

- Nine of the UK's 13 native amphibian and reptile species occur in Staffordshire, including five amphibians and four reptiles (SER, 2016a).
- An additional species is thought to be extinct in the county and a number of non-native species are present (SER, 2016b).

#### Key threats

- Degradation, fragmentation and loss of habitats, e.g. loss of breeding ponds and suitable terrestrial habitats nearby.
- Pond/waterway degradation through pollutant runoff, siltation and shading.
- Disruption of toad migration routes, e.g. due to road construction.
- Spread of infectious diseases amongst amphibians such as Ranavirus and Chytrid.
- Intensification of farming practices.
- Persecution, particularly of snakes.

#### Recommendations

- Ensure continuity of widespread interconnected high quality habitats over time.
- Create and restore habitats such as wildlife ponds and create more mosaics of scrub/bracken in areas of heathland restoration.
- Utilise opportunities provided through agri-environment schemes and developments, e.g. using Sustainable Drainage Systems to create beneficial habitats.
- Increase knowledge of reptiles and amphibians through further recording and research, and identify trigger points to indicate when action is required.
- Increase public engagement to get people more positively engaged in amphibian and reptile conservation thereby hopefully reducing persecution, particularly against snakes.

## 13.1 State of amphibians and reptiles in Staffordshire

### 13.1.1 Overview

Amphibian and reptile figures	Staffordshire	UK
Number of native species recorded	9	13*
Number of Priority species	6	10*
Number of protected species	5	8

\*There is increasing evidence that the pool frog was once native in Norfolk (RAUK, 2009). It is also classed as a UK BAP priority species and as such is included here. Marine turtles are not included.

**Table 1. Number of important amphibian and reptile species in Staffordshire.**

**Species:** Table 2 shows a list of native species occurring in Staffordshire (these include species listed under the NERC Act 2006, Section 41: Species of Principal Importance (S41), and those listed on the Staffordshire Biodiversity Action Plan [SBAP]).

Common Name	Scientific Name	Designations
Great crested newt	<i>Triturus cristatus</i>	S41 & SBAP
Common toad	<i>Bufo bufo</i>	S41
Adder	<i>Vipera berus</i>	S41
Slow-worm	<i>Anguis fragilis</i>	S41
Grass snake	<i>Natrix natrix</i>	S41 & SBAP
Common lizard	<i>Zootoca vivipara</i>	S41
Common frog	<i>Rana temporaria</i>	
Smooth newt	<i>Lissotriton vulgaris</i>	
Palmate newt	<i>Lissotriton helveticus</i>	

**Table 2. Native amphibian and reptile species occurring in Staffordshire.**

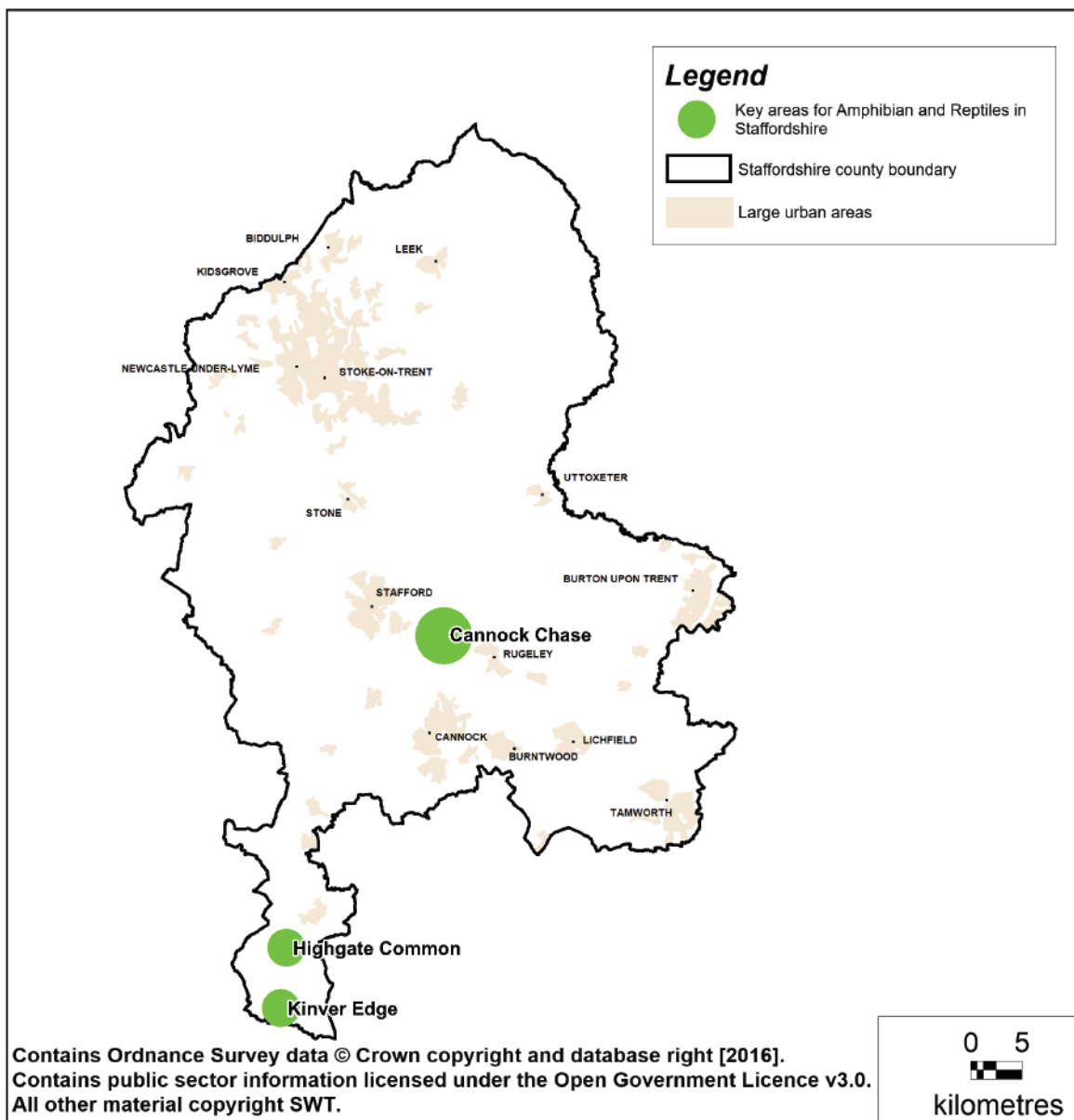
There is also a recorded population of natterjack toad (*Epidalea calamita*) from Cannock Chase (SER, 2016a). Natterjack toad is considered a UK BAP species as well as a Staffordshire BAP species, and it receives full protection through the Wildlife and Countryside Act 1981. Based on best available knowledge it is believed that this population has now become extinct.

#### Protected Species:

Great crested newt has full protection due to large European declines in the 20<sup>th</sup> Century (Amphibian and Reptile Conservation, 2016) but common lizard, grass snake, slow-worm and adder are protected by part of sub-section 9(1) and all of sub-section 9(5) prohibiting the intentional killing, injuring and trade of these animals (Froglife, 2016).

Amphibians and reptiles are important indicators of environmental change. In particular, with regards to ponds, the status of the amphibian fauna can give a good indication on the quality of the pond for other wildlife (Sewell & Griffiths, 2009). In Staffordshire, ponds are well distributed across the county but are believed to be declining in the wider countryside, placing increased importance on garden ponds.

The ponds of Stoke-on-Trent and Newcastle-under-Lyme are known to support good populations of great crested newt. Heathland is also a particularly valuable habitat, especially for reptiles. Cannock Chase and the heathland network in southern Staffordshire, including Kinver Edge and Highgate Common, are key areas (Figure 1).



**Figure 1. Key areas for reptiles in Staffordshire**

### 13.1.2 Population trends

In a national context, amphibians and reptiles are some of the most vulnerable animals with large declines reported for several species (Table 3) and others being highly vulnerable to habitat change/loss, habitat degradation and disease (BHS, 2016). Changes in farmland practices and countryside management have also impacted negatively including ‘tidying up’ of the countryside resulting in a lack of compost/dung heaps that some species such as grass snakes or slow-worms utilise. In addition, development pressure has increased in recent years, further aiding land use change.

Summary of changes in Priority Species	UK population status
Greatcrested newt	Declining (JNCC, 2010)
Common toad	Declining (JNCC, 2010)
Adder	Declining (Baker, Suckling and Carey, 2004)
Slow-worm	Declining (Baker, Suckling and Carey, 2004)
Grass snake	Declining (JNCC, 2010)
Common lizard	Declining (JNCC, 2010)



Summary of reasons of changes
<ul style="list-style-type: none"> <li>• Habitat loss and fragmentation due to changes in land use and agricultural practices</li> <li>• Slow-worm and common lizard declines have been attributed to brownfield site loss and continued development pressure in the countryside (JNCC, 2010)</li> <li>• Reduced habitat condition due to pollution and runoff decreasing water quality of ponds can negatively affect the food source of species reliant upon ponds</li> <li>• Predation</li> </ul>
Other trends
<p>Common toads are estimated to have declined nationally by 68% since the 1970s (Caton, 2016). Nationally adders are thought to have suffered large declines over the last decade (Gleed-Owen &amp; Langham, 2012) and it is thought that up to 1/3 of adder populations have reduced to 10 or fewer individuals (ZSL, 2016).</p>
Summary of reasons for “other trends” changes
<ul style="list-style-type: none"> <li>• Habitat loss and fragmentation</li> <li>• Increased disturbance and persecution</li> </ul>

**Table 3. Summary of reptile and amphibian species population trends.**

Data is too limited to be able to give figures on population changes within Staffordshire. However, best available knowledge does indicate how amphibians and reptiles are faring in the county. Great crested newts, common frogs and common lizards are all relatively common in suitable habitats within Staffordshire but are all highly vulnerable. Common lizards have declined at least in South Staffordshire, although have shown recent signs of recovery (Wilkinson, 2016). Limited data on common toads indicate large declines both in terms of breeding sites and population sizes. Grass snakes are widespread but not common; usually only in low numbers making them vulnerable (Wilkinson, 2016). Palmate newts are probably the rarest of the three native newt species (Wilkinson, 2016) but can be locally common particularly on acidic pools such as on Cannock Chase.

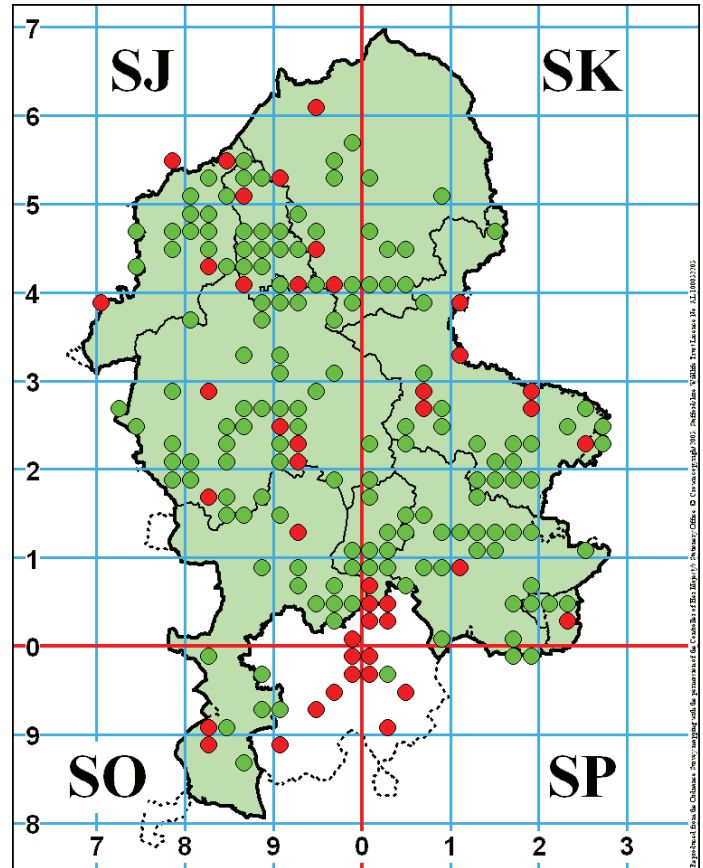
Adder are now mainly found on a few sites scattered around Staffordshire in low and very vulnerable populations (Wilkinson, 2016), with an increase in disturbance from recreational users of their habitats and persecution particularly affecting this species (The Wildlife Trust, 2016). This is a species that has also suffered serious declines nationally and is reported to have seen greater declines in the Midlands than elsewhere (Baker, Suckling and Carey, 2004). Slow-worms are very under-recorded (even more so than the other species, which are all under-recorded to a greater or lesser extent [Wilkinson, 2016]) but are a species that can readily live in gardens. Despite this, Baker, Suckling and Carey (2004) found declines in the status of slow-worms across England, with the largest declines being evident in the Midlands.

Natterjack toads are now thought to be extinct in Staffordshire, with the last record from 2002 (SER, 2016a). They were restricted to a very small number of sites and were likely out-competed by other amphibians better able to cope with the change in their pond habitats (Wilkinson, 2016). Natterjacks require warm, shallow ponds that dry out regularly (preferably every year) in order to successfully breed, and do not do well when other amphibian species move into their breeding ponds (Flavenot *et al.*, 2015).

Non-native species have also been recorded in Staffordshire including Alpine newt, terrapins and green frog (SER, 2016a), with one record of an escaped Burmese python (that was quickly recaptured) in 2016 (Mowat, 2016). Non-natives are of concern as they have the potential to bring in and spread disease and have the potential to out-compete native species, however in many cases their exact impact cannot be predicted (Wilkinson, 2016).

### 13.1.3 Key species changes

**Great crested newt (GCN) *Triturus cristatus***  
 Rare but widespread in Staffordshire and can be locally abundant where conditions suit. However, this species is extremely vulnerable as the pond environments they depend upon are highly changeable and a pond with a high GCN population can change to an unsuitable pond very quickly. In particular, unmanaged ponds can silt up, become over-vegetated or become populated by fish, all of which can adversely affect the suitability of a pond for GCNs (JNCC, 2016). This species also has a limited dispersal rate making them slow to colonise new suitable ponds, especially when dispersal barriers or large distances to new sites are present (Van Teeffelen *et al.*, 2015).

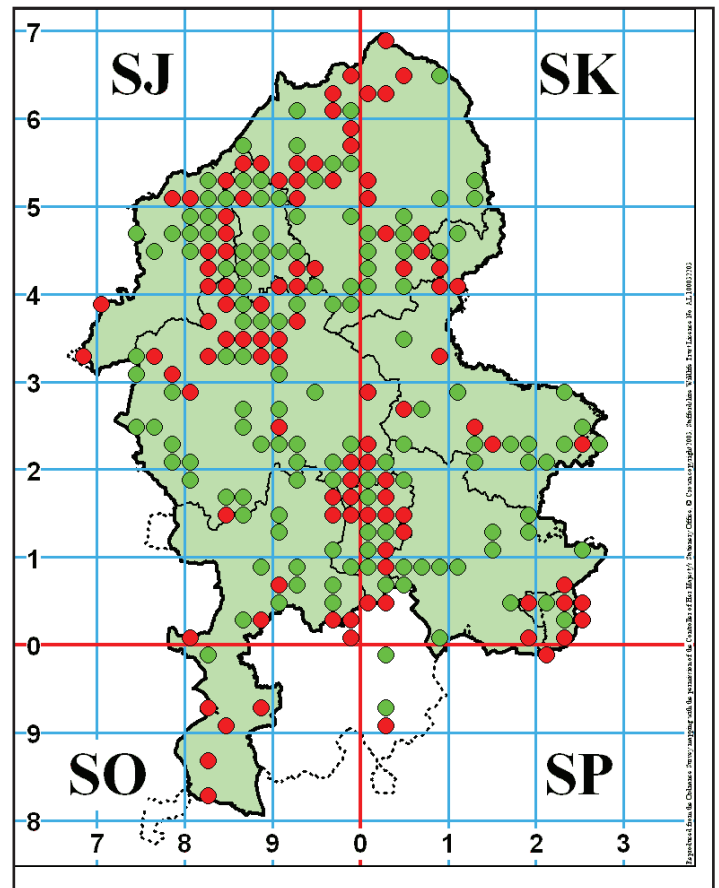


Distribution of great crested newt in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016

**Common toad *Bufo bufo***  
 Best available knowledge suggests that the common toad population has declined within Staffordshire, although it can appear common in certain areas. Nationally the species has been reported to have declined by 68% in the last thirty years (Caton, 2016). The species has the ability to spread widely but is reliant upon breeding ponds and has a high site fidelity making them slow to colonise new ponds and therefore vulnerable to the loss of ponds (Reading *et al.*, 1991). In addition, due to their breeding strategy, they require large numbers of breeding individuals to maintain viable populations (Wilkinson, 2016).



Common Toad by Victoria Liu



Distribution of common toad in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016

**Adder** *Vipera berus*

Very vulnerable, highly persecuted and in need of serious conservation effort. In Staffordshire, habitat disturbance is a particular threat in some locations as adders will hibernate shallowly in dead bracken and are vulnerable to trampling and crushing by machinery (Wilkinson, 2016). The species prefers edge habitat with bracken and 10-15 year old scrub and these habitat requirements should be considered during heathland restoration works, with increased focus on creating a varied mosaic of habitats providing bracken and gorse cover and edge habitat (Wilkinson, 2016). In addition to the persecution of snakes in particular, there is an increasing problem of disturbance due to wildlife photography.

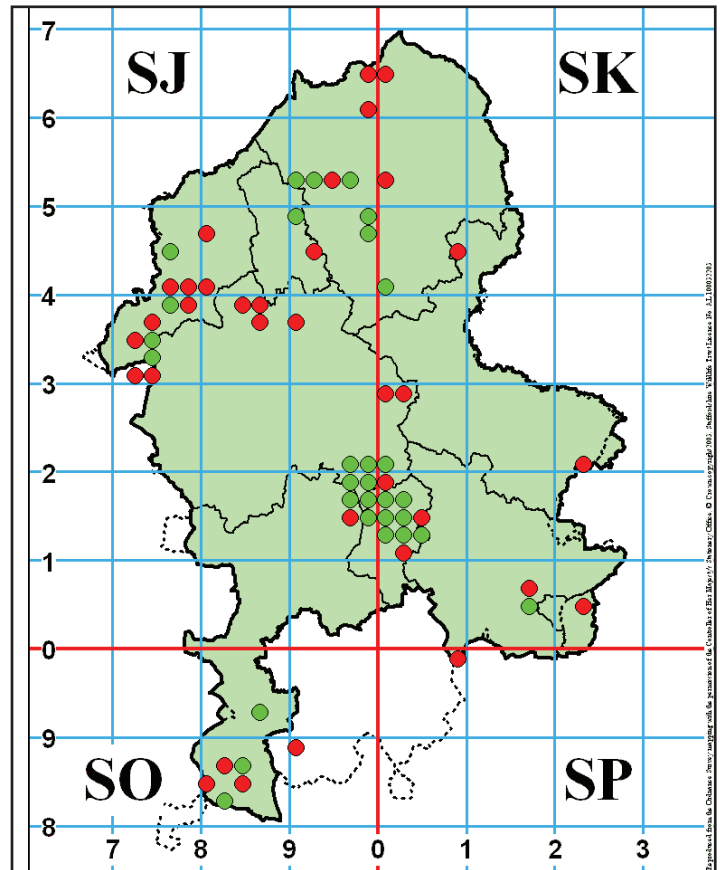


Adder by Jon Hawkins

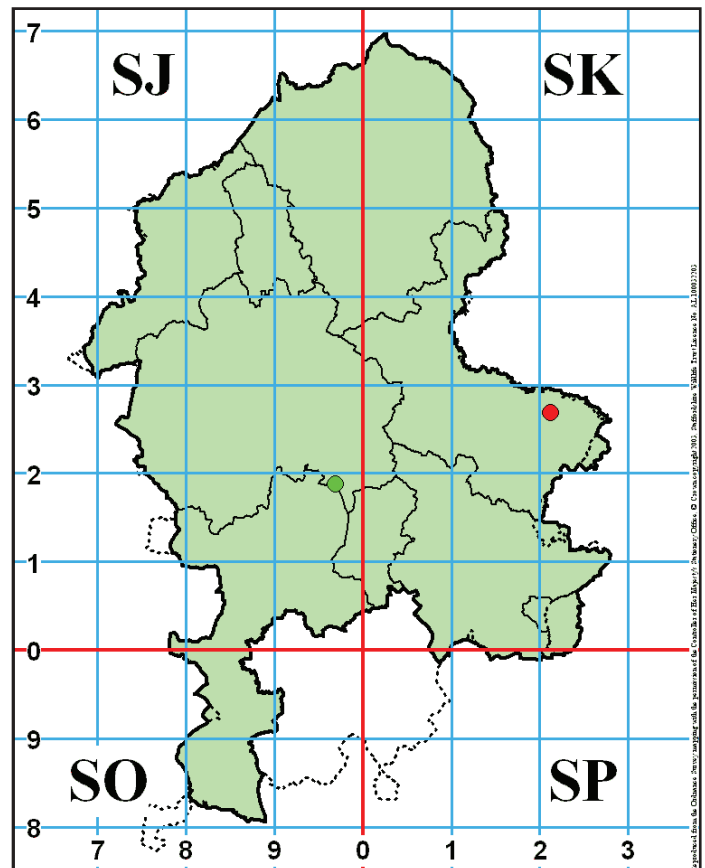
**Natterjack Toad** *Epidalea calamita*  
Staffordshire's population of natterjack toad provides an important lesson that monitoring and surveying is not enough without corresponding management action. Monitoring suggests that this species was lost from Staffordshire during the 1990s as habitat became unsuitable and habitat management was not implemented quickly enough (Wilkinson, 2016). Although some areas of suitable habitat remain, current conservation efforts should focus on halting the decline of Staffordshire's remaining amphibian and reptile species.



Natterjack by Thomas Brown



Distribution of adder in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016



Distribution of natterjack toad in Staffordshire (SER, 2014) [red dots are records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016

### 13.1.4 Habitat condition

Ponds, particularly ones without fish, are vital for amphibians and can provide a diverse and abundant invertebrate community for them to feed on. Ideally, they should be close enough together to allow species migration in order to provide multiple breeding ponds connected by foraging habitats (O'Brien, 2015). It is thought that frogs and toads are capable of colonising new ponds within 1 km of an existing breeding site, however newts have a smaller colonisation range of 400-500 m (Freshwater Habitats Trust, 2016). Common toads prefer deeper more permanent ponds and are less prone to fish predation than frogs or newts (Brady & Griffiths, 2000). Grass snakes are the only British reptile to use ponds as a hunting ground, where they feed on fish and amphibians. There is also an essential need for suitable terrestrial habitat for reptiles and amphibians to forage in, that support lots of invertebrates including suitable places for them to hibernate overwinter, such as log piles (Salazar *et al.*, 2016). Both of these habitats are under threat and require improved management as well as restoration/creation to ensure they are sufficient in both number and quality.

Heathland is also a vital habitat within Staffordshire, particularly for adders and common lizards. Good heathland habitat for reptiles incorporates a rich mosaic of heather of different age structures, bracken, gorse and scrub (Wilkinson, 2016). The focus for heathlands in Staffordshire should be to provide more edge habitat within the heathlands to allow reptiles to thrive.

Slow-worms and grass snakes are more able to adapt to human influence and can do well in garden/sub-urban environments (Beebee, 2014). Wildlife-friendly gardens with ponds, log piles, and compost piles where invertebrates can thrive and that are well connected to each other provide good substitutes to natural habitats for amphibians and reptiles (Goddard *et al.*, 2010), although large-scale wetland, woodland and meadow habitats are also important for these species.

## 13.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 2-6, 9-11, 13-18;** pollution, nutrification, runoff (from roads, land uses and chemicals), access/disturbance, habitat fragmentation and severance, limited resources, neglect, inappropriate management, intensive agriculture, habitat loss, land drainage, invasive non-native species.

### Additional specific issues for amphibians and reptiles

- Habitat fragmentation and severance, particularly loss of breeding ponds and suitable terrestrial habitats nearby due to changes in land use such as due to development or the intensification of farming practices.
- Excessive siltation of ponds can lead to them drying up.
- Excessive shading of ponds can block out sunlight and cause declines in water temperatures that can lead to a reduction in amphibian larval food intake and therefore reduced growth and development rates (Browne, 2016).
- Disruption of toad migration routes, e.g. due to road construction.
- Spread of infectious diseases amongst amphibians such as Ranavirus and Chytrid.
- Persecution, particularly of snakes.
- Climate change could see a mixed response for our native reptiles and amphibians. Some amphibians could benefit in the short term with heavier rainfall increasing recruitment time for tadpoles and warmer temperatures could benefit reptiles (Lepetz *et al.*, 2009). However, in the long-term there could also be an increase in toad flies and diseases such as the Chytrid virus due to the warmer and wetter conditions (Lips *et al.*, 2008), and reptile reproduction may be negatively impacted by changes in seasonal temperatures. For great crested newts there is some evidence that milder winters and heavy rainfall may reduce annual survival rates (Griffiths *et al.*, 2010) but the impact is difficult to predict.
- Invasive non-native species; alpine newt, green frog and red-eared terrapin threaten to out-compete native species and spread disease (Wilkinson, 2016).
- Fisheries management and the introduction of fish to ponds can alter the dynamics of the food chain. Increased fish densities can be a threat to amphibian and their invertebrate-prey populations.

### 13.3 Conserving amphibians and reptiles – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues described in the threats section and to promote amphibian and reptile conservation. Some of these are highlighted in the case studies below:

CASE STUDIES
Case Study 1 – Amphibian translocation at i54 (Authors and contributors: Dan Saberton, Ali Glaisher, Lucy O’Toole)
Case Study 2 – Great crested newt at Redhill Business Park (Authors and contributors: Ali Glaisher, Chris Evans)

### 13.4 Conserving amphibians and reptiles – recommendations

Generic recommendations that apply (see Appendix A for more detail)
<b>Numbers HC1; M2; M5; M8; M13:</b> Improve the following: increase habitat size and connectivity; manage for structural habitat diversity; improvements in planning & use of chemicals; consider potential recreation impacts on habitats & species when planning management; increase survey and monitoring.
Additional specific recommendations for amphibians and reptiles
<ul style="list-style-type: none"><li>• A lot of traditional heathland management and restoration work creates large blocks of heathland and bare ground, often through clearing areas of scrub and bracken. However, for reptiles (and adders in particular), it is important to get a mixture of many different edge habitats including some scrub, bracken and heather of differing age structures to provide cover and foraging habitat.</li><li>• Increase awareness of the effects of pollution on ponds and the wildlife that use them.</li><li>• More effort needs to be made to keep existing populations connected and to re-connect isolated populations.</li><li>• Increase awareness of the use of areas such as heathland by reptiles and encourage sensitive recreational use, e.g. reducing trampling by keeping to pathways.</li><li>• Utilise opportunities provided through agri-environment schemes and developments, e.g. using Sustainable Drainage Systems to create beneficial habitats or installing wildlife passes underneath roads (see case study: Redhill Business Park), and restoring and/or installing hedgerows, dry stone walls and buffer strips for example.</li><li>• Increase survey effort and monitoring to ascertain population trends and more importantly to identify and set trigger points to indicate when action is required so more effective habitat management objectives can be put into place.</li><li>• Maintain or re-create high quality habitat for native species. Providing diverse niche habitats within broader habitats could help some species withstand the effects of climate change.</li><li>• Increase awareness of the impact that stress and disturbance has on wildlife and encourage responsible wildlife watching and photography, particularly in relation to adders.</li><li>• Determine the presence of reptiles and amphibians during the early stages of local authority development plans, land allocation (especially of brownfield sites), and development schemes and aim for net biodiversity gains in planning processes.</li></ul>

## Amphibian translocation at i54

### Habitats & species:

**Habitats:** Ponds, wetlands.

**Species:** Common toad, common frog, smooth newt.



**Photo:** i54 site with sustainable drainage area providing amphibian habitat in the foreground

### Key messages

- Partnership working helped to secure a population of a species of principal importance.
- 4,000 toads along with other reptiles and amphibians were relocated from a development plateau to good quality habitat before development took place.
- Development sites may support important species.

### Overview

i54 is an important employment site in South Staffordshire on the border with Wolverhampton. Securing Jaguar Landrover as a major employer was important for the local economy. The site was prepared in advance for engine plant construction with ecology surveys carried out. The development plateau, though vacant for a short length of time, developed habitat attractive to amphibians including a pond and wetland habitat.

In spring 2012 only a few days before works were due to commence the site ecologist noticed that hundreds of toads were making their way from hibernation into this pool for breeding. The area was due to be flattened and all the soil moved within a week so that building work could progress. Emergency action was required: an autumn amphibian rescue was carried out and small numbers of common toad moved to the on-site sustainable drainage area.

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### Partners

The project to translocate the toads was managed by SWT after initial work from Staffordshire County Council (SCC) and their consultant ecologist on site (Atkins).

### Funding

Funding from SCC; important volunteer input via SWT.

## Amphibian translocation at i54

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### Partners

The project to translocate the toads was managed by SWT after initial work from Staffordshire County Council (SCC) and their consultant ecologist on site (Atkins).

### Funding

Funding from SCC; important volunteer input via SWT.

**Redhill Business Park**

**Habitats & species:**

**Habitats:** Wet woodland, broad-leaved and mixed woodland, ponds, grassland.

**Species:** Amphibians: great crested newt; Mammals: bats, badger; Invertebrates: Odonata.



**Photos:** Newly created pond (left); SuDS swale (right), Chris Evans

**Key messages**

- Economic development can include protection and enhancement of biodiversity.
- Partnership working from project inception to completion is important to achieve this.
- Quality green infrastructure can attract investment.

**Overview**

Redhill Business Park was developed on land allocated for employment in the Stafford Local Plan and predicted to support up to 2,000 jobs. The project sought to develop the 33 hectare (ha) site on the edge of Stafford by creating the road access and development plateaux for employment use whilst retaining the existing network of small woods and ponds that support a diversity of wildlife, including great crested newts, a protected species. An important objective of the development was to maintain and enhance this existing network and provide quality green infrastructure for the employment site.

Great crested newt breeding ponds and terrestrial connecting habitat were maintained and enhanced through business park layout and landscape design. In addition, new areas of habitat were created and incorporated into the development. These included areas of species-rich grassland, created by spreading locally-sourced green hay, ponds and swales, and tree and scrub planting.

A multi-disciplinary Steering Group, including the County Council ecologist and landscape architect managed the project from inception to completion.

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**Partners**

Construction: Birse  
Civils/Balfour Beatty for Staffordshire County Council.  
Ecological works: Apex Ecology and Middlemarch Environmental Ltd.  
Landscape works: Ashlea Ltd.  
Hay strewing: Staffordshire Wildlife Trust.  
Monitoring: Froglife.

**Funding**

Ecological costs were covered by Staffordshire County Council as part of overall development costs.



## Objectives

- To create a quality business park securing local jobs whilst maintaining and enhancing site habitats and providing for protected species.
- To maintain ecological connectivity allowing great crested newts and other species to move through the landscape both on and off site.

## Approach

Ecology surveys carried out at the beginning of the project informed the business park layout which was designed to preserve great crested newt ponds and woodlands of principal importance and include a green infrastructure network linked to adjacent habitats. The site layout includes a network of species rich grassland with ponds and Sustainable Drainage System (SuDS) features which complement retained woodlands and ponds. A buffer to a Local Wildlife Site featuring highly diverse wet woodland on the northern boundary includes SuDS spreader ditches that aim to replicate pre-construction drainage flows to the wet woodland and maintain the willow carr community. Measures for great crested newt protection include a series of new ponds and swales and customised amphibian tunnels under the central spine road. Twenty-one bat boxes were installed on suitable trees.

## Outcomes

- The population of great crested newts has been maintained following habitat enhancements, increased number of water bodies suitable for breeding and maintenance of habitat connectivity. Initial monitoring also shows an increase of the great crested newt population.
- At least eight species of dragonfly and damselfly have been seen using ponds and swales
- Grassland created using green hay from Mottey Meadows SAC is managed by a hay cut regime; large numbers of small mammals use the grassland areas.
- Great crested newts and at least seven other species have used the road tunnels.
- The Business Park was Commended by CIEEM for the award category Large Scale Practical Nature Conservation.
- The business park green infrastructure was winner of the Stafford Borough Council Public Sector Green Award 2016.

## Future work

- Staffordshire County Council will continue to manage the green infrastructure.
- Monitoring of great crested newts and use of road tunnels will continue, contributing to a national Froglife project.
- Developers of plots are provided with principles for landscape design that they are required to follow as part of the outline planning consent. These include advice regarding use of native species planting, protected species and lighting that avoids impact on bats.



**Photos:** Amphibian tunnels (left); Mottey Meadows hay strewing (right), Ali Glaisher

## 14. Birds

Authors: Mike Shurmer (RSPB), with contributions from Nick Pomiankowski (County Bird Recorder) and Bernadette Noake (Staffordshire Wildlife Trust)

### Birds headlines

#### Overview

Staffordshire contains a broad range of both lowland and upland habitats, including ancient woodland, lowland heathland, upland meadows, blanket bog and reedbed. As a consequence Staffordshire supports a large number bird species with 317 species recorded up until the end of 2015, of which 41 are Priority Species and 162 are legally protected. Important sites include Middleton Lakes, Cannock Chase, waterbodies such as Blithfield, Belvide and Tittesworth Reservoirs, Doxey Marshes, Coombes and Churnet Valleys, Aqualate Mere and the Peak District.

#### Key species

- Breeding waders: lapwing, curlew, redshank and snipe.
- Heathland species: nightjar and woodlark.
- Woodland migrants: wood warbler, redstart, pied flycatcher, tree pipit, spotted flycatcher.
- Woodland residents: lesser-spotted woodpecker, willow tit, marsh tit.
- Farmland birds: grey partridge, turtle dove, yellow wagtail, tree sparrow, corn bunting.

#### Headlines

- Staffordshire holds nationally and regionally important populations of several bird species including nightjar, woodland, curlew and willow tit.

#### Key threats

- Loss and fragmentation of important habitats, including woodland, grassland, heathland and wetland.
- Intensification of agriculture, arable cropping regimes and loss of field boundary habitats.
- Lack of Favourable condition on nationally and internationally designated sites.
- Inappropriate development and insufficient mitigation.
- Illegal persecution, particularly involving birds of prey.

#### Successes

- Cetti's warbler, red kite, little egret and Mediterranean gull have recently become established as a breeding species.

#### Recommendations

- Manage, restore, create and connect habitats at a landscape-scale.
- Secure environmental funding for landowners through the rural development programme.
- Work with minerals operators to maximise opportunities for high quality restoration of sites following extraction.
- Ensure that consideration of measures for Priority Species are incorporated into rural and urban planning policies.

## 14.1 State of birds in Staffordshire

### 14.1.1 Overview

Bird figures	Staffordshire
Number of bird species recorded	317*
Number of Priority Species (including SBAP and S41)	41

\* Data provided by the County Bird Recorder (WMBC), correct up to the end of 2015. This figure excludes sub-species and exotics.

**Table 1. Number of important bird species in Staffordshire.**

Priority Species:

Common Name	Scientific Name
Barn owl	<i>Tyto alba</i>
Bullfinch	<i>Pyrrhula pyrrhula</i>
Corn bunting	<i>Emberiza calandra</i>
House sparrow	<i>Passer domesticus</i>
Linnet	<i>Carduelis cannabina</i>
Reed bunting	<i>Emberiza schoeniclus</i>
Tree sparrow	<i>Passer montanus</i>
Yellowhammer	<i>Emberiza citrinella</i>
Grey partridge	<i>Perdix perdix</i>
Lapwing	<i>Vanellus vanellus</i>
Nightjar	<i>Caprimulgus europaeus</i>
Skylark	<i>Alauda arvensis</i>
Snipe	<i>Gallinago gallinago</i>
Woodlark	<i>Lullula arborea</i>

**Table 2. Bird species listed as Staffordshire Biodiversity Action Plan (SBAP) Priority Species**

Other notable species:

Common Name	Scientific Name
Curlew	<i>Numenius arquata</i>
Hen harrier	<i>Circus cyaneus</i>
Merlin	<i>Falco columbarius</i>
Peregrine	<i>Falco peregrinus</i>
Short-eared owl	<i>Asio flammeus</i>
Lesser spotted woodpecker	<i>Dendrocopos minor</i>
Turtle dove	<i>Streptopelia turtur</i>
Yellow wagtail	<i>Motacilla flava</i>
Tree pipit	<i>Anthus trivialis</i>
Redstart	<i>Phoenicurus phoenicurus</i>
Pied flycatcher	<i>Ficedula hypoleuca</i>
Spotted flycatcher	<i>Muscicapa striata</i>
Wood warbler	<i>Phylloscopus sibilatrix</i>
Dartford warbler	<i>Sylvia undata</i>
Willow tit	<i>Poecile montanus</i>
Marsh tit	<i>Poecile palustris</i>

**Table 3. Other notable bird species that occur in Staffordshire**

For a land-locked county, Staffordshire has a rich avifauna, thanks to the large variety of lowland and upland habitats it contains. Many species of conservation concern have regionally, and in some cases nationally, important populations in the county.

Breeding waders can still be found throughout, though populations are in decline in both the uplands and lowlands. Lapwing and curlew can be found on lowland wet grassland, species-rich hay meadows, upland grassland and pasture and open moorland. The largest populations of both species are in the South West Peak, with nearly 200 pairs of lapwing and between 250 and 300 pairs of curlew. Good populations of snipe are also found in the uplands. Populations in the lowlands are at a lower density and quite fragmented. However, a recent survey of lapwing found over 400 pairs, a figure higher than previously thought due to increased survey effort across the county finding new locations, though many areas remain unrecorded. Redshank can still be found breeding at a few lowland sites, including Middleton lakes RSPB, gravel pits and on farmland, though a population of 4-5 pairs is typical. Other breeding waders include little-ringed plover and oystercatcher, typically around lowland wetland, and avocet has also attempted to breed in recent years.

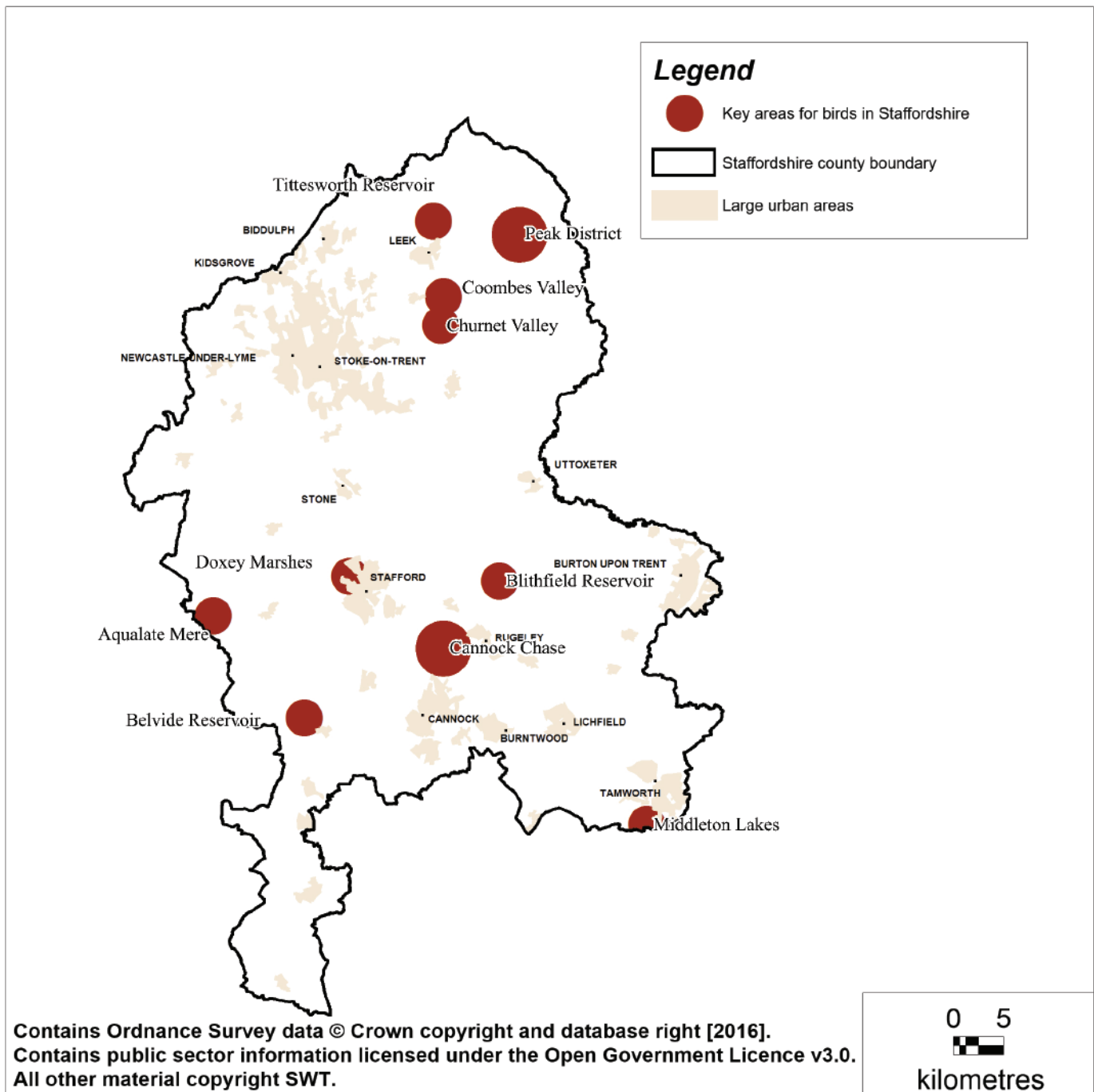
Woodland birds of note include the declining sub-Saharan summer migrants pied flycatcher, redstart and wood warbler, along with the residents lesser-spotted woodpecker and willow tit. The Churnet Valley in particular contains strong populations of these species, being a particular hotspot for willow tit, with a recent survey here finding the species at 50 locations. Some species are also found in the south of the county, with the ancient woodlands of Cannock Chase being particularly important.

Birds of prey include merlin, peregrine and short-eared owl, for which the South Pennine Moors SPA is notified. However, both merlin and short-eared owl have decline with only 1-2 pairs present in most years. Hen harrier is also found in the South West Peak with notable winter roosts, though any potential breeding population is suppressed by persecution across the UK's uplands.

The heathlands of Cannock Chase are important for nightjar and woodlark. Dartford warbler colonised the area in the early 2000's, though recent harsh winters mean that the species has now been lost, though hopefully only in the short-term.

Farmland birds are also found throughout, though populations are much suppressed. Corn buntings are restricted to a few locations, whilst tree sparrow and yellow wagtail are still reasonably widely spread. Turtle doves are now rarely recorded and at risk of local extinction, in the face of steep national declines.

Staffordshire has also seen gains in recent years. Cetti's warbler is a recent coloniser, whilst little egrets are seen much more regularly. Other generalist species have increased, in line with national trends.



**Figure 1. Key areas for birds in Staffordshire.**

### 14.1.2 Population trends

Many species of conservation concern are continuing to decline. The reasons for this are varied, but key factors are habitat loss, especially of semi-natural habitats; intensification of agriculture; woodland neglect and fragmentation; intensification of upland management; illegal persecution of birds of prey and climate change.

Much of our avifauna is also increasing. Generalist species, such as blue tits, great tits, chaffinches and great-spotted woodpeckers, may benefit from an increase in garden feeding and milder winters. The changing climate also helps explain why we see more blackcaps and chiffchaffs wintering in the county. Recent arrivals, including Cetti's warbler and little egret, are mirroring national expansions in range. Increases in wetland habitat following minerals extraction could be benefiting numbers of some wildfowl.

Conservation action is likely to be having a major effect, such as the uptake of agri-environment schemes and projects run by conservation organisations and partnerships. However, these may be slowing declines rather than seeing a reversal of fortunes.

### **14.1.3 Species assemblages**

As across the UK, Staffordshire's avifauna can be characterised by several recognised species assemblages. There is insufficient data to calculate county-level trends for the majority of bird species in the county, but national trends can be indicative.

The 19 species on the UK farmland bird indicator are all found in Staffordshire. In 2014, the combined UK populations were 54% of levels in 1970. The UK farmland bird indicator can be divided into 12 specialist species (including grey partridge, turtle dove, tree sparrow and corn bunting) and seven generalist species (including woodpigeon and jackdaw). The declines were stronger in the 12 specialist species at 69%, compared to 9% for the generalist species.

Populations of the 37 species on the UK woodland bird indicator have shown a combined decline of 20% compared to 1970 levels. These declines are particularly noted with specialist species, which declined by 40%. In a Staffordshire context, the county is particularly important for species typical of western oak woodlands including tree pipit, wood warbler, pied flycatcher and redstart. Other notable specialist species include lesser spotted woodpecker and willow tit.

### **14.1.4 Key species changes**

Of the species for which regional trends are available, populations of habitat specialists have generally declined, in line with national trends. This includes specialist farmland species such as skylark, starling, yellowhammer, linnets and lapwing. Migrant species have also experienced declines, mirroring well-publicised national trends, including cuckoo and swift.

Some species have experienced strong population increases. Buzzards have increased in the West Midlands by 194% since 1994, notably higher than the 75% national increase over the same period. Generalist species such as great-spotted woodpecker and nuthatch are particularly notable. Other species are bucking national trends. Song thrush and bullfinch has shown strong recent increases in comparison to national figures.

Many species of importance do not have population sizes sufficient to enable trends to be calculated. This particularly includes specialist woodland birds, such as lesser-spotted woodpecker, willow tit, wood warbler and pied flycatcher. Bespoke surveys would be required to establish accurate breeding populations. Similarly, heathland bird populations (specifically woodlark and nightjar) have not been systematically surveyed for over ten years.

Species	West Midlands Population Change 1995-2013	BBS trend 1995-2013	Long-term trend 1970 - 2013
Grey partridge	n/a	↓59%	↓92%
Buzzard	↑194%	↑75%	↑439%
Lapwing	↓20% <sup>ns</sup>	↓45%	↓65%
Curlew	n/a	↓46%	↓63%
Turtle dove	n/a	↓97%	↓97%
Cuckoo	↓73%	↓46%	↓59%
Swift	↓36%	↓42%	n/a
Great spotted woodpecker	↑138%	↑136%	↑357%
Lesser spotted woodpecker	n/a	n/a	↓82%
Willow tit	n/a	↓81%	↓94%
Marsh tit	n/a	↓29%	↓71%
Skylark	↓23%	↓34%	↓60%
Swallow	↑10% <sup>ns</sup>	↑26%	↑15%
House martin	↓34%	↓10% <sup>ns</sup>	↓47%
Wood warbler	n/a	↓58%	n/a
Chiffchaff	↑131%	↑90%	↑85%
Willow warbler	↓46%	↓4% <sup>ns</sup>	↓39%
Nuthatch	↑162%	↑92%	↑253
Starling	↓65%	↓50%	↓81
Song thrush	↑74%	↑8%	↓56
Spotted flycatcher	n/a	↓47%	↓87%
Pied flycatcher	n/a	↓60%	n/a
Redstart	n/a	↑47%	↑74%
House sparrow	↑5% <sup>ns</sup>	↓3% <sup>ns</sup>	↓65%
Tree Sparrow	n/a	↑122%	↓90%
Yellow wagtail	n/a	↓31%	↓67%
Tree pipit	n/a	↑13% <sup>ns</sup>	↓68%
Bullfinch	↑32% <sup>ns</sup>	↑6%	↓41%
Linnet	↓29% <sup>ns</sup>	↓29%	↓60%
Goldfinch	↑194%	↑111%	↑146%
Yellowhammer	↓40%	↓15%	↓55%
Reed Bunting	n/a	↑19%	↓38%
Corn bunting	n/a	↓40%	↓90%

<sup>ns</sup> = trend is not statistically significant

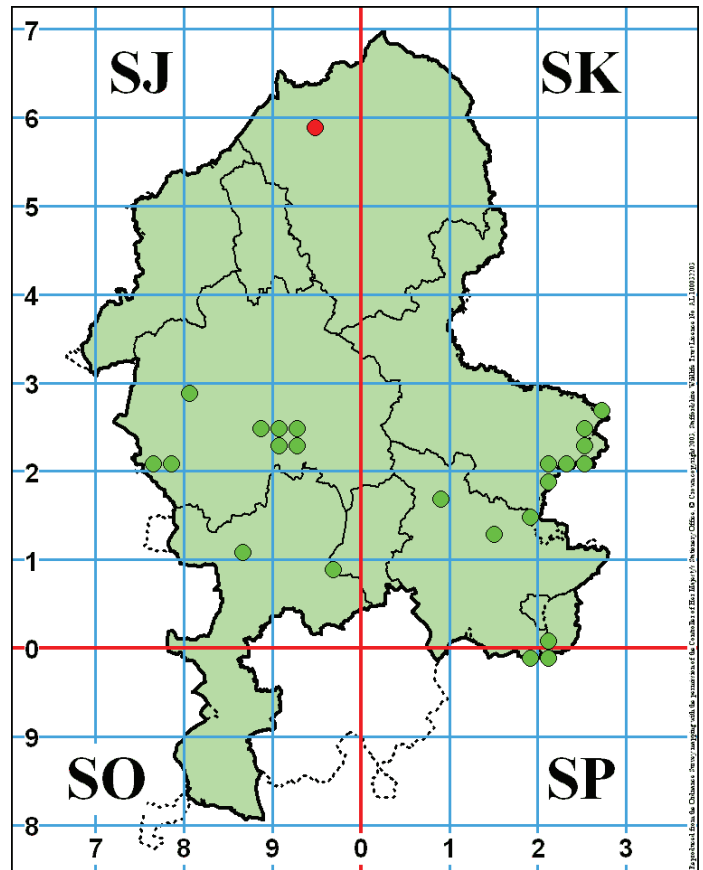
**Table 4. Population changes in key bird species that occur in Staffordshire. Due to the low sample sizes for Staffordshire it is not possible to generate species trends. Therefore the Breeding Bird Survey trends for the West Midlands are shown for a selection of key species alongside national trends where data is available (Hayhow *et al.* 2015).**

**Cetti's warbler** *Cettia cetti*

Over the last ten years Cetti's warbler has completed the transition from a county vagrant to a permanent resident. The species first nested at sites on the south coast of England in 1973, and the push northwards is well known. In Staffordshire the first territories were noted at Middleton Lakes and Branston Gravel Pits. With regular sightings at many other wetland sites, it looks set to colonise the whole of the lower lying areas of the county.



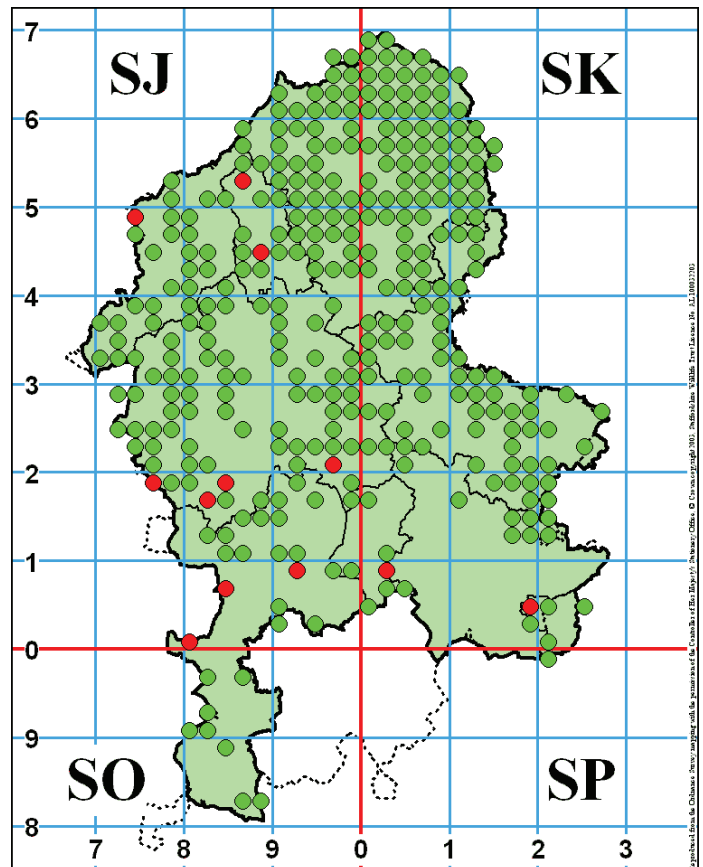
Cetti's warbler by Amy Lewis



Distribution of Cetti's warbler in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016

**Curlew** *Numenius arquata*

The curlew is now thought to be the highest priority bird of conservation concern in the UK. In Staffordshire, this species is found in greatest numbers on rush meadows and open moorland in the Peak District, with the most recent survey suggesting a population of 250-300 pairs in this area. The species is found in lower densities on upland hay meadows in areas such as the Churnet Valley. In the lowlands the species is patchily distributed, but is not common. Habitat condition and availability is key for this species, though there is still much research to be done to fully understand its needs. Predation is also thought to be an important factor, particularly where populations are suppressed. Work in the South West Peak is feeding into a national research programme led by the RSPB.

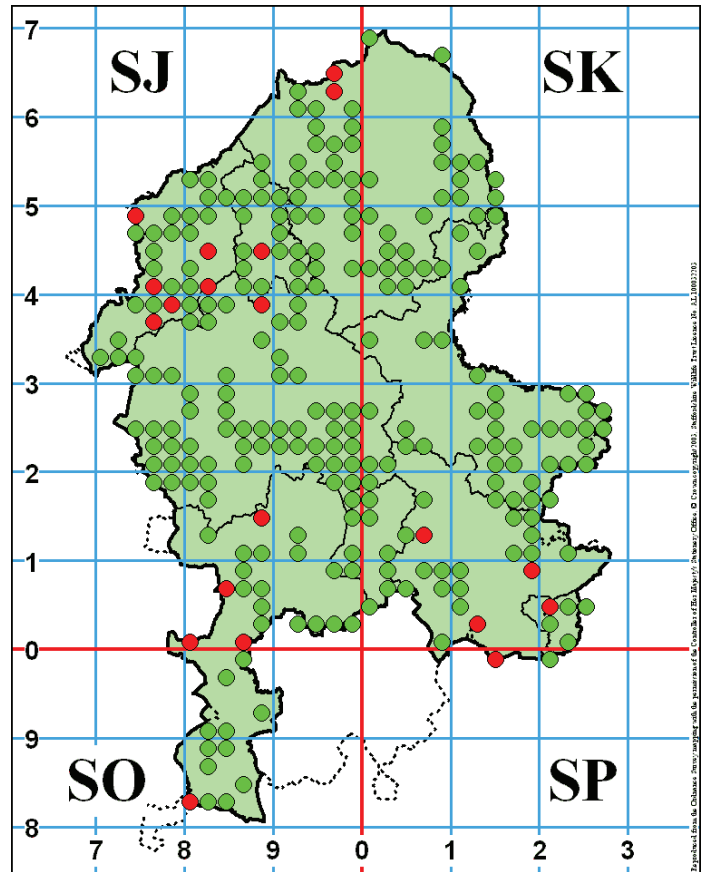


Distribution of curlew in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016



## Willow tit *Parus montanus*

Willow tit is the UK's fastest declining resident bird, experiencing a UK population decline of 94% since 1970. A species of wet woodland and scrub, the main causes of the decline are unknown, though it is thought that the loss of these habitats is important. Staffordshire holds good populations of willow tits, though they are very locally distributed. However, recent changes in survey technique, measuring responses to recordings of their calls, suggests the species may be under-recorded. The Churnet Valley appears to be a hotspot for this species, particularly in scrub and small damp woodland patches along the River Churnet and canal network.



Distribution of willow tit in Staffordshire (SER, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2016

There are many sites and areas that provide good habitat conditions for priority bird species. However, a common issue is whether habitats and habitat mosaics are available and in good condition at large enough scales and in large enough amounts. Habitat patch size and connectivity is very important for populations to remain at viable levels.

Key habitat issues surround woodland, where much of this resource is not in appropriate management; heathland, where only small areas remain; the uplands, where management has intensified; and open farmland, where pressures to support viable farming and food production can impact on habitat quality.

Increasingly the approaches to conserving priority bird populations is to ensure that there are core sites, such as designated sites and nature reserves, in Favourable condition, with these sitting in a landscape of connected habitats to support large populations. Relying just on core sites will not lead to the recovery of bird populations, and a landscape-scale approach, working positively with land managers, is crucial to maintaining Staffordshire's avifauna. We also need to consider how populations can become more resilient to climate change through the availability of larger areas of good habitat, and also to consider how our avifauna may change in the future.

## 14.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 9-10, 13-15;** access/disturbance of sensitive habitats through recreation pressures, habitat fragmentation and severance, neglect of woodland habitats, inappropriate management, intensive agriculture.

### Additional specific issues for birds

- Loss and fragmentation, especially of semi-natural habitats including woodland, grassland, heathland and wetland.
- Intensive agriculture, arable cropping regimes and loss of agricultural field boundary habitats.
- Lack of favourable condition on nationally and internationally designated sites
- Inappropriate development and insufficient mitigation.
- Predation of suppressed populations, particularly preventing the recovery of breeding waders.
- Illegal persecution, particularly involving birds of prey.
- Climate change and resilience.
- Afforestation, for example coniferous plantations on Cannock Chase SAC.
- Viability of sustainable woodland management.
- Intensification of upland management.

## 14.3 Conserving birds – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues described in the threats section and to promote bird conservation. Some of these are highlighted in the case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to birds:

- Woodland bird recovery in the Churnet Valley (woodland chapter)
- Brund Hill Plantation (moorland chapter)

Case Study 1 – Staffordshire Barn Owl Action Group (Authors and contributors: Helen Cottam, Staffordshire Barn Owl Action Group)

Case Study 2 – Staffordshire lapwing survey 2014 (Authors and contributors: Scott Petrek)

## 14.4 Conserving birds – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M2; M8; M13; M16; DM1:** Improve the following: increase habitat size and connectivity; manage for structural habitat diversity; consider potential recreation impacts on habitats & species when planning management; increase survey and monitoring; manage woodlands for age and habitat diversity; use opportunities through agri-environment schemes and any targeting of the schemes to create and manage habitats.

### Additional specific recommendations for birds

- Manage, restore, create and connect habitats at a landscape-scale.
- Secure environmental funding for landowners through the rural development programme.
- Work with minerals operators to maximise opportunities for high quality restoration of sites following extraction.
- Ensure that consideration of measures for Priority Species are incorporated into rural and urban planning policies.
- Ensure sustainable management of upland habitats.
- Increase awareness of bird conservation with the aim of tackling persecution, particularly amongst birds of prey.
- Encourage take-up of Countryside Stewardship to benefit farmland and woodland birds.
- Ensure Natura 2000 sites and SSSIs notified for birds are in Favourable condition.
- Ensure that consideration of measures for Priority Species of bird are incorporated into rural and urban planning policies.
- Work with minerals operators to maximise opportunities for high quality restoration of sites following extraction.
- Secure environmental funding for landowners through the rural development programme.

Staffordshire Barn Owl Action Group

**Habitats & species:**

**Habitats:** Rough grassland, moorland.

**Species:** Barn owls, small mammals.



**Photo:** Barn owl, Jon Hawkins

**Key messages**

- Barn owl breeding success is determined by prey availability and nest site opportunities.
- In the UK 75% of known barn owl nest sites are found in nest boxes (Shawyer, 2010).
- BOAG has installed over 400 barn owl nest boxes since 2001.

**Overview**

The barn owl has been in steady decline in the UK over the last 80 years mainly due to a loss of habitat following changes in agricultural practices and the loss of roost and nest sites through the conversion of old barns and buildings and felling of old trees. The barn owl is protected as a Schedule 1 species under the Wildlife and Countryside Act, 1981.

In Staffordshire, the barn owl is a Staffordshire Biodiversity Action Plan species. The Staffordshire Barn Owl Action Group (BOAG) was set up in 2001 to help reverse the downward trend of barn owls in the county. Efforts to help with its conservation are largely focused on the provision of nest boxes in prime barn owl habitat.

**Contact**

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**Partners**

Staffordshire BOAG is affiliated with Staffordshire Wildlife Trust

**Funding**

Staffordshire BOAG is a charitable organisation

## Objectives

- To install nest boxes targeting sites with suitable foraging habitat of rough grassland areas, rich in small mammals.
- To undertake an annual monitoring programme to determine population trends.
- To ring chicks to help gather more data on population movements.

## Approach

- Identify barn owl hot spots by asking the public to report barn owl sightings.
- Apply for small funded projects and donations to build nest boxes.
- Train volunteers to install nest boxes, climb trees and monitor nest sites.
- Collect and interpret data to establish a network of nest boxes for barn owl connectivity across Staffordshire.

## Outcomes

Staffordshire BOAG has installed over 400 barn owl nest boxes across Staffordshire that are monitored during the breeding season. The Staffordshire Moorlands, with less intensive agriculture, has been identified as a barn owl stronghold.

Breeding success is determined by availability of prey as well as by the weather and seasonal variations. In 2012, 53 pairs were recorded, the highest number to date, followed in 2013 by a drastic decline to just 15 pairs. A winter of extreme cold weather and a late spring impacted breeding success on a much reduced population.

## Future work

Staffordshire BOAG will continue to install nest boxes. More durable recycled plastic nest boxes are being trialled as plywood boxes can delaminate over time. Staffordshire BOAG will continue to monitor population trends, feed data to Staffordshire Ecological Record and The Barn Owl Trust, and advise landowners on how to best manage landscapes for barn owls.



**Photos:** Staffordshire BOAG installing a barn owl nest box, Helen Cottam (left); Staffordshire BOAG ringing a barn owl, Tony Redmond (right)

**Figure 1.** Map showing the location of barn owl nest boxes in Staffordshire as of 2014.



Staffordshire lapwing survey 2014

**Habitats & species:**

**Habitats:** Wetlands, moorland and farmland with suitable nesting habitat.

**Species:** Birds: lapwing, snipe, curlew.



**Photo:** Lapwing, Darin Smith

**Key messages**

- Our knowledge of the distribution of breeding lapwing in Staffordshire is not complete and new, previously unrecorded sites exist.
- Not all sites are suitable for breeding each year and habitat loss, even on a temporary basis, is limiting the population in the county.
- Productivity at nearly all sites appears low, but further investigation is needed.

**Overview**

Lapwing are one of the few breeding waders that can still be found across most of Staffordshire where suitable habitat exists, unlike snipe and curlew, which have almost disappeared from the lowland areas and are now heavily restricted to Staffordshire moorlands habitats. This is possibly due to predation and unsympathetic management on lowland arable land as well as changes in land use. Previous estimates of the number of breeding pairs of lapwing in Staffordshire have been based on records submitted by bird watchers to West Midland Bird Club (WMBC) and British Trust of Ornithology (BTO), and could be heavily biased towards 'good' bird watching areas rather than representing a true reflection of lapwing status in the county.

**Contact**

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**Partners**

The survey was managed by Staffordshire Wildlife Trust, working with West Midland Bird Club and Staffordshire Ecological Record.

**Funding**

The survey was funded by Staffordshire Wildlife Trust as part of wider conservation monitoring in the county.

## **Objectives**

- Assess the current breeding status and distribution of lapwing in Staffordshire.
- Compare increased survey effort with current knowledge and breeding reports.
- Identify new breeding hot spots for lapwing in the county.

## **Approach**

The partnership of three organisations, led by Staffordshire Wildlife Trust, aimed to use social media and local press to appeal for sightings of lapwing across Staffordshire, using details of the number seen and the behaviour of the birds to assess the likelihood of breeding. Reports were received online through the Trust's website, via email and collated from records submitted to WMBC and BTO. All data was validated by the county bird recorder before being included in the survey data. Checks on new breeding areas were repeated in 2015 to assess their suitability for long-term breeding.

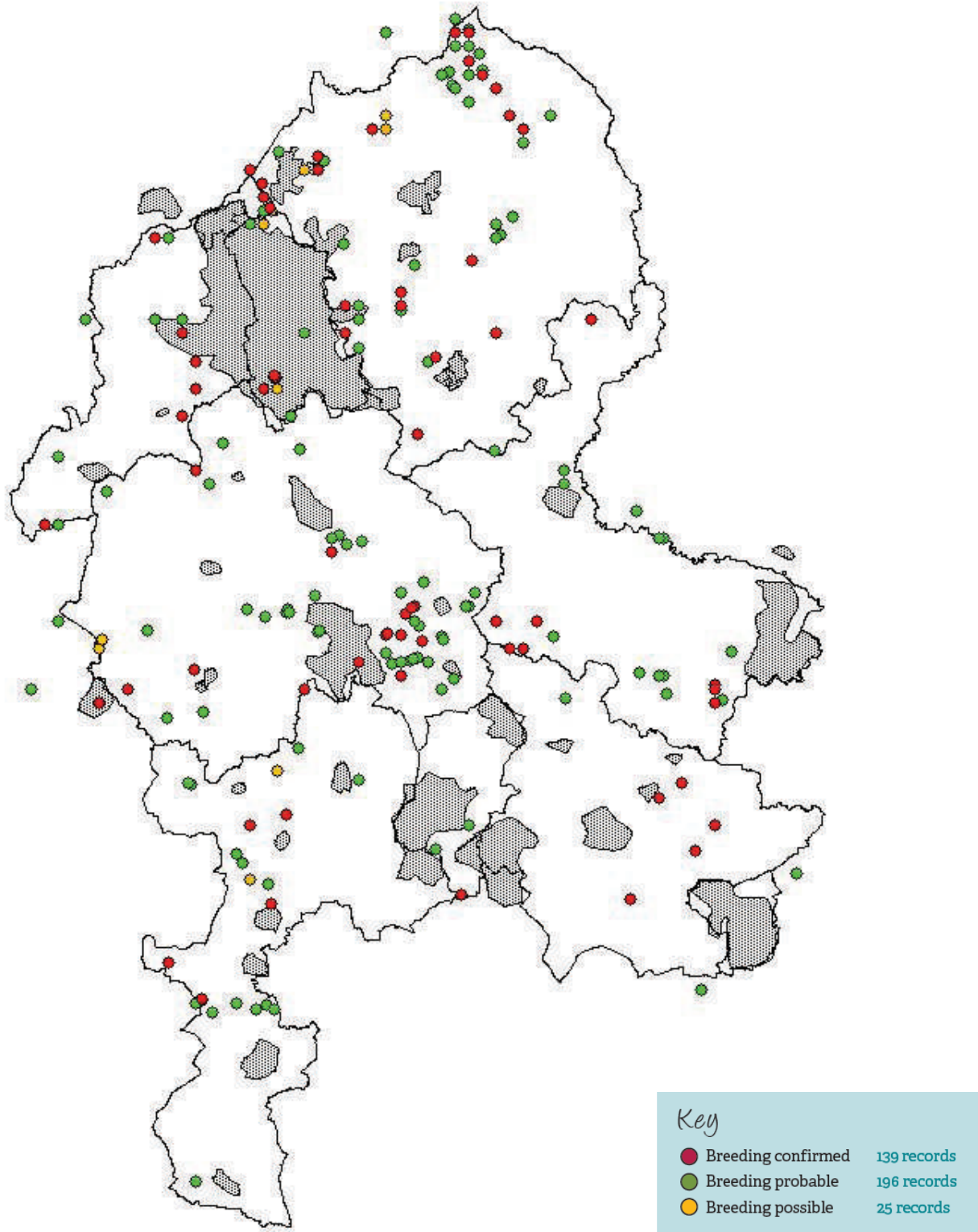
## **Outcomes**

The survey found around 400 pairs of lapwing attempting to breed in the county in 2014, far higher than the number of pairs that could be estimated from traditional datasets alone. The Staffordshire moorlands remains the most important breeding area, but colonies in the river corridors around Stafford and south of Burton play an important role. The species has not been restricted to wetland and upland habitat, with some breeding in arable areas. Not all sites recorded in 2014 are suitable long-term and may have only arisen due to suitable ground conditions as the birds arrived. Several new breeding sites had follow up surveys in 2015 and many were found to no longer be suitable due to either a change in land use or the drier conditions in the spring.

## **Future work**

The key colonies across Staffordshire should be more routinely monitored using a standard methodology, and a wider public appeal and awareness raising campaign should be periodically run to discover new breeding sites. Many of the temporary colonies from the 2014 survey could become key breeding areas with some habitat intervention, whilst existing long-term breeding sites need to address low productivity to help the population increase and expand.





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**Figure 1. Records indicating lapwing breeding activity in Staffordshire in 2014. Urban areas are also shown.**

## 15. Mammals

Authors: Derek Crawley (Chair of Staffordshire Mammal Group; County Recorder for Mammals), Debby Smith (Secretary of Staffordshire Mammal Group), with contributions from Nick Mott (Staffordshire Wildlife Trust), Bernadette Noake (Staffordshire Wildlife Trust) and Sue Lawley (Independent expert).

### Mammal headlines

#### Overview

Most mammals are rarely seen as they are either elusive or nocturnal. Mammals are important indicators of a healthy environment; many of the smaller mammals are important food sources for predatory birds and other mammals. Some species of mammal provide financial benefits from shooting and tourism, whilst others are considered pests as they have an impact on farming, forestry and human health. A wide range of mammals are found in Staffordshire.

#### Key species

Bats, water vole, hedgehog, brown hare, otter, pine marten, harvest mouse, hazel dormouse, polecat, red squirrel

#### Headlines

- 43 species of mammal have been recorded in Staffordshire since 1990, two of which are now considered extinct (the red squirrel and red-necked wallaby)
- 13 of these present-day species are Priority Species and 17 are legally protected
- Current limited knowledge suggests that six species are declining, four are increasing, 18 are stable, and 13 species have unknown status

#### Key threats

- Illegal release of species into the wild, of both native and foreign origin
- Habitat loss and isolation of habitats
- Poaching and other forms of deliberate killing
- Road casualties
- Government policy with regard to culls for disease control
- Pollution and pesticides
- Dredging of watercourses
- Climate change (although this may benefit some species)
- New buildings and roads isolating populations of mammals

#### Successes

- Increase in population and distribution of several species including otter *Lutra lutra* and polecat *Mustela putorius*
- Increased survey effort of harvest mice *Micromys minutus* has resulted in the identification of an additional 40 harvest mouse sites across Staffordshire.
- Discovery of wild populations of hazel dormouse *Muscardinus avellanarius* in northwest Staffordshire in 2000.

#### Recommendations

- More specific studies to give accurate data on population changes
- Encourage further citizen science participation in recording common species to reduce under-recording
- Improve protection and mitigation in new built infrastructure, e.g. roads, rail, culverts, bridges, new buildings
- Retain habitat and improve management

## 15.1 State of mammals in Staffordshire

### 15.1.1 Overview

Mammal figures	Staffordshire (SER, 2016)	UK
Number of species	43	64
Number of species NERC Act Section 41 status	13	18
Number of species non-native status (from last ice age)	10	19
Number of legally protected species	17	
Number of extinct species	2	

**Priority Species:** List of Staffordshire BAP & UK BAP species

English Name	Scientific Name
Water vole	<i>Arvicola amphibius</i>
Hedgehog	<i>Erinaceus europaeus</i>
Brown hare	<i>Lepus europaeus</i>
Otter	<i>Lutra lutra</i>
Pine marten	<i>Martes martes</i>
Harvest mouse	<i>Micromys minutus</i>
Hazel dormouse	<i>Muscardinus avellanarius</i>
Polecat	<i>Mustela putorius</i>
Noctule	<i>Nyctalus noctula</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Brown long eared bat	<i>Plecotus auritus</i>
Lesser horseshoe bat	<i>Rhinolophus hipposideras</i>
Red squirrel (considered extinct in Staffordshire since 1995)	<i>Sciurus vulgaris</i>

**Table 1. Mammal species in Staffordshire.**

Mammals are key indicators of good habitat and effective biodiversity management. Some mammal species are top predators or no longer have natural predators (except man), such as deer. Mammals appear on the favourite species list of many people, despite being difficult to see.

Staffordshire supports almost three quarters of the UK's Priority (S41) species (Cresswell *et al.*, 2012). It has two thirds of the UK's terrestrial mammal fauna, with just over half of all non-native species present in the county (Mammal Society, 2000). This is largely due to Staffordshire's wide habitat range, location and positive management efforts. Situated in the middle of the country, Staffordshire is on the northern limit of the yellow-necked mouse range (Crawley *et al.*, 2007, Harris *et al.*, 1995). Staffordshire is one of the last places in mainland Britain for roe deer to colonise from the northern and southern populations (Crawley, 2016). Staffordshire has seen the local extinction of red squirrels *Sciurus vulgaris* and red-necked wallaby *Macropus rufogriseus* (Crawley *et al.*, 2007, 2016)

The species groups of greatest concern with regard to mammals are Bats, Insectivores, selected Rodents, Lagomorphs, Carnivores and Deer.

Survey data is such that detailed analysis of population and distribution trends is not possible for many species. However, there is clear evidence that bat species are in decline in the county, (Richardson, 2000). Rodent species such as water vole (VWT, 2001) and hazel dormouse (Crawley *et al.*, 2007 & 2016) have also shown recent declines and insectivores such as hedgehog are also causing concern (Crawley *et al.*, 2007 & 2016), (Hedgehog Street).

There has been encouraging data with regard to otter and polecat, (Birks, 2008) (Crawford, 2011) but for other mustelids the signs are not as positive. Data is particularly limited for these species due to difficulties in recording (Crawley *et al.*, 2007 & 2016). Badger numbers appear to have increased in recent years (Crawley *et al.*, 2007 & 2016) but in addition to the ongoing threat of baiting and persecution, government policy with regard to bovine tuberculosis (bTB) is a potential future threat.

Further afield in recent decades, there has been a national discovery of a new bat species in the UK (Richardson, 2000) and the splitting of pipistrelles into common *Pipistrellus pipistrellus* and soprano *Pipistrellus pygmaeus* (P. Richardson, 2000).

### 15.1.2 Population trends

For many species, Staffordshire’s mammal data is limited by levels of survey effort, both in terms of intensity and coverage. We can only explore distribution for most species as we have insufficient data to determine population size. With the exception of a handful of species that have been targeted for in-depth surveys (for example water vole *Arvicola terrestris*), we can only give a best estimate population trends at this time, however, Staffordshire is reflecting the national trends for most species of mammals

Summary of changes	
Staffordshire population status	Species
Stable	mole, badger, red deer, grey squirrel, rabbit, brown hare, brown rat, fox, fallow deer, harvest mouse, bank vole, field vole, wood mouse, whiskered bat, Brandt’s bat, natterer’s bat, common pipistrelle, brown long-eared bat
Increasing	roe deer, polecat, muntjac, otter
Declining	hedgehog, hazel dormouse, Daubenton’s bat, water vole, pine marten, mink
Unknown	stoat, weasel, common shrew, pygmy shrew, water shrew, yellow-necked mouse, house mouse, noctule, Leisler’s bat, serotine, soprano pipistrelle, Nathusius’ pipistrelle, lesser horseshoe bat

**Table 2. The population status of mammal species that have been recorded in Staffordshire since 1990 (Crawley *et al.*, 2016; SE Staffs Bat Group, 2016; Staffordshire Mammal Group, 2016)**

## Summary of reasons of changes

Many species are not often seen or recorded to be able to estimate if their range or population has changed, e.g. stoat *Mustela erminea*, weasel *Mustela nivalis*, water shrew *Neomys fodiens*. However, some species which are elusive have had intense monitoring such as otter, water vole and hazel dormouse. This allows us to make better judgements on their status. Despite limited data to demonstrate threats and population changes, experts believe that mammal species are threatened by:

- habitat changes (25 Species)
- pesticides and pollution (23 Species)
- poaching or other forms of deliberate killing (16 Species)
- Climate change (11 Species), although some in a positive way
- Fragmentation of populations into smaller sub-populations (6 Species)
- Road deaths (2 Species)
- Competition from other species (5 Species)
- Inter-breeding with similar species (2 Species)

## Other trends

- Improved water quality and habitat schemes along waterways have positively affected the number of otters.
- Increased road use has killed more animals. Although this has led to increased records particularly with regard to dispersing species e.g. polecat and muntjac *Muntiacus reevesi*
- Redevelopment of existing buildings to residential, e.g. barn conversions, has caused losses in bat roosts. Provision has improved with regard to alternatives in the last two decades due to legislative improvements, but illegal activity is still common.

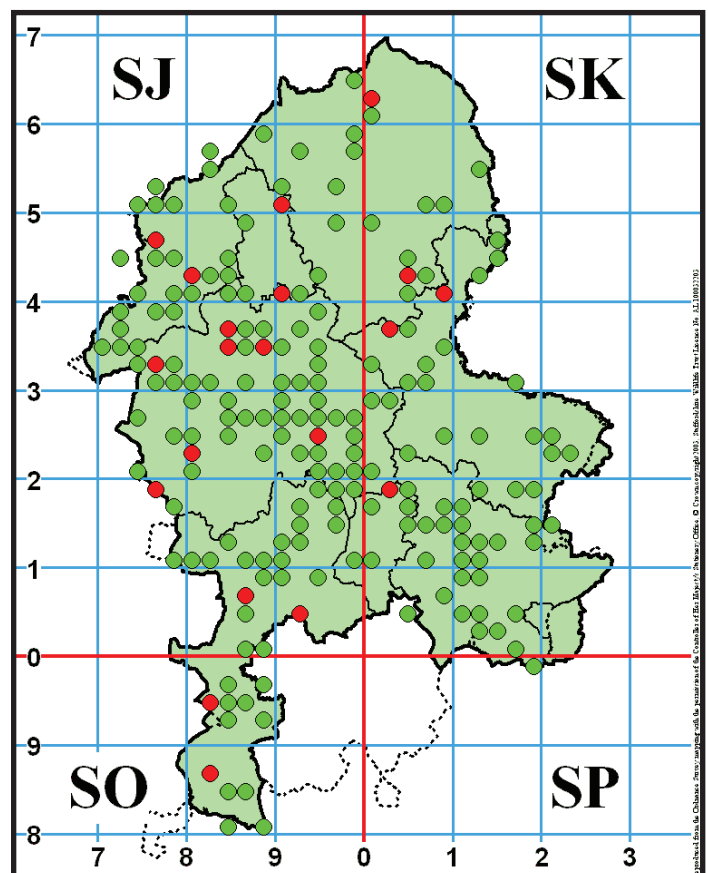
### 15.1.3 Key species changes

#### Polecat *Mustela putorius*

Absent from Staffordshire records until 1975. The species underwent a steady spread into the county from their stronghold in Wales. With less persecution and a protected status they were able to exploit the rat and rabbit populations around farms and rural homes. By the 1990s polecats were frequently observed in large gardens and commonly recorded as road casualties. Vincent Wildlife Trust surveys of dead specimens showed Polecat increasing their range from west to east Staffordshire and lower numbers of polecat ferrets. The number of polecat ferret hybrids have reduced in numbers over the years as the pure polecats outcompete the hybrids.



Polecate by Derek Crawley



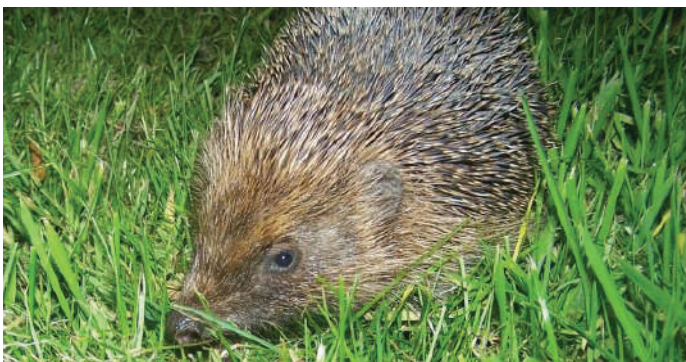
Distribution of polecat in Staffordshire (SMG, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

**Soprano pipistrelle** *Pipistrellus pygmaeus*  
 Only separated from common pipistrelle in 1999, reducing the number of common pipistrelle records, but not their distribution as they are found in similar habitats. They can be differentiated in hand or by picking up their echolocation via a bat detector. Sopranos have a higher frequency call 55 htz rather the 45 htz of the common. Like most bat species, soprano pipistrelle is thought to be declining. Some roost sites recorded are lost due to exclusion in development, for which roost compensation is not always adequate.

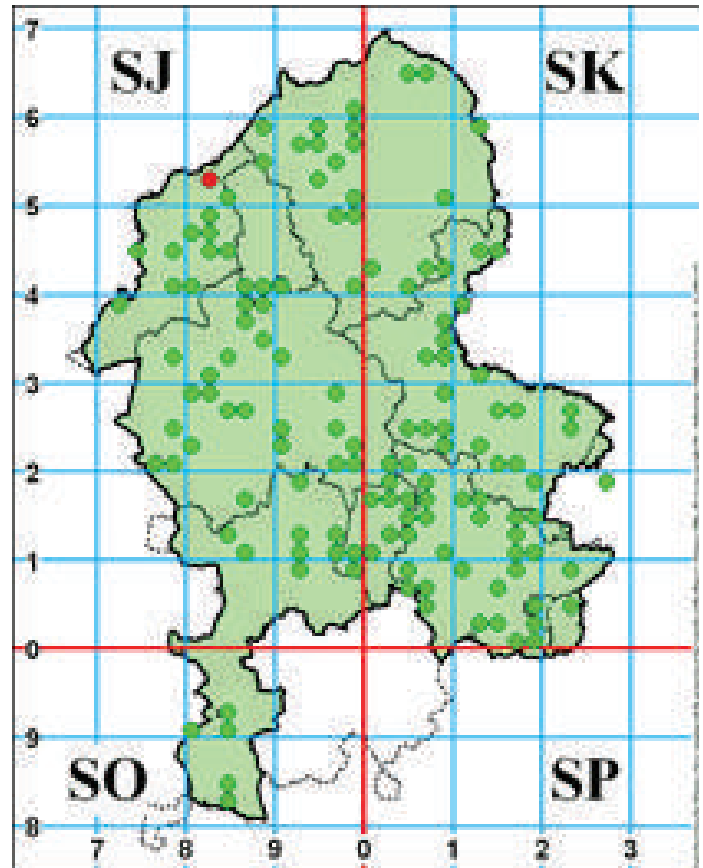


Soprano pipistrelle by Derek Crawley

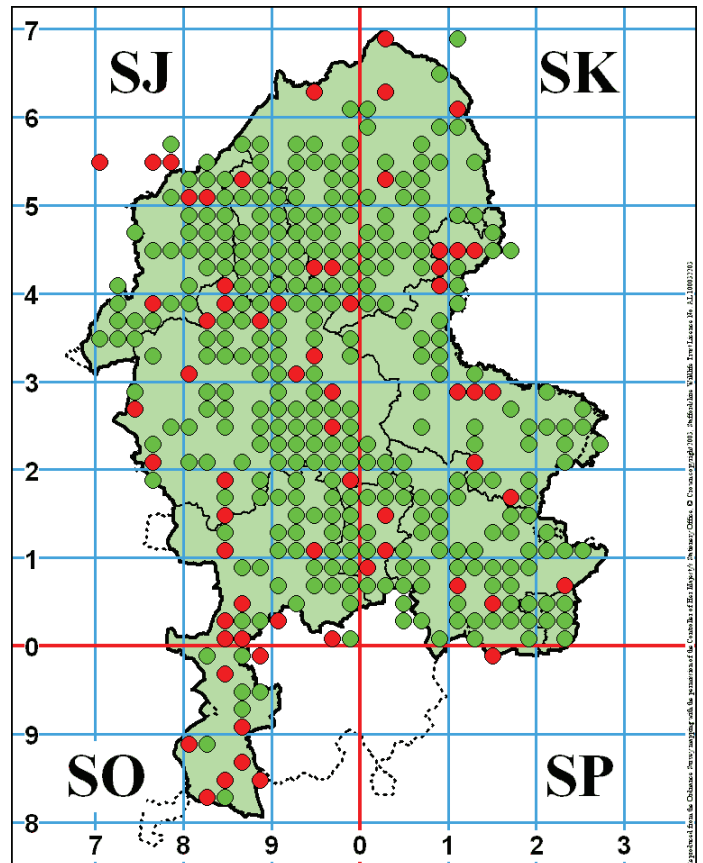
**Hedgehog** *Erinaceus europaeus*  
 Hedgehog is common in both town and country. Since the 1970s it has suffered a major decline nationally and in Staffordshire. The number of rescued hedgehogs in Staffordshire has increased however, possibly due to more public awareness of the hedgehog's status. The Staffordshire Mammal Group has observed a decline in both the number of road deaths, and sightings of hedgehogs in Staffordshire. The decline is thought to be due to habitat loss, loss of nesting sites and decreasing number of invertebrates. Solid fences around gardens prevent hedgehog movements, restricting feeding activity. Declines of hedgehogs have been well published nationally, and this has led to The People's Trust for Endangered Species (PTES) running 'Hedgehog Street', a campaign to help hedgehogs in urban areas.



Hedgehog by Derek Crawley



Distribution of soprano pipistrelle in Staffordshire (SMG, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017



Distribution of hedgehog in Staffordshire (SMG, 2014) [red dots denote records before 1995]. © Crown Copyright. All rights reserved SWT 100018777/SWT28504/60610 2017

#### 15.1.4 Habitat condition

There have been a number of positive habitat management changes over the last four decades that have benefitted mammal species. For example, the amount of woodland now having more woody debris left as standing or on the ground has increased, providing more homes and feeding opportunities for many mammal species.

Waterways have improved in terms of biodiversity and water quality, which is good news for the semi-aquatic and riparian species such as otter. However, the increased prevalence of flash flooding due to urbanisation and accelerated runoff has had a major impact on species populations that rely both on the rivers and the adjacent floodplains. Small mammal populations can be wiped out locally in such circumstances, requiring immigration to replace lost numbers. With increasing flash flooding this could become more of an issue in the future.

Some changes in farming practice have been detrimental. Larger field sizes and hedgerow removal has negatively impacted many mammal species, as have the monocultures maintained by spraying. The change from traditional meadow management (an annual cut) to silage grass regimes (several cuts throughout a long growing season) have impacted negatively on small mammal species and brown hare in particular.

Many small areas of scrub or unused land are now tidied up, leaving less space for mammals. Increased car use has resulted in many urban gardens lost to driveways and has reduced the overall green space in town and villages.

Fragmentation of habitat is a significant factor for many species and can seriously reduce the quality of habitat through lost linkages. These result from land use change often for development, including large infrastructure such as transport and building.

Some species have adapted more readily to urban conditions than others, for example fox and badger. These have been able to exploit urban/suburban food sources and shelter and are often fed by householders. Meanwhile, common pipistrelle are able to utilise modern housing estates, roosting under roof tiles and feeding round street trees and street lamps.

## 15.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 2-6, 8-10, 14-18:** pollution; nitrification; runoff (roads, land uses, chemicals); overgrazing; access / disturbance; habitat fragmentation; inappropriate management; intensive agriculture; habitat loss; land drainage; invasive non-native species.

### Additional specific issues for mammals

- Habitat loss and isolation of habitats
- Poaching and other forms of deliberate killing
- Road casualties
- Government policy with regard to culls for disease control
- Pollution and pesticides
- Dredging of watercourses
- Climate change (although this may benefit some species)
- New buildings and roads isolating populations of mammals
- Illegal release of species into the wild, of both native and foreign origin. This can be a significant problem with regards to pest issues and impact on native species. Notably there have been many mink releases from farms which severely impacted water vole populations. The loss of working ferrets and pets released into the wild have impacted the genetic purity of polecats. In addition, the increase in sale and keeping of exotic pets has led to non-native animals being released or escaping into the wild, e.g. racoon, racoon dog, pygmy hedgehog, porcupine and Virginia opossum.
- There have also been deliberate and accidental releases of native captive animals into the wild. Although not always illegal under specific wildlife legislation there can be significant welfare and legal concerns from such actions, e.g. red squirrel, polecat and pine marten. IUCN guidelines for re-introductions should always be followed. 'Hard' releases, where animals are given insufficient support post-release are rarely successful in the long term and can result in many individual animal deaths.
- Decline of common species such as hedgehog *Erinaceus europaeus* (Hedgehog Street, D. Crawley *et al.*, 2007)
- Genetic isolation
- The impact of HS2
- The increasing impact of cats on bats has been noticeable amongst rescued bats, although this in part could be attributed to the increasing ease of being able to take bats in for rehabilitation.

## 15.3 Conserving mammals – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the threats section. Some of these are highlighted in the case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to mammals:

- Friends of the Wom Brook (wetland chapter)

Case Study 1 – Otters in Staffordshire (Authors and contributors: Derek Crawley, Debby Smith, Nick Mott)

Case Study 2 - Harvest mice (Authors and contributors: Derek Crawley, Debby Smith, Nick Mott)

Case Study 3 – Staffordshire Bat Group (Authors and contributors: Vicky Worrall)



In addition to the case studies above, there are many more examples of positive work that is of benefit to mammals in Staffordshire. These include:

- Increase in population and distribution of several species including otter *Lutra lutra* and polecat *Mustela putorius*, (Birks, 2008) (Crawford, 2011)
- Discovery of wild populations of hazel dormouse *Muscardinus avellanarius* in northwest Staffordshire in 2000.
- Natural spread of roe deer *Capreolus capreolus* (Crawley *et al.*, 2016)
- Major reduction in the status and distribution of the non-native American mink *Mustela vison* in Staffordshire since the mid-late 1990s.
- Formation of the Staffordshire Mammal Group and the increase in records and monitoring of these species plus raising awareness and community inclusion.
- Publication of the Provisional County Mammal Atlas in 2007.
- M6 Toll reducing road deaths and allowing crossing point.
- Formation of two bat groups in Staffordshire as well as a badger group.

## 15.4 Conserving mammals – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

Numbers HC1; M2-M13; M15-M17; DM1-DM5: Improve the following: increase habitat size and connectivity; increase bare ground habitat; manage for structural habitat diversity; increase resources; ensure appropriate grazing (ensure sites are not over-grazed); improve planning and use of chemicals; implement sustainable drainage systems (SuDS); innovative management of recreation pressures; consider recreation impacts when planning management; more integrated planning and management of sites across ownership boundaries; integrated use of volunteer groups; use of byproducts from management; sustainable management; survey and monitoring; manage hedgerows by rotational winter cutting; manage woodlands for age and habitat diversity; increase research; agri-environment schemes; habitat creation through the planning system; grants; guidelines for planning; large-scale habitat creation.

### Additional specific recommendations for mammals

- More specific studies to give accurate data on population changes
- Encourage further citizen science participation in recording common species to reduce under-recording
- Improve protection and mitigation in new built infrastructure, e.g. roads, rail, culverts, bridges, new buildings
- Retain habitat and improve management
- Better protection from new built infrastructure, e.g. roads, rail, culverts, bridges, new buildings. For example, aiming to enhance habitats for mammals rather than providing standard required mitigation and increasing the amount of mitigation in minor development, e.g. installing otter holts and bat boxes.
- Increase research on the effectiveness of mitigation in development
- Secure additional funding

**Otters in Staffordshire**

**Habitats & species:**

**Habitats:** Wetlands, rivers.

**Species:** Otter.



**Photos:** Otter (left), Derek Crawley/Staffordshire Mammal Group; Otter holt roof under construction (right), Derek Crawley/Staffordshire Mammal Group

**Key messages**

- Otter populations suffered drastic declines across in the UK between the 1950s and 1970s.
- A ban on the use of certain organochlorine pesticides in the 1980s led to improved water quality and had substantial benefits on aquatic environments, resulting in recovering otter populations.
- The installation of artificial holts further aided the recovery of otter populations in Staffordshire, and by 2007 otters could be found in all sub-catchments, canals and river-side towns in the county.

**Overview**

Otter were widespread in England from the last ice age up to the 1950s, but suffered drastic population declines from the 1950s to the 1970s. By the late 1970s, the UK's only healthy population of otter was found in Scotland, with small isolated populations in Wales and in the south and northwest regions of England.

Habitat loss and pollution were two of the main drivers of the decline; organochlorine pesticides, in particular dieldrin or 'sheep dip', accumulated in the food chain and led to large-scale mortalities. Otters were particularly affected as the toxins built up in the fatty deposits of animals such as eels, commonly eaten by otters, and as with other mammals, otters use up their fat deposits on an annual basis. In addition, female otters only have two litters on average during their lifespan and they only reach sexual maturity at 2 years of age, making the species more susceptible as populations take longer to recover from declines.

Otter was considered absent from Staffordshire by the early 1980s. Around this time the manufacture and use of dieldrin and related chemicals was banned resulting in increased water quality and increased fish stocks. Otter also received greater legal protection.

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**Partners**

Staffordshire Mammal Group, Staffordshire Wildlife Trust, Environment Agency and landowners

**Funding**

Funding comes from Staffordshire Mammal Group

## Objectives

- To further enhance otter populations within Staffordshire.
- To raise awareness of the plight of otters and gain community support for the conservation of the species.

## Approach

As river quality improved and the amount of pesticides in watercourses was reduced in the 1980's, otter populations started to increase. By the 1990s, surveys found otters in most Staffordshire catchments, but a lack of suitable resting and breeding sites was reported. In Staffordshire, a large number of artificial holts were built by many volunteer groups, notably Staffordshire Mammal Group, to replicate suitable resting and breeding sites for otters to use.

## Outcomes

In 2007, it was reported that re-colonisation of otter had continued faster than had been predicted and that the species was now present in all sub-catchments, canals and river-side towns in Staffordshire.

## Future work

Good water quality and bank side refuges are key to ensuring the species does not decline again. Regular monitoring needs to be continued so that changes in populations can inform conservation action. In addition, other threats such as road traffic mortalities, holt disturbance, crayfish traps, pollution from other sources and persecution still require attention.



**Photos:** Otter holt installation (left), Derek Crawley/Staffordshire Mammal Group; Otter tracks (right), Derek Crawley/Staffordshire Mammal Group

**Harvest mice**

**Habitats & species:**

**Habitats:** Grassland, hedgerows, wetlands (including reedswamp and drawdown zones)

**Species:** Harvest mouse



**Photos:** Harvest mice, Derek Crawley/Staffordshire Mammal Group

**Key messages**

- Harvest mice have been found at over 40 sites in Staffordshire.
- Over 100 people have been trained to carry out winter surveys to locate the vacated summer nests of harvest mice, both in the county and for a national survey.
- Once you have found your first nest, the second is easy!

**Overview**

Harvest mice are the smallest rodents in Europe and can be hard to see, but can become more noticeable around the time of year when crops such as wheat or barley are harvested, hence their name. The development of modern seed drills resulted in them sowing seeds too far apart for the harvest mice to be able to use the stalks of the subsequent crops for movement and nest building, and a resulting lack in records was observed; there is a recording gap between 1800 and 2002 with a single record from 1975. Although not thought to be extinct in Staffordshire at this time, the species was certainly overlooked. Staffordshire Mammal Group (SMG) formed in 2000 and concentrated on surveying for under-recorded species. Since many members had previously searched for harvest mice with no success, training in surveying for the species was also undertaken. The first SMG meeting to look specifically for harvest mice took place in 2002 at Aqualate Mere, and several were found in the first hour. Searching at subsequent meetings proved just as successful, and SMG currently have over 120 records at more than 40 sites.

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**Partners**

Staffordshire Mammal Group,  
Staffordshire Wildlife Trust  
and land owners

**Funding**

Staffordshire Mammal Group

## Objectives

- To survey and monitor harvest mouse populations in Staffordshire.
- To encourage land owners to maintain rank grassland and wetland sites for tall or tussocky vegetation.
- To train people to survey for vacated harvest mouse nests.

## Approach

Harvest mice are the only British mammal to build nests of woven grass well above the ground, and surveying for them is best done in late autumn and winter by searching for abandoned summer nests. To assist in survey efficiency, volunteers were trained in how to survey for nest sites at Doxey Marshes Nature Reserve; a site with easy access and a high population of harvest mice. The aim was to encourage people to carry out further surveys in their local areas. In addition, harvest mice surveys were prioritised through the SMG winter program and live trapping of harvest mice was also undertaken, partly to test this as a survey method, but also to help inspire the volunteers taking part.

## Outcomes

It is notoriously difficult for someone to find their first harvest mouse nest without the help of an expert, and it is often compared to finding a needle in a haystack. Despite this, the training and increased surveying effort resulted in harvest mice being recorded at over 40 sites in Staffordshire. Harvest mice nests are typically found in rank grasses such as reed canary grass and cocksfoot, and to a lesser extent in wavy hair-grass, soft rush, purple-moor grass, pond sedge and common reed. A couple of nests have also been found in elephant grass. Although a few harvest mice were caught in live traps, this was not deemed a reliable way to survey for the species.

## Future work

Staffordshire Mammal Group plans to continue monitoring harvest mouse populations and to undertake a complete tetrad survey for Staffordshire. In addition, there are plans to work with the Mammal Society to monitor the species and provide a training centre for other county mammal groups.



**Photos:** Vacated harvest mouse nest (left), Derek Crawley/Staffordshire Mammal Group; Finding a harvest mouse nest in heathland (right), Derek Crawley/Staffordshire Mammal Group

Staffordshire Bat Group

**Habitats & species:**

**Habitats:** Mixed, including woodland, scrub, grassland, wetlands, built environment, farmland.

**Species:** Bats.



**Photo:** Bat box checks carried out in April 2014, Vicky Worrall

**Key messages**

- Staffordshire Bat Group aims to offer advice, support and involvement of the community in bat related issues, including care, rehabilitation, education, training, and research.
- They also aim to increase knowledge about bats, their roosts and their important habitats throughout the county.

**Overview**

The Staffordshire Bat Group (SBG) was formed in 1990 and exist to increase knowledge, understanding and acceptance of bats through promotional activities and research. They also work with other bat groups and national organisations to further the cause of bat conservation.

SBG have a varied membership with a core of dedicated volunteers who undertake work for the group in their spare time. Activities include talks, walks, surveys, promotional work, bat care and rehabilitation, and training courses

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**Partners**

Staffordshire Wildlife Trust, Bat Conservation Trust, Staffordshire Mammal Group

**Funding**

Membership, voluntary donations, revenue from walks and talks and specific project funding.

## Objectives

- To engage with members of the public to increase knowledge and awareness of bats.
- To increase records of bats and their roosts throughout the county through care and rehabilitation.
- To increase records of bats and their roosts through a targeted approach, with a scientific basis.

## Approach

Records can be gathered randomly through the care and rehabilitation network. This can provide very specific records, detailing species, sex, maturity and often a confirmed roost. Volunteer Bat Roost Visits for Natural England that some of our members undertake also help to fuel the record collecting offering similar specifics to care and rehabilitation. SBG also endeavour to investigate some of these records further, as well as to create new records by undertaking projects throughout the county, e.g. bat box schemes at Cannock Chase, Consall and The Wolseley Centre.

## Outcomes

The results of these methods of record collection help to understand how bats are using areas within Staffordshire. The records can help to inform management plans, guide planning permissions, highlight core subsistence areas and important habitats for bats. This all helps to conserve and improve bats and bat habitat. SBG records also feed into national databases and research.

## Future work

SBG intend to increase the number of records in a drive over the next five years, by making records easier to submit for members of the public, local wildlife groups, consultants and enthusiasts. This is in addition to a county-wide project to increase acoustic data in areas where records are low or non-existent. This will be a citizen science project that will hopefully increase in momentum with time. These targeted records, along with ad hoc records, will be ultimately be used to initiate research projects for rarer species and to help inform management of wildlife sites across the county by working with land owners such as the Forestry Commission.



**Photo:** Wearing gloves is recommended for bat handling, Vicky Worrall

## 16. Plants

Authors: Sue Lawley (Independent expert), David Cadman (Staffordshire Wildlife Trust) and Ian Hopkins (Independent expert) with contributions from Ian Trueman (Independent expert), Ali Glaisher (Staffordshire County Council) and Bernadette Noake (Staffordshire Wildlife Trust).

### Plants headlines

#### Overview

This section includes flowering plants, ferns, conifers and stoneworts. Mosses and liverworts are not covered.

#### Key Species

Staffordshire Biodiversity Action Plan (SBAP) species include: Dyer's greenweed, hybrid bilberry, floating water-plantain, grass wrack pondweed and native black poplar.

#### Headlines

- There are nearly 2,200 species, subspecies or hybrid plant species recorded in Staffordshire (Hawksford, 2016), compared to 4,273 in the UK (Kent, 1992).
- Of the species, 50 are Priority Species and 15 are protected (SER, 2016).
- Species of brownfield habitats have increased since the 1970s.
- Analysing data on the distribution of species between the mid-20th Century and late 20th / early 21st Century indicates that plants of natural habitats such as ancient woodlands, flower-rich grasslands and moorlands have declined.

#### Key threats

- Land use change, including unsympathetic/unsuitable management (e.g. cutting regimes of verges/hedgerows, lack of woodland management meaning loss of ground flora species).
- Isolation and loss of habitats, particularly through more intensive agricultural production.
- Climate change.
- Land drainage and modification of watercourses.
- Invasive species.
- Changes in legislation and agri-environment schemes.
- Pesticides, herbicides and pollution.
- Declines in pollinating insects.
- Nitrogen deposition due to agriculture, power generation and transport.

#### Successes

- Himalayan balsam control is seeing positive results across the county.
- Snake's head fritillaries at Broad Meadow Local Nature Reserve.

#### Recommendations

- Protect remaining habitat.
- Encourage good conservation management.
- Restore damaged habitat and create new areas using local seed sources such as from green hay.
- Expand existing projects that are creating and restoring new habitats.



## 16.1 State of plants in Staffordshire

### 16.1.1 Overview

Plant figures	Amount
Number of species, subspecies or hybrid plant species	2,200
Number of Priority Species	50
Number of protected species	15

**Table 1. Number of important plant species in Staffordshire.**

**Key species:**  
Staffordshire Biodiversity Action Plan (SBAP) species include: Dyer's greenweed, hybrid bilberry, floating water-plantain, grass wrack pondweed and native black poplar.

Plants form the basis of the food chain and for many animal species they also provide shelter, e.g. from grass stems for overwintering butterflies to tree roots forming otter holts along rivers. Staffordshire is centrally located in the UK and therefore has few nationally rare species; rarities are usually restricted to the south or north. Exceptions include species of the Meres and Mosses such as cowbane, floating water-plantain on canals and canal reservoirs, yellow bird's-nest in willow scrub, and some species, like bee orchid, that have become associated with post-industrial habitats.

The distribution of plant species across Staffordshire reflects the changing nature of land use and management. Across Staffordshire losses have been seen across many plant groups associated with more undisturbed habitats. The increase of land managed under intensive agricultural practices and the spread of urban areas has changed the suite of species typically seen across Staffordshire, with species more resilient to disturbance and the change in environmental conditions brought about by human activity replacing historical suites of species typical of the early 20th century. Even within shorter time scales changes in species associated with activities such as arable farming has produced losses in native arable weeds as farming has become more efficient (see farming chapter).

The sites that continue to support some of our rarer species are at threat from a number of issues not limited to; fragmentation of natural habitats by intensive farming land use, urban spread and activities such as quarrying, inputs to the environment which are a product of human activity such as diffuse pollution and leaching of fertilisers and pesticides and change from traditional management practices to intensive or lack of management.

Restoration projects targeting the recreation of Priority Habitats have produced some gains in increasing plant species associated with these more vulnerable habitats. However whilst it is possible to recreate a target community, sometimes species which typically occupy a narrow niche with specific habitat conditions are more challenging to transfer.

There are concerns over hybridisation of non-native species with native species as in the case of the English bluebell where the more voracious hybrid bluebell is expanding its range, particularly near to urban areas due to cross pollination with the Spanish bluebell. Other native species such as Indian balsam can become dominant along sections of water course, within wet woodlands and in fen meadows, where they threaten native species assemblages.

Some important sites for rare plants include Chartley Moss for sundew, cranberry and bog rosemary; Motte Meadows for snake's-head fritillary, meadow thistle and saw-wort; Thorswood for greater butterfly orchid and Allimore Green Common, Smooth cat's-ear found on the sandy soils in Kinver.

Recording efforts continue to produce new, or 'returning' plant species records every year. The Botanical Society of Britain and Ireland (BSBI) keeps a record of notable plants seen in the county and annual reports produced, list confirmed sightings. In the last few years species such as stiff saltmarsh grass have appeared in a historic inland saltmarsh near Tixall where it has not been seen since 1923, since the most recent edition of The Flora of Staffordshire was produced in 2011 herb-Paris has been recorded in tetrads where it has not previously been noted. It is unlikely that these species have spread to these places recently, rather that they had previously been overlooked. The BSBI keeps a record of species which are new to the county some of which have expanded their range into Staffordshire or may have been introduced inadvertently or through planting such as grain aliens introduced near to brewery sites e.g. Indian knotgrass on Bass waterside which is its only known UK population. Many of these new county records are associated with brownfield sites. The nectar source provided by species colonising brownfield sites are an important resource for invertebrates in urban areas.

### 16.1.2 Habitat changes

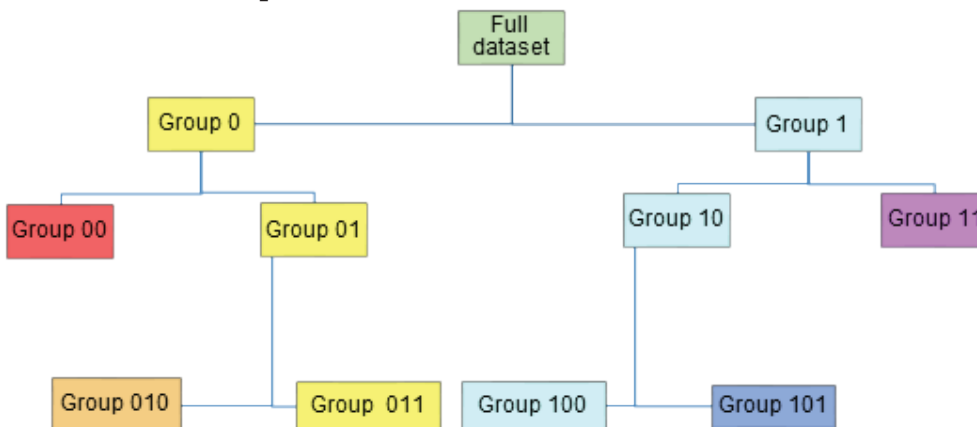
As habitats are usually defined by their plant composition, changes to habitats described elsewhere in the report also reflect changes to plants, and vice versa; most plant species are dependent on their place in a particular habitat, e.g. ragged robin in wetlands or bluebells in woodlands. Therefore, in addition to the changes outlined in individual habitat chapters and the habitat change chapter this chapter will focus on an analysis of the two major botanical recording efforts of the last 80 years.

The distribution of botanical species and the changes in this over time provide an indication of the changing state of habitats and their support of fauna such as invertebrates, birds and mammals. In order to analyse changes in the flora of Staffordshire, and therefore habitats, data from the two Floras of Staffordshire was analysed. The Floras are based on extensive field surveys over two periods of time; Edees' Flora covered the period 1930-1970 (Edees' text indicates that the majority of records were from the period 1956-70) (Edees, 1972), while the more recent Flora covered the period 1995-2011 (Hawksford *et al.*, 2011).

In order to compare the data, only species that were recorded by Edees were used, so the analysis is not influenced by the appearance of new species, often 'neophyte' species of urban areas that have recently arrived in the UK and are spreading north. Instead the following report focuses on the changes in the distribution of flora species present in Edees Flora up to 1970 rather than changes that are due to more recent introductions.

Data from Edees' Flora of Staffordshire and from The Flora of Staffordshire (1995-2011) were compared using the computer program TWINSpan (Hill, 1979). Both datasets are based on the same 2km grid squares (tetrads).

**Staffordshire Flora Analysis** – changes in species compositions between Flora publications, 1930-1970 data compared against 1995-2011 data  
Introduction / Summary of Methods

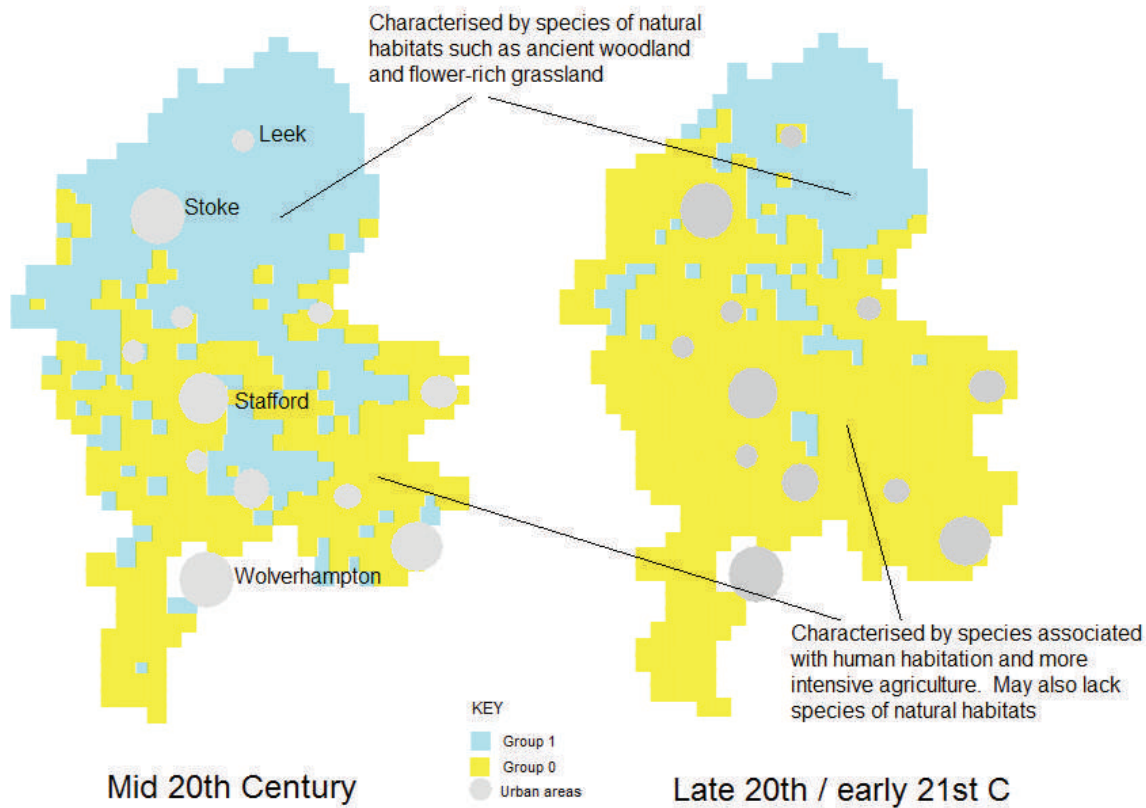


**Figure 1 - Diagram showing the hierarchy of the groups of species divided during the analysis (groups shown in Figures X to X and explained in more detail in the text in the following section. See Figure X in the Methodology, chapter X for the detailed dendrogram listing species in each group.**

## Results and discussion

### First division of the data

In the first step in the analysis the TWINSPAN programme clearly differentiated plants of well-established semi-natural habitats such as ancient woodlands, flower-rich grasslands and moorlands (Group 1) from species associated with cultivation and human habitation (Group 0). Figure 2 shows the Group 1 tetrads representing species of the well-established semi-natural habitats were much more widespread in Edees' time.



**Figure 2 - Distribution map of Group 0 and Group 1 tetrads in Edees Flora (left) and the modern Flora (right) - Comparison of the distribution of plant species characteristic of natural habitats (in blue) and those characteristic of human habitat and more intensive agriculture in the mid-20th Century (left) to the late 20th / early 21st Century (right)**

When comparing the modern Flora map with the Edees Flora map in Figure 2, it is evident that there is a clear contraction of Group 1 species of the semi-natural habitats in the later period around the Cannock Chase plateau, the Needwood Forest (mid-west) and in the northwest area around Burnt Wood and Maer Hills. It is not possible to be sure that this is due to habitat loss as the datasets are simple presence/absence species lists for large areas (2 km squares), however it is a strong indication that the modern flora of the county is very different to that of the mid 20th century and that semi-natural habitats are decreasing overall.

It is also interesting to note that Stoke and Cannock belonged to the richer Group 1 in the Edees map, suggesting that richer habitats pervaded the urban areas, at least at a tetrad level of differentiation, prior to 1970. It is also possible that some typical "urban" species such as Oxford ragwort *Senecio squalidus* had not yet spread as far north as Stoke by 1970.

The areas around Group 1 tetrads in the modern county probably represent reservoirs of habitat that could form the basis of landscape-scale habitat restoration.

## Second division of the data

In the second step of the analysis, the program undertakes a new analysis to divide each group from the first step into two sub-groups: Group 0 becomes Groups 00 (red) and 01 (yellow), and Group 1 becomes Groups 10 (light blue) and 11 (purple) (Figure 1).

As demonstrated in Figure 3, Group 00 does not appear in Edees at all and is characterised by species that are usually found in urban areas such as Canadian fleabane *Conyza canadensis* and shining crane's-bill *Geranium lucidum*. The latter species is naturally found on limestone, but in recent years it has become a species associated with gardens. Group 01 lacks these 'core urban' species and is probably characteristic of a combination of human habitation and more intensive agriculture.

Group 11 (purple) covers the part of the county characterised by limestone (including the Hamps, Manifold and Dove Valleys in the northeast), and this area appears roughly the same for both periods of time. Group 10 shows the areas of species-rich habitat in the county outside of the limestone areas, which has decreased between the two time periods alongside the growth of habitats modified by urbanisation and agriculture (Groups 00 and 01) (Figure 3).

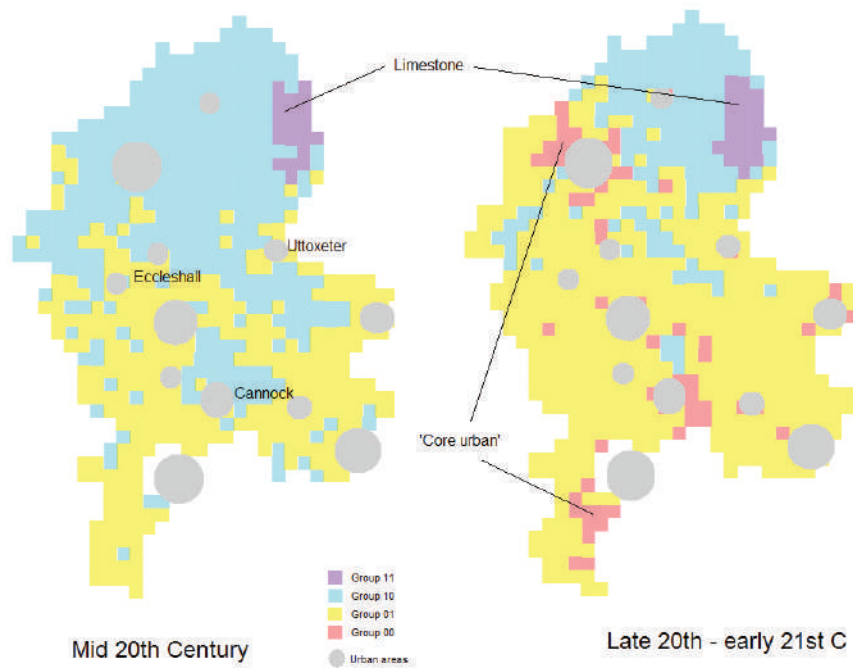


Figure 3 - Map showing subdivisions of Group 0 and Group 1

## Third division of the data

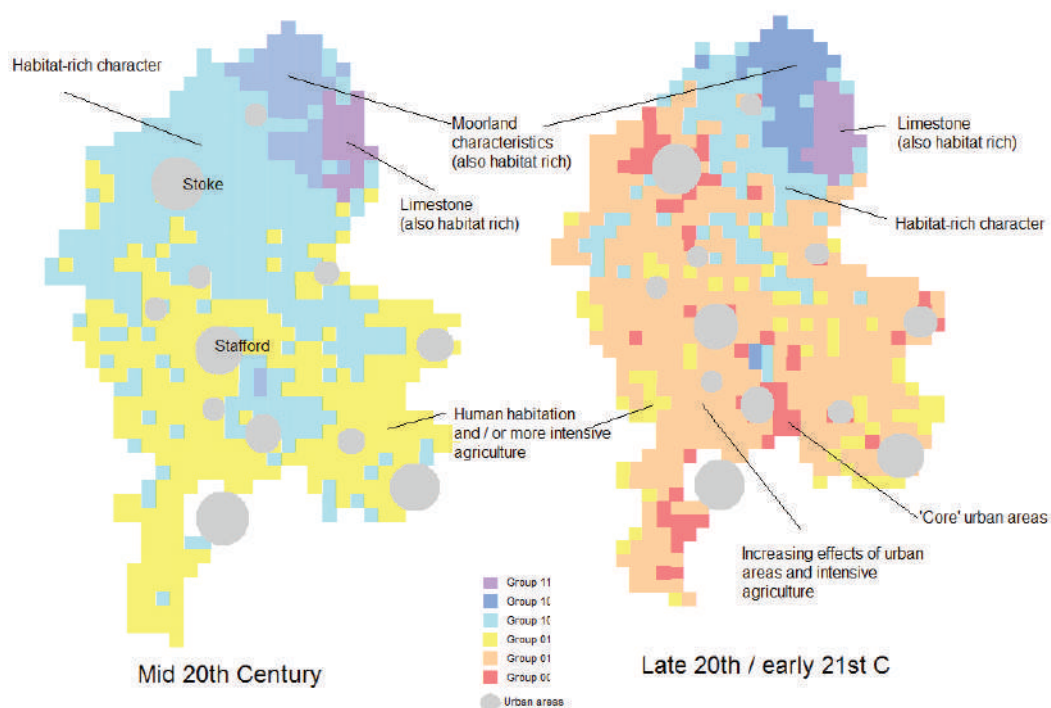
The next step of the analysis provides a further division of the four groups seen in Figure 3, and produces additional points of interest:

In the 'agriculture and human occupation' part of the county (Figure 3, Group 01, yellow) the analysis shows a strong difference between the two Flora periods, with the modern Flora predominantly Group 010 (Figure 4, orange) but the Edees Flora entirely Group 011 (yellow). Divisions at this level can be difficult to interpret; in this case the program lists no characteristic species for Group 011. Species typical of the new orange squares (Group 010) include: those of habitation such as Danish scurvygrass *Cochlearia danica*, tansy *Tanacetum vulgare* and comfrey *Symphytum officinale* & *S. x uplandicum*; species that are often planted such as wild privet *Ligustrum vulgare*, bird cherry *Prunus padus* and wild cherry *Prunus avium*; and, unexpectedly, species of ancient woodland species such as wood anemone *Anemone nemorosa*, and remote sedge *Carex remota*.

It appears that these areas of the county are becoming more urbanised and that planting initiatives (e.g. the Newcastle Countryside Project, Forest of Mercia, The National Forest) have had an impact. It is difficult to say why some of the species of ancient woodlands appear to have increased in these areas, although there has been some introduction of them into new planting schemes and some may also have naturally spread into these areas.

In Group 10, the habitat-rich part of the county outside the limestone, the moorland of the Leek Moors and Ipstones Edge stands out (Group 101, darker blue) and these characteristics are shared with two squares of Cannock Chase.

It can also be seen that the effect of urbanisation around a number of conurbations is becoming more pronounced.



**Figure 4 - Comparison map of characteristics of Staffordshire between mid 20th C and late 20th- early 21st C as shown by analysis of botanical data**

NB In this final map subdivisions of Groups 11 and 00 are not shown

### Conclusions / Discussion

The analysis of the datasets highlight a number of significant trends:

- The strongest change from the mid 20thC to the late 20th/early 21stC is that there has been a clear geographical contraction of areas characterised by species of semi-natural habitats towards a core area in the northeast of the county with isolated habitat parcels elsewhere such as the Cannock Chase heathlands, Needwood woodlands and the group of woodlands in the west of Stafford and Newcastle Boroughs.
- Areas where species of semi-natural habitats are still prevalent are potential core areas for landscape-scale habitat restoration, because the presence of these species indicates that they may form the 'building blocks' for habitat expansion.
- Species characteristic of urban areas now shape the botany of tetrads around Stoke, Newcastle, Cannock and Wolverhampton, and to a lesser extent, Burton and Lichfield. The current analysis is likely to considerably under-represent this trend (due to the exclusion of many new (neophyte) species from the analysis in order to maintain parity between the two Flora period datasets).
- Most of the lowland county shows the effects of increasing urbanisation and agricultural intensification.

The Flora analysis does not clearly represent the presence of a number nature reserves, SSSIs, Local Wildlife Sites and Country Parks outside core habitat areas. It is difficult to ensure that the diversity and quality of such isolated places is maintained. Appropriate management, such as the right mowing or grazing regime, and woodland management is crucial. It is certainly important that floral diversity of such places is regularly monitored to see how the various plant species respond to habitat management and then to act accordingly. Loss of species from an isolated plot is a well-known feature of the ideas of "island geography" and care must be taken to try to ensure that any management scheme is not inadvertently contributing to species loss



Herb paris



Frog orchid

## 16.2 Threats

### Generic issues that apply (see Appendix A for more detail)

**Numbers 1 - 18;** dominant species control, pollution, nutrification, runoff (roads, land uses, chemicals), lack of grazing/under grazing, overgrazing, access / disturbance, habitat fragmentation and severance, resources, nitrogen deposition, neglect, inappropriate management, intensive agriculture, habitat loss, land drainage, invasive non-native species.

### Additional specific issues for plants

- Land use change, including unsympathetic/unsuitable management (e.g. cutting regimes of verges/hedgerows, lack of woodland management leading to excessive growth and shading which can result in the loss of ground flora species).
- In Staffordshire the greatest threat to plants is habitat loss and isolation of habitats due to agricultural change, for example flower-rich grassland lost to more intensive production such as arable or silage.
- Climate change.
- Land drainage and modification of watercourses.
- Invasive species.
- Changes in legislation and agri-environment schemes.
- Pesticides, herbicides and pollution.
- Declines in pollinating insects.
- Increasing nitrogen deposition from various sources including dog and horse fouling (particularly noticeable on Cannock Chase where large grasses and nettles are becoming more frequent), but also from power generation, car exhausts and agricultural run-off that affect roadside flora and water.

## 16.3 Conserving plants – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues which have been described in the issues section. Some of these are highlighted in the case studies below:

### CASE STUDIES

Case studies elsewhere in the report relevant to plants:

- Chasewater and the Southern Staffordshire Coalfield Heaths SSSI (designated sites chapter)
- 25 years of The National Forest (woodland and trees chapter)
- Booming Stoke (grassland chapter)
- Friends of Motte Meadows (grassland chapter)
- Restoring species-rich grassland at Cauldon Quarry (grassland chapter)
- Heathland restoration at Kinver Edge (lowland heathland chapter)
- Connecting Cannock Chase (lowland heathland chapter)
- Heathland restoration at Barlaston & Rough Close Common (lowland heathland chapter)
- Brund Hill Plantation (moorland chapter)
- Low intensity mixed grazing at The Roaches Nature Reserve (moorland chapter)
- Wetland Restoration - Perkins Engines Limited (wetlands chapter)
- Friends of the Wom Brook (wetlands chapter)
- Burton-upon-Trent i-Tree Project (built environment chapter)
- Motte Meadows Rural Sustainable Drainage Systems (RSuDS) (farming chapter)
- Redhill Business Park (amphibians and reptiles chapter)
- Burntwood Milestone Way Strategic Development Allocation (area chapter)
- Habitat network mapping in the Churnet Valley (why is nature changing & what needs to happen chapter)
- Whittington Heath Golf Course, HS2 Phase 1 Biodiversity Offset Scheme (why is nature changing and what needs to happen chapter)

Case Study 1 – Himalayan balsam control (Authors and contributors: Lucy O’toole, Jeff Sim)

Case Study 2 – Snake’s head fritillary population at Broad Meadow LNR, Tamworth (Authors and contributors: Shelley Pattison)

Case Study 3 - Woodland Wildflower Project, Forest of Mercia 2001 - 2005 (Authors and contributors: Kate Dewey)

In addition to the case studies above, there are more examples of positive work that is of benefit to plants and their habitats in Staffordshire. These include:

- Clive Farm, near Wolverhampton, is an excellent example of profitable farming and wildlife conservation. The farm is predominantly arable with grassland grazed by livestock. The farm has been in HLS since 2012, which has enabled sympathetic management. Pollinators benefit from beetle banks, field margins and pollen and nectar flower mixtures. Bird counts are carried out by the landowner with species including lapwing, corn bunting and grey partridge.
- The creation of new flower-rich habitats, such as through the Churnet Valley Living Landscapes Partnership.

## 16.4 Conserving plants – recommendations

### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M1 – M9; M13 - M17; DM1 - DM5:** Improve the following: increase habitat size and connectivity; increase bare ground habitat; manage for structural habitat diversity; increase resources; ensure appropriate grazing; improve planning and use of chemicals; implement Sustainable Drainage Systems (SuDS); innovative management of recreation pressures; consider potential recreation impacts on habitats and species when planning management; more integrated planning and management of sites across ownership boundaries; survey and monitoring; instate suitable mowing regime; manage hedgerows by rotational winter cutting; manage woodlands for age and habitat diversity; increase research; agri-environment schemes; habitat creation through the planning system; increase uptake of grants; guidelines for planners; large-scale habitat creation projects.

### Additional specific recommendations for plants

- Protect remaining habitat.
- Encourage and increase awareness of good conservation management.
- Restore damaged habitat and create new areas using local seed sources such as from green hay.
- Expand existing projects that are creating and restoring new habitats.
- Utilise plants in Sustainable Drainage Systems.

## State of Staffordshire's Nature Report - Case Study Number 1

### Himalayan balsam control

#### Habitats & species:

**Habitats:** Schwingmoor bog / mere.

**Species:** Flora: cranberry, round leaved sundew, cotton grass, heather, cross leaved heath, sphagnum sp.



**Photo:** Himalayan balsam

#### Key messages

- Himalayan balsam became established at Cranberry Bog due to the presence of a seed source in the soil (Himalayan balsam most often spreads along watercourses).
- With the lack of a watercourse bringing in new seed, continued pulling and monitoring has led to a distinct reduction in Himalayan balsam on the site, with the potential for complete eradication.



<p>Interest (SSSI) and RAMSAR site. The Staffordshire Wildlife Trust owned nature reserve is one of a series of depressions caused by retreating ice sheets that once covered parts of Staffordshire, Shropshire and Cheshire.</p>	<p><a href="mailto:lotoole@staffs-wildlife.org.uk">lotoole@staffs-wildlife.org.uk</a> Staffordshire Wildlife Trust</p>
<p>Cranberry bog is an example of a schwingmoor basin mire. It still has open water (mere) at one end and is surrounded by a ditch that links it to Black Firs across adjacent farmland.</p>	<p><b>Partners</b> Staffordshire Wildlife Trust</p>
<p>It is understood that in the 1970s Himalayan balsam, a non-native invasive species, was planted on private land surrounding Cranberry Bog. The water levels in the ditches led to the spread of the balsam seed and the sensitive nature of the site and limited access have made controlling the Himalayan balsam challenging.</p>	<p><b>Funding</b> This reserve is in a Higher Level Stewardship (HLS) scheme, and has been since 2008. An invasive species control supplement from Natural England is also received as an annual payment.</p>
<p><b>Objectives</b></p>	
<ul style="list-style-type: none"> <li>• To eradicate Himalayan balsam from the site through pulling the plants out and monitoring it.</li> <li>• Engage with adjoining landowners to gain access and increase awareness of the issue.</li> </ul>	
<p><b>Approach</b></p>	
<p>Himalayan balsam is a highly invasive non-native plant that can dominate habitats and out-compete native species. It is also an annual plant, therefore if new seed production can be prevented, the quantity of viable seeds dormant in the soils will reduce over time. Since 2008 and after entering the HLS agreement, it has been part of the management plan at Cranberry Bog and Black Firs nature reserve to visit the site and carry out annual pulling of Himalayan balsam prior to the plants flowering and producing seed. The work fits into the practical habitat management work on reserves schedule and is carried out with the help of the reserves volunteer team. The balsam is generally pulled by hand, but brushcutters have been used in the past on large areas. As the plants have the ability to re-root from cutting, it is important to keep the entire plants off the ground after they have been pulled.</p>	
<p><b>Outcomes</b></p>	
<p>Pulling balsam is continuing to show a very noticeable reduction in plant numbers year on year with very little now found in the neighbouring fields and ditches, thanks to a combination of pulling and grazing keeping vegetation levels low. In terms of the number of volunteer days required to perform the management, this has been reduced for 3 days and 26 volunteers in 2010, to 1 day and 11 volunteers in 2016.</p>	
<p><b>Future work</b></p>	
<p>Continued hands on management and monitoring are required to ensure the Himalayan balsam remains under control and will meet the target of total eradication.</p>	

Snake's head fritillary population at Broad Meadow LNR, Tamworth

**Habitats & species:**

**Habitats:** Lowland meadow.

**Species:** Snake's head fritillary.



**Photo:** Volunteers counting snake's head fritillaries at Broad Meadow Local Nature Reserve, Shelley Pattison

**Key messages**

- Broad Meadow is one of only two sites of naturally occurring snake's head fritillary in Staffordshire
- Records go back to the 1950s, but it is estimated the population could have existed since 1790
- Management using a regime of cutting and grazing has benefitted the site

**Overview**

Broad Meadow Local Nature Reserve (LNR) is a 22.5 hectare (ha) site that was originally designated a Site of Biological Importance (SBI) (also known as a Local Wildlife Site) in 1979, and remains so to the present day.

It is one of 7 Local Nature Reserves in Tamworth. It is owned by Tamworth Borough Council (TBC) and managed by a group of community volunteers through the Wild About Tamworth (WAT) project, a partnership between TBC and Staffordshire Wildlife Trust (SWT).

Conservation management began in 2014 when TBC took ownership of the site and grazing was introduced in 2016.

**Contact**

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SWT  
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**Partners**

The Wild About Tamworth project is a partnership between Tamworth Borough Council, Staffordshire Wildlife Trust and the local community

**Funding**

The project is primarily funded by Tamworth Borough Council. Additional funding has been provided by Tesco/Groundwork, Tame Valley Wetlands Partnership, UPS and others.

## Objectives

- To increase snake's head fritillary numbers.
- To bring 22 ha of grassland into active management.
- To support the development of a sustainable community volunteer group to manage the site.

## Approach

A project officer has been employed by SWT since 2004 to deliver the WAT project. The officer supports groups of local people in managing their local TBC owned sites. Together the volunteers, officer, SWT and TBC develop a management plan agreement for the sites to be carried out. The officer also assists the groups with grant applications to obtain funding to help site management and trains them in practical conservation and volunteer management skills so they can continue to manage the sites. The WAT project became involved with the conservation management of Broad Meadow LNR started when TBC took ownership of the site in 2014.

## Outcomes

The initial conservation management of Broad Meadow has seen positive results, with less scrub and undesirable flora present on site compared with when management began. Snake's head fritillary numbers remain stable, with a small increase over recent years. A small group of committed volunteers regularly attend the task days to carry out practical works on site and the public awareness of the site has increased.

## Future work

Future management plans on Broad Meadow LNR include scrub control, restoration of the ditch network and restoration of grassland for target features. As a LNR, plans also include improvements to access and interpretation and increased numbers of education and community events. Increased self-sufficiency of the group is also to be developed.



**Photo:** Snake's head fritillary, Anna Maxwell

Woodland Wildflower Project, Forest of Mercia 2001 - 2005

**Habitats & species:**

**Habitats:** Mature semi-natural woodland, young plantation woodlands.

**Species:** Woodland flora: bluebell, wild daffodil, yellow archangel, ramsons, red campion.



**Photos:** New native daffodil patch (far left); bluebell seed collecting (left); Sevens Road – unsown (right); Sevens Road sown after 4 years (far right), SWT

**Key messages**

- Seeds and cuttings were collected from 18 mature donor sites and spread into 11 young woodland receptor sites
- 347 volunteers and children were involved in 23 events including walks, seed collection and sowing
- Most species readily established natural-looking carpets in a few years under the right conditions

**Overview**

Most young woodlands have low flora diversity compared to mature habitat, as woodland flora species are very slow at colonising even when present nearby. The project aimed to develop an effective strategy for the introduction of appropriate wildflowers into new woodlands in the Forest of Mercia area, involving as many local people as possible in their enhancement and care, and to create attractive, diverse wildlife habitat.

Landlife specialise in creating new wildflower landscapes, particularly in urban areas, and have pioneered many new methods of working. They worked with the 12 community forests across England, set up to help regenerate communities and degraded landscapes, and other local delivery partners such as The Wildlife Trusts. The Forest of Mercia covers 92 square miles (23,000 hectares) near Cannock, including parts of Lichfield, South Staffordshire and Walsall districts.

**Contact**

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**Partners**

Landlife  
Forest of Mercia  
The Countryside Agency  
Local Heritage Initiative

**Funding**

The Countryside Agency  
Local Heritage Initiative  
Esmée Fairbairn Foundation  
Nationwide Building Society

## Objectives

- Identify and prepare suitable receptor woodland sites, and find diverse local donor sites
- Involve the community, schools and other groups in learning about, collecting, sowing and enjoying woodland flowers
- Establish new native wildflower areas visible to the public
- Enhance young community woodlands for wildlife and amenity value

## Approach

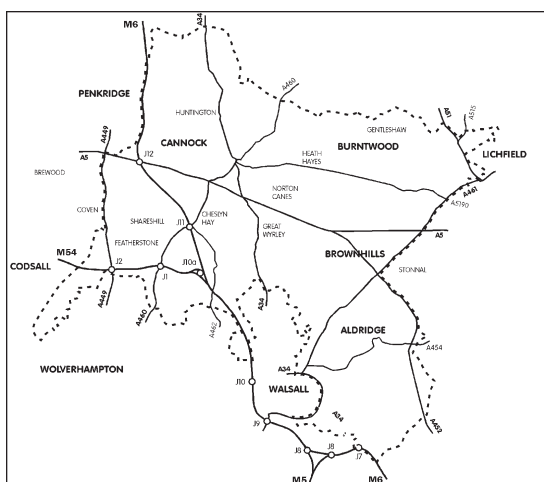
A project officer at Staffordshire Wildlife Trust (SWT) worked with staff at the Forest of Mercia to deliver the work. The Forest of Mercia led on site preparation with their New Deal team and SWT led on the organisation of events, press and the public. Some events were tailored to specific groups that contacted the project. Seeds of common species were collected from a range of donor sites following best practice methods, and sites were prepared by raking a bare seed bed; any grass was treated with herbicide in advance.

## Outcomes

347 volunteers and children were involved in the project, with 432 attendances overall, involving members of the public, schools, and childrens' groups. 23 events were held including woodland walks, seed collection, seed sowing/ planting, and a school visit. Material was collected from 18 donor sites and spread into 10 young woodlands and one hedgerow receptor site. Bare ground without grass was essential, and areas with canopy closure worked best, as did sowing/ planting a mixture of species rather than single species. Creeping plants propagated well from cuttings, whilst bluebells and wild daffodils flowered after 4 and 6 years respectively.

## Future work

Monitoring and some visits to share best practice were undertaken after the project ended, but to our knowledge there has been no specific follow-up to this project. SWT and Forest of Mercia continue to carry out some woodland flora planting in other projects and the woodlands continue to provide benefits to the local communities. The amenity value, community involvement, use of local plant material and good results of this project show there are great opportunities to enhance the huge areas of newly created woodlands in the county. Monitoring the effects on insects and assessing the woodlands for Local Wildlife Site status are recommended.



**Figure 1.** Map of the Forest of Mercia area. **Photo:** Walk at Piggotts Bottom ancient woodland, SWT

# 17. Fungi

Authors: Keith Bloor (Staffordshire Fungus Group)

## Fungi headlines

### Overview

Fungi are distinct organisms belonging to a separate kingdom than both plants and animals. As well as the familiar 'mushrooms' and 'toadstools', fungi include 'moulds', yeasts and plant and animal pathogens. They are the main recyclers of nutrients and decomposers of organic materials and can be found across Staffordshire.

### Key species

Pink waxcap, brown birch bolete, beautiful bonnet, dusky bolete

### Headlines

- A total of 1,669 species of fungi and slime mould have been recorded to date in Staffordshire, equating to around 10% of the species found in the UK (Staffordshire Fungus Group, 2016). Of these, two are Priority Species and one is legally protected (SER, 2016).

### Key threats

- Habitat loss and changes in management, particularly woodlands and grasslands.
- Habitat fragmentation.
- Loss of veteran trees.
- Potential loss of key sites due to HS2.
- Climate change.
- A lack of information due to very limited capacity to carry out surveys.

### Successes

- 27 new sites were identified in the county for the pink meadow-cap, characteristic of traditionally managed grasslands, during recent surveys.

### Recommendations

- Establish and maintain beneficial management practices to increase populations. In key woodlands increase the amount of fallen deadwood, retain stumps and reduce the loss of veteran trees.
- Carry out surveys for development proposals that may affect key species or sites.
- Improve knowledge by ensuring regular monitoring at key sites, identifying new sites and the management of fungi data.
- Increase awareness and identification skills by holding workshops.

## 17.1 State of fungi in Staffordshire

### 17.1.1 Overview

Fungi figures	Amount
Number of fungi and slime moulds in Staffordshire (Staffordshire Fungus Group, 2016)	1,669
Number of Priority Species	2
Number of protected species	1

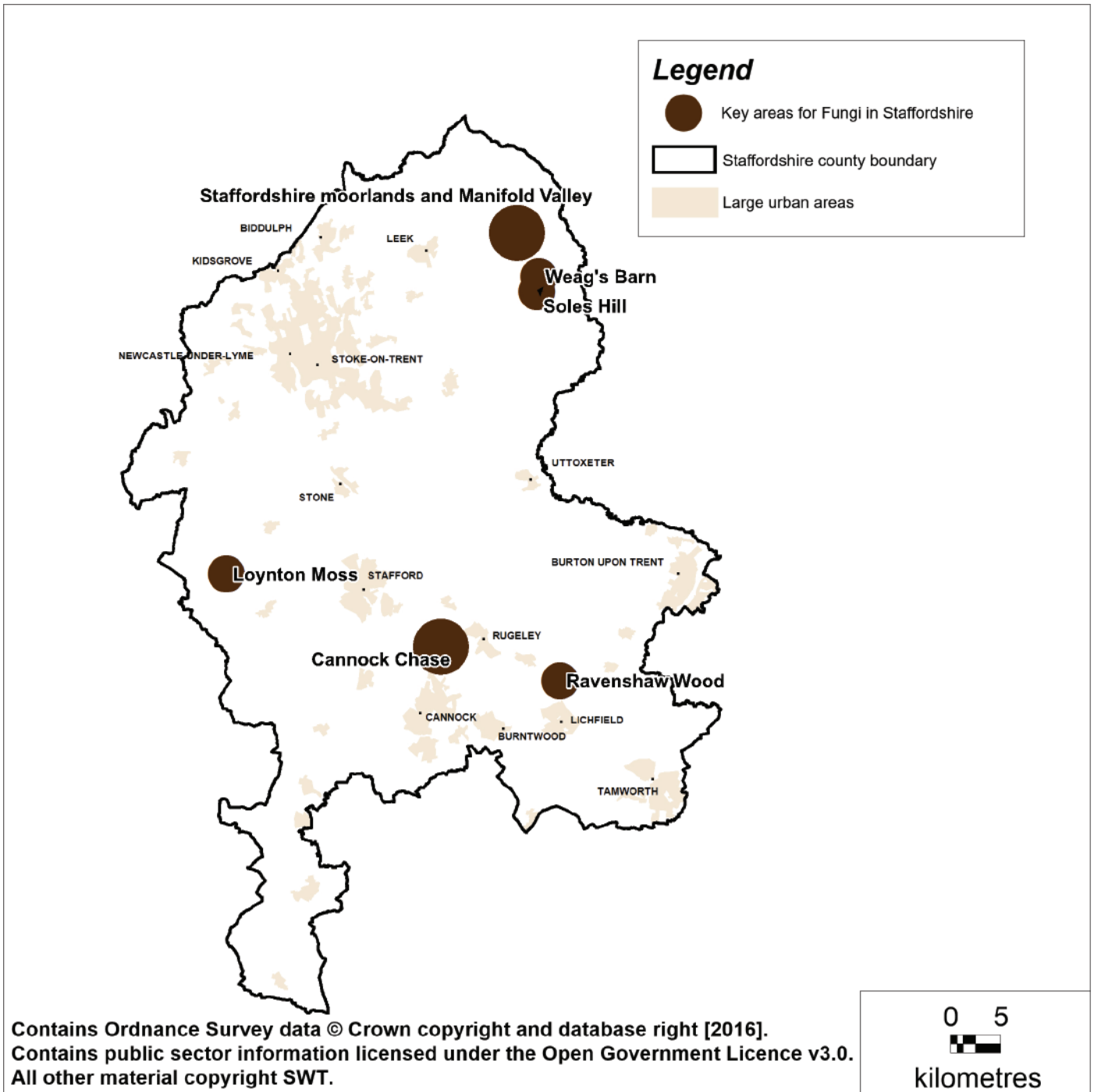
**Table 1. Number of important fungi species in Staffordshire.**

**Key Species:**  
Staffordshire BAP species: pink waxcap  
UK BAP & NERC Schedule 41 species: beautiful bonnet  
Red List for Threatened British Fungi species: brown birch bolete & dusky bolete

Fungi are distinct organisms that are not plants or animals. They feed on plant, animal and microbe cells, tissues and bodies, and not only include mushrooms, but also moulds and yeasts. Fungi are key components of nature and are extremely important to the natural world and human society. They play an essential role in breaking down dead materials such as branches and leaves. Some fungi live in the roots of plants such as trees and orchids, without which they would not survive. Some fungi are important pathogens of plants and animals, including humans, and others can cause commercial losses in agriculture and forestry. Fungi are important to both the conservation of other organisms that depend on them and to man, being of great economic benefit in providing food and medicines, and helping produce chemicals.

The status of fungi within Staffordshire is poorly understood due to a limited capacity to record them; they are sometimes considered difficult to study and there is limited awareness of them. Consequently, distribution reflects more the distribution of recorders and recording activity rather than the true distribution of species. However, fungus forays are now organised throughout the year to increase monitoring at key sites and Staffordshire Fungus Group aims to evidence all species new to the County by depositing voucher specimens in the herbariums of The Potteries Museum & Art Gallery, with some specimens being held at the Royal Botanic Gardens Kew or Royal Botanic Garden Edinburgh.

Staffordshire's fungi are in great need of conservation and are becoming part of the broader conservation agenda within the County. Current key areas and sites for fungi in Staffordshire include Cannock Chase, Loynton Moss, Ravenshaw Wood, Weags Barn, Soles Hill and a number of sites in the Staffordshire Moorlands and Manifold Valley.



**Figure 1: Key areas for fungi in Staffordshire**

### 17.1.2 Population trends

The status of fungi within the Staffordshire is poorly understood as capacity to record them is limited. However, the main threats causing changes in populations of fungi are habitat loss, loss of veteran trees and changes in management regime, e.g. of grassland sites. Some species have expanded their range northwards into the county such as common porecrust, and others have been recorded at a greater number of sites, although this is probably due to increased awareness and recording effort, such as with pink waxcap.



### 17.1.3 Key species changes

#### Pink waxcap *Hygrocybe calyptriformis*

An increase in recording effort led to the identification of an additional 27 sites where pink waxcap occurs in Staffordshire. The species tends to be found in old, short grasslands such as pastures, lawns or churchyards.



#### 17.1.4 Habitat condition

Fungi can be found in all habitat types in Staffordshire with woodland and unimproved/ semi-improved grassland being especially important for species diversity. Semi-natural grasslands can be particularly rich in fungi, including the very colourful waxcaps (*Hygrocybe* spp.) with their green, crimson-red and yellow fruiting bodies as well as the pinkgills (*Entoloma* spp.), fairy clubs and earthtongues. Such groups or assemblages of species have been used as indicators of grassland quality (McHugh *et al.* 2001) as they are sensitive to the presence of agricultural fertilisers. Heathland also supports distinctive species.

### 17.2 Threats

#### Generic issues that apply (see Appendix A for more detail)

**Numbers 7-10, 14-16;** lack of grazing/under grazing, overgrazing, access / disturbance, habitat fragmentation and severance, inappropriate management (e.g. woodland, grassland), intensive agriculture (fertiliser application), habitat loss.

#### Additional specific issues for fungi

- Habitat loss and changes in management, particularly woodland and unimproved/ semi-improved grassland of nature conservation value.
- Possible decline in fungus species associated with grasslands at some sites.
- Loss of veteran trees.
- Potential loss of key sites due to HS2.
- Climate change.
- Very limited capacity to carry out systematic surveys across the County.

### 17.3 Conserving fungi – successes

There are a number of examples of projects that are underway that are attempting to address some of the issues that have been described in the issues section. These include:

The formation of Staffordshire Fungus Group in 1994 as a specialist group of Staffordshire Wildlife Trust to foster an awareness of the need to conserve fungi and their habitats and to increase recording activity.

Increased survey effort for the pink waxcap, *Hygrocybe calyptriformis*, identified 27 new sites in the County.

The implementation of the Staffordshire Common Fungus Survey: the commoner species of fungi tend to get overlooked and are under-recorded. This selection of ten common species that can be easily recognised aims to improve the distribution mapping of these species throughout the County by encouraging the public to make contributions to recording.

Management of deadwood for invertebrate conservation on Staffordshire Wildlife Trust reserves has benefitted fungi conservation.

### 17.4 Conserving fungi – recommendations

#### Generic recommendations that apply (see Appendix A for more detail)

**Numbers HC1; M2; M4; M7-M9; M13; M17; DM1-DM5:** Improve the following: increase habitat size and connectivity, manage for structural habitat diversity (woodlands), ensure appropriate grazing, innovative management of recreation pressures, consider potential impacts on habitats and species when planning management, more integrated planning and management of sites across ownership boundaries, survey and monitoring, increase research and links with universities, colleges and schools, agri-environment schemes, increase habitat creation through the planning system, grants, guidelines for planners, large-scale habitat creation projects.

#### Additional specific recommendations for fungi

- Establish and maintain beneficial management practices to increase populations. In key woodlands increase the amount of fallen deadwood, retain stumps (particularly on ancient woodland sites) and reduce the loss of veteran trees.
- Maintain current populations of fungi at key grassland sites by site safe-guarding and limiting damaging activities such as agricultural improvement.
- Seek to control scrub invasion on all existing sites where key grassland fungi are known to occur.
- Seek establishment of suitable grazing/ mowing/ management regimes on all existing sites where key fungi species are known to occur.
- Carry out appropriate surveys for development proposals that may affect key species or sites.
- Carry out regular visits to known sites to determine the current status of the species and broaden site surveying in the County to identify new sites.
- Increase awareness and identification skills by publishing articles and holding workshops to ensure accurate identifications.
- Increase awareness through schemes such as the Biodiversity Target Species Recording Scheme, operated by Staffordshire Wildlife Trust.
- Improve knowledge by ensuring regular monitoring at key sites, identifying new sites and through the management of fungi data.
- Consolidate all data sources and review current collection, handling and dissemination of fungus distribution data with the aim to improve the current database.

# 18. Local Authorities

## 18.1 Key messages for local authorities

Understanding ecology at a local a scale through the work of local experts, individuals, recorders, conservation organisations and local authorities is critical in implementing measures to conserve, restore and enhance existing biodiversity and securing effective monitoring. Through assessment at a local level it becomes easier to prioritise allocation of time and resources in order to garner the most effective protection of biodiversity.

Local Authorities are required to have due regard for biodiversity in all of their functions such as:

- Policy creation
- Development management
- Green and open spaces and property management
- Community education

National legislation and policy provides local authorities with powers to protect and conserve species and habitats within their district or borough. These can be further strengthened by the creation of policies in local plans, neighbourhood plans, supplementary planning documents and biodiversity strategies.

**It is vital that Local Authorities use these powers to achieve the best possible outcome for biodiversity. In 2008, all Staffordshire Councils signed the West Midlands Biodiversity Pledge commitment to the conservation of biodiversity.**

There is a wide variety of legislation and policy provision relating to biodiversity conservation ranging from international to local level that local authorities have a duty to take into consideration. Specifically, Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 places a duty on Local Planning Authorities (LPAs), to have regard, so far as is consistent with the proper exercise of its functions, to the purpose of conserving biodiversity. Local authorities have a key role to play in conserving biodiversity, through their role in: developing and influencing local policies and strategies; planning and development control; owning and managing their estates; procurement; education, awareness raising and advisory functions. The Duty affects all public authorities and aims to raise the profile and visibility of biodiversity, to clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making.

Through the correct implementation of existing powers to conserve and protect nature, councils have real opportunities to create significant net gains.

LPAs must ensure they have access to ecological advice and expertise; this is best provided via in house support. Proposals for development should be informed by robust survey and assessment to ensure effects on wildlife and habitats are better understood. Councils should also seek to follow best practice guidance and adhere to the mitigation hierarchy. Changing from qualitative to quantitative assessment of a developments impact on biodiversity ensures its effect on wildlife and habitats are better understood; net losses can then be easily identified and net gains become measurable.

Ecological experts should be involved in the writing of planning conditions relating to biodiversity, habitat or protected species to ensure the conditions are appropriately worded. Where approved developments will involve the creation or management of habitats or species, regular monitoring must be carried out by developers. This requirement, and the submission of regular results to the local authority, must be written into planning conditions.

Where Local Authorities own designated sites (SSSIs, SACs etc.) these must be managed to improve their nature conservation value. Local Authorities also have the power to designate land in their ownership as Local Nature Reserves in recognition of their importance for wildlife and to local communities.

To attempt to slow and then reverse the national trend in the decline of habitats and species, Local Authorities should attempt to improve the biodiversity value of their land and property holdings wherever possible. This can be achieved by simple measures such as reducing grass-cutting frequency, installing bat and bird boxes or planting hedgerows and woodlands. Local Authorities must also ensure that they have due regard for biodiversity when proposing management changes to land that they own or conducting building works to properties that they own. This may mean having due regard for protected/Priority Species and Habitats and in some instances ensuring protected species surveys are conducted, adherence to the mitigation hierarchy, and applying for the appropriate protected species licenses.

Local Authorities should also be active partners of the Local Wildlife Site partnership.

Local Authorities should always seek to consult and engage with local communities on biodiversity and habitat management. Involving local people in wildlife can foster greater understanding, enjoyment and protection of the natural resource. By giving people information about what they can see in an area and informing them of its significance, interest and history, people are more likely to appreciate it and respect it. By explaining management changes that are taking place, the public are more likely to take a constructive interest and welcome change. By involving the public directly in the management, they can take an informed and responsible interest in the wider environmental programme.

## 18.2 What is happening in your area

### Local Wildlife Site Appropriate Conservation Management analysis

\*\*Local Wildlife Sites (LWS) are broken down into two categories: Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS) based on their relative scores against the LWS partnership criteria for grading habitats.

- SBIs score higher on the LWS Selection Guideline Criteria and are generally considered to be of county importance
- BASs do not score as highly on the LWS Selection Guideline Criteria but are still of conservation interest and are considered to be of local/borough importance.

In 2008, as part of the Government's Local Area Agreements (LAAs), the management of Local Wildlife Sites was selected as one of the possible 198 indicators of local authority performance. Along with 25 other counties in England, National Indicator 197 (known as 'Improved Local Biodiversity') was adopted by Staffordshire with the target of increasing the number of sites in appropriate conservation management by 5% a year over the course of the three years of the LAAs (2008 – 2011). Following discussions with central government regarding the agreed assessment measure, in March 2008, Staffordshire's LWSs (Sites of Biological Importance only) were analysed to identify a baseline number of sites which were under appropriate conservation management (Figure 9).

In 2008, 25% of the LWSs analysed were considered to be under appropriate conservation management. The assessment used the following criteria to judge if a site was deemed to be in appropriate conservation management:

- An agri-environment scheme agreement or woodland grant scheme with options appropriate for the designated habitat/s.
- A current and appropriate management plan.
- Management guidance that had been documented and was being acted upon.

At the completion of the LAAs in March 2011, Staffordshire had achieved the target of a 5% a year increase countywide in the number of sites under appropriate conservation management and the total proportion stood at 40%. The completion of the LAAs saw the introduction of the Single Data List (SDL), which is a list of datasets local government must submit to central government on an annual basis. While 'Improved Local Biodiversity' remained on the list of reporting indicators, crucially, there were no targets agreed with central government for the indicator to improve further.

As part of the State of Staffordshire's Nature Report, the indicator assessment was carried out again in 2015 using the same methodology as in 2008 for the 945 sites in the county present in 2015.

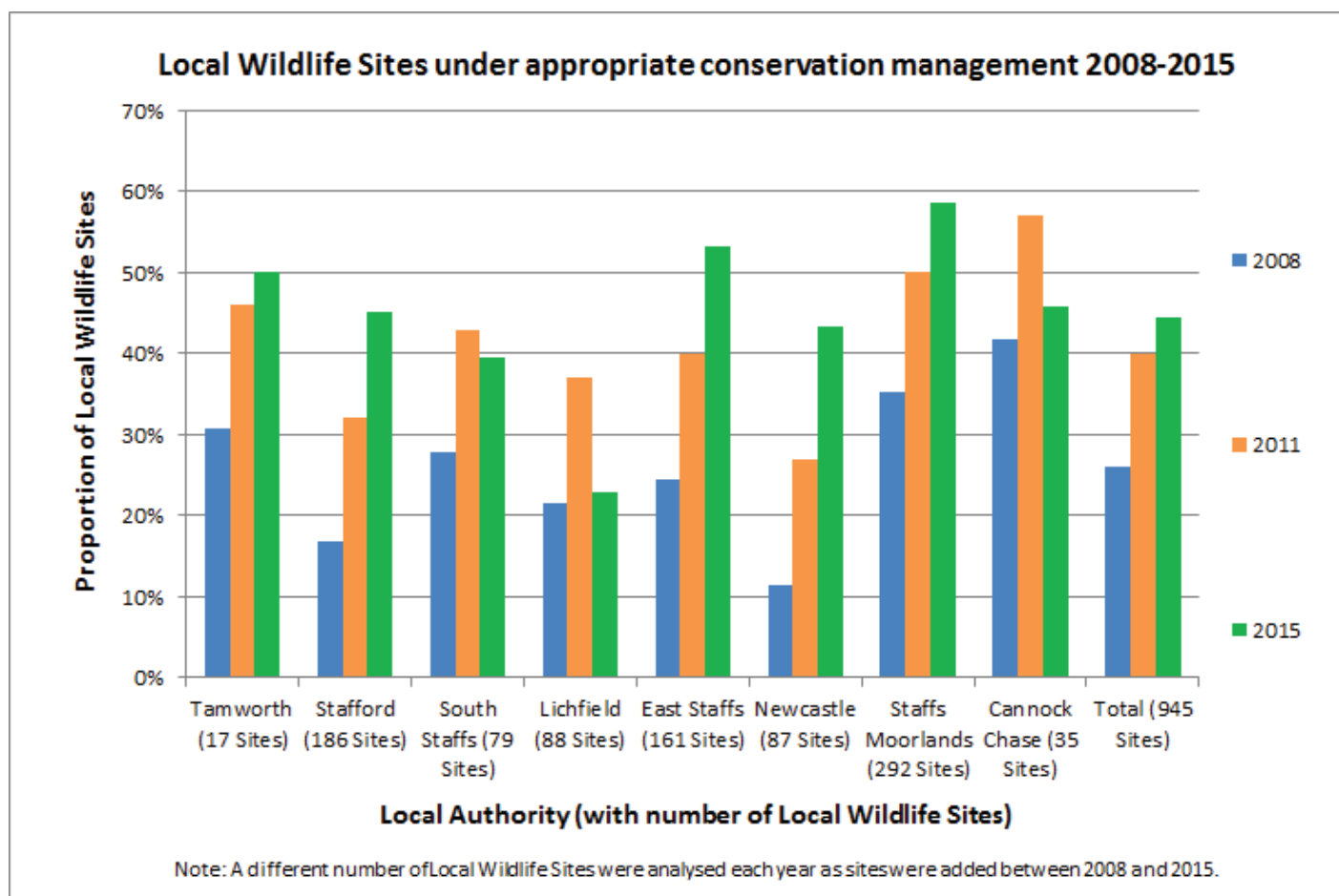


Figure 2.

Proportional increases of LWSs under appropriate conservation management were observed in every local authority between 2008 and 2015, with the total standing at 45%, however the proportional increases differed between each local authority, with five out of the eight local authorities witnessing an increase between 2011 and 2015 (Figure 2).

### Local Wildlife Site area change analysis

A comparison of Local Wildlife Sites (LWSs) was undertaken to give a wider representation of the county, comparing baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016. The methods used for this analysis are presented in Appendix C, but results are presented at the end of each of the following local authority area sections.

#### 18.2.1 Stafford Borough

##### Number of designated sites

Site Type	Number of sites in LA area
SSSI	14
Ramsar	3
SAC	3
SPA	1
NNR	2
LNR	7
LWS (SBI)	169
LWS (BAS)	102

## Area Character and Important Habitats

Stafford Borough comprises of four National Character Areas. These are Cannock Chase and Cankwood; Shropshire, Cheshire and Staffordshire Plain; Needwood and South Derbyshire Claylands; and, Potteries and Churnet Valley.

There are three main rivers, the Penk, Sow and Trent that eventually meet to the east of Stafford. In the northwest are the woodlands of Hanchurch and Bishop's Wood. To the southeast is the heathland of Cannock Chase, designated an Area of Outstanding Natural Beauty. As part of the Meres and Mosses landscape, there are a variety of wetlands in the west of the borough such as Cop Mere, Loynton Moss and Aqualate Mere. To the east of Stafford is Chartley Moss, Britain's largest example of a Floating Bog. On the southern border of the Borough is Motte Meadows, one of the best-preserved floodplain meadows in the country. In total there are 15 Special Sites of Scientific Interest (SSSI), two of which are NNRs.

- King's and Hargreaves Woods
- Burnt Wood
- Cop Mere
- Loynton Moss
- Doley Common
- Aqualate Mere
- Allimore Green
- Doxey Marshes
- Motte Meadows
- Chartley Moss
- Pasturefields
- Rawbones Meadow
- Baswich Meadow
- Stafford Brook
- Cannock Chase

Cannock Chase, Pasturefields Saltmarsh, Motte Meadows and Chartley Moss are all designated as SACs. Additionally Chartley Moss along with Cop Mere and Aqualate Mere are designated as Ramsar Sites.

In Stafford Borough there are 169 Local Wildlife Sites (SBI). These sites have a wide variety of good quality habitats and a range of species of county importance. They provide the backbone to Stafford Borough's rich natural environment.

Key species in the Borough include: Otter, Barn Owl, Great Crested Newt, Small Pearl-bordered

### Current response

Stafford Borough Council currently has a policy in its Local Plan, N4 The Natural Environment & Green Infrastructure, that ensures the Borough's natural environment will be protected, enhanced and improved by implementation of the Staffordshire Biodiversity Action Plan, the Stafford Borough Green Infrastructure Strategy and other guidance to ensure appropriate management for a network of:

- Designated Sites
- Biodiversity Action Plan habitats and species populations
- Wildlife Corridors and Ecological Networks

Additionally, there is also Policy N5 – Sites of European, National & Local Conservation Importance, to give the highest level of protection to current European Sites and SSSI's, LNRs and LWS.

Cannock Chase has two policies; the SAC has a specific policy, N6, to ensure Cannock Chase SAC is not harmed through future development by appropriate avoidance and mitigation. Policy N7 seeks to conserve and enhance the special landscape character of the AONB.

Since 2000, the Council has had its own Biodiversity Strategy with the stated aim, “To conserve and enhance the characteristic biodiversity of Stafford Borough for present and future generations.” Its objectives relate to three key areas.

- Land Management – to halt the loss of biodiversity and reverse losses through targeted action
- Integration and Coordination – to ensure consideration of biodiversity through policy and practice
- Awareness – to increase understanding, enjoyment and engagement with the natural world

Stafford Borough Council owns and manages seven Local Nature Reserves:

- Ferndown LNR, Clayton
- Barlaston & Rough Close Common LNR
- Goodall Meadow LNR, Stone
- Southern Meadow LNR, Stone
- Astonfields Balancing Lakes LNR, Stafford
- Kingsmead Marsh LNR, Stafford
- Kingston Pool Covert (South) LNR, Stafford

Each site has a five-year Management Plan and several have local Friends of groups. Four sites are currently in Higher Level Stewardship Agreements. We also work with Staffordshire Wildlife Trust and their “Wild about Stafford” project in delivering a series of conservation working parties.

### Stafford Borough Local Wildlife Sites

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 survey baseline surveys observed an increase of 0.2% in area despite a decrease in area of 0.4% in BASs in Stafford Borough.

A further additional 420ha of LWS has been designated in Stafford Borough since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.2.2 Staffordshire Moorlands District

### Number of designated sites

Site Type	Number of sites in LA area
SSSI	24
Ramsar	0
SAC	2
SPA	1
NNR	1
LNR	7
LWS (SBI)	270
LWS (BAS)	92

### Area Character and Important Habitats

Staffordshire Moorlands district possesses 99% of the counties moorland habitats and contains almost all of the counties ‘upland’ habitat. The upland nature of the Staffordshire Moorlands district gives it a more rugged and wild appearance compared to the rest of the county with sites such as The Roaches, the Manifold Valley and Dovedale all contributing to this aesthetic.

Despite there being some reasonably large settlements such as Leek, Biddulph and Cheadle, the majority of the Staffordshire Moorlands landscape is rural and owing to several factors such as climate, altitude and steep gradients most of its area has seen far less agricultural improvement than other areas of the county. This has assisted the formation of habitats which are of high quality leading to a large proportion of the districts area being designated as a nature conservation site of some type either internationally, nationally or locally. The upland habitats of the district also provide an important range of ecosystem services from recreation and mental health benefits, to carbon storage, water quality and flood prevention.

The Churnet Valley area which extends from Tittesworth Reservoir in the North to Alton in the South contains a collection of very diverse semi-natural ancient woodland along with significant areas of species rich hay meadows and pasture forming a large wildlife corridor throughout the Staffordshire Moorlands District which not only links the landscape of Staffordshire but also serves as an important wildlife corridor between neighbouring counties. North of the Churnet Valley is the Peak District National Park with a mixture of geological types from gritstones to limestone which lends itself to the diverse range of habitats present with large open expanses of moorland habitats and deep steeply sided river and stream valleys which support pastures and exposed geological features.

Staffordshire Moorlands and the Churnet valley in particular are a critical area for species rich grasslands in the county supporting a high proportion of the limestone calcareous grassland in the county as well as a range of neutral and acid grasslands and wet pastures on soils with impeded drainage. There are several important examples of diverse grassland, particularly concentrated around Waterhouses, Cauldon, the Manifold Valley and those surrounding Tittesworth Reservoir; there are also other examples of high quality grassland dispersed throughout the Churnet Valley and the district as a whole.

The moorland area within the Staffordshire section of the South West Peak is currently a stronghold for some of our nationally declining upland species. Birds such as Lapwing, Curlew, Red Grouse and Wheatear all have breeding populations within the Staffordshire Moorlands and rely heavily on the moorland and grassland habitats present. Many other uncommon species are supported by the habitats in Staffordshire Moorlands, particularly invertebrates and plants some of which are not found anywhere else in the county.

## Threats

There are a suite of threats which do and are likely to affect habitats in Staffordshire Moorlands district, one major threat is the uncertainty over the future of agri-environment schemes may lead to a lack of incentive to farm in an environmentally sustainable capacity or retain unprofitable habitats which may lead to direct habitat loss through neglect or conversely intensification.

Other specific threats such as air pollution or invasive non-native species may cause problems for particular habitats such as upland heaths or calcareous grasslands. Human pressures are also a concern in some areas due to the popularity of sites as tourism venues, The Roaches for instance has a high annual footfall which leads to associated problems such as erosion and potential wildlife disturbance.

## Current Response

Robust environmental policies have been set out as part of the Staffordshire Moorlands District Council adopted local plan core strategy 2016 - 2031 which will serve to counteract and mitigate processes which may be detrimental to the health of the districts landscape. The Peak District National Park Authority also has several policies laid out for the conservation of habitats through their core strategy.

A good amount of land in the district is currently owned and managed for its landscape and environmental value by conservation charities and the local authority, there is also plenty of engagement with landowners and mineral companies which are securing positive outcomes for biodiversity through habitat conservation, restoration and enhancement within the district.



## Staffordshire Moorlands District Local Wildlife Sites

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 survey baseline surveys observed an increase of 1.7% in total area, despite a decrease in area of 0.5% in BASs.

A further additional 800ha of LWS has been designated in Staffordshire Moorlands since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

### 18.2.3 South Staffordshire District

#### Number of designated sites

Site Type	Number of sites in LA area
SSSI	11
Ramsar	0
SAC	1
SPA	0
NNR	1
LNR	5
LWS (SBI)	76
LWS (BAS)	93

#### Area Character and Important Habitats

South Staffordshire District lies on the periphery of the large West Midlands conurbation, much of the landscape of the district is dedicated to arable farmland with small meadows and pastures used for grazing, interspersed by small settlements and areas of woodland. There is only one main river; the River Penk flowing through the district roughly south to north, along with the Staffordshire and Worcestershire canal, both of which provide good riparian habitat.

Several large private estates such as Teddesley Park, Weston Park, the Chillington Estate and the Enville Estate occupy a reasonable area of the district with extensive areas of parkland containing veteran trees.

Much of the district lies on sandy soils supporting several large areas of nationally and internationally important Lowland heath habitat e.g. Highgate Common and Kinver edge; both of which are owned and managed by nature conservation organisations, however there are other privately owned lowland heathland sites which are also sympathetically managed.

There is plenty of high quality grassland habitat throughout the district as well as one of the best remaining examples of traditional wildflower rich lowland floodplain meadow in the country; Motte Meadows National Nature Reserve (NNR) which lies on the Whiston Brook.

Woodland habitats feature extensively throughout the district as remnants of semi-natural ancient woodland to large mixed or coniferous plantation woodlands such as The Million near Stourton and Big Wood on the Chillington Estate near Codsall.

South Staffs District Council owns and manages 5 Local Nature Reserves (LNR) these are:

- Shoal Hill Common
- Wyrley and Essington Canal
- South Staffordshire Railway Walk
- Baggeridge Country Park
- Wom Brook Walk

## Threats

There are a suite of pressures affecting habitats in South Staffordshire which echo those observed in other local authorities, particularly relating to future uncertainties regarding agri-environment schemes, water quality and diffuse pollution. These threats have both direct and indirect consequences to the important habitats of the district which could potentially impact both the habitats themselves as well as the species that they support.

## Current Response

Several core policies are laid out as part of the South Staffordshire Local Plan Core Strategy to directly protect and enhance the environmental quality of the districts biodiversity assets. Specifically, in Core Policy 2: “Protecting and Enhancing the Natural and Historic Environment” and strategic objectives 3 and 4: “To protect and improve South Staffordshire’s environmental assets” and “To protect, conserve and enhance the countryside character and quality of the landscape and the diversity of wildlife and habitats”.

Policies such as this will ensure that there is no detrimental impact on the districts biodiversity and that biodiversity is considered throughout the planning process.

## South Staffordshire District Local Wildlife Sites

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 survey baseline surveys observed an increase of 0.2% in area despite decreases of 9% and 0.7% in BAS and SBI respectively in South Staffordshire. The reduction of LWS area was negated due to 3.3% of the area of SBI in South Staffordshire being designated as SSSI since the original baseline surveys.

A further 551ha of LWS has been designated in South Staffordshire since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.2.4 Newcastle-under-Lyme Borough

### Newcastle-under-Lyme Borough Local Wildlife Sites

Site Type	Number of sites in LA area
SSSI	5
Ramsar	2
SAC	0
SPA	0
NNR	0
LNR	3
LWS (SBI)	74
LWS (BAS)	42

### Area Character and Important Habitats

Newcastle borough sits in the North-western corner of Staffordshire occupying some 21,000 hectares of the county. Newcastle is bordered by Shropshire to the West, Stoke-on-Trent to the East, Stafford Borough to the south and Staffordshire Moorlands district and Cheshire to the North.

The North-western section of the borough is heavily urbanised however further south the borough the urban graduates into more rural countryside. The periphery of the more built up area of Newcastle is a mixture of settlements, small and large scale industrial developments and post-industrial brownfield land.

The exhaustive industrial heritage of the borough has contributed to the numerous post-industrial brownfield sites seen throughout the urban conurbation today, these sites support good open mosaic habitats on previously developed land (OMHPDL) and conditions which support a number of species that may otherwise not be able to exist in such an urban landscape. OMHPDL are an important characteristic of this landscape as Stoke and Newcastle support a far greater area of this type of habitat than anywhere else in the county, supporting species which may not be present elsewhere.

Part of the Meres and Mosses of the Marches Nature Improvement Area (NIA) overlaps into the borough where several nationally and locally important wetland sites are present, Betley Mere and Black Firs and Cranberry bog on the border with Cheshire are designated Ramsar sites and are internationally important and recognised for their wetland features and sites such as Craddocks Moss, Maer Pool SSSI and sites on the River Tern further support the wetland network of the borough. Wetland features such as these further contribute to the character of the borough due to the relative national and international scarcity of habitats of this type.

Grasslands and woodlands are another primary feature throughout the borough and several important examples are present, the wooded quarter Staffordshire Biodiversity Action Plan (SBAP) area covers a significant section of the south of the borough and supports a diverse range of woodland types including semi-natural ancient woodlands and wet woodlands. There is a significant amount of important grassland surrounding the urban conurbation in areas such as Apedale and Butterton which further contribute to the varied landscape on the fringes of a dense urban environment.

### **Threats**

Due to a significant portion of the borough being densely urbanised, one of the primary threats to Newcastle's habitat is development pressure especially when coupled with the increasing need to accommodate an ever expanding demand for housing and employment. Development can lead to the direct loss and destruction of habitats, particularly rarer habitats such as OMHPDL habitats and those occurring on the periphery of the urban environment as well as the reduction in connectivity and isolation of habitats particularly in an urban context.

Development can also lead to indirect issues and pressures such as run-off of pollutants leading to contamination of watercourses, increased flooding risk and preventing species dispersion.

### **Current Response**

The current adopted core spatial strategy contains policies for the protection, conservation and enhancement of the boroughs landscape heritage and biodiversity.

### **Future aspirations**

Development of a joint local plan with Stoke-on-Trent will update existing environmental policies, furthermore the development of a joint green space strategy will seek to conserve and enhance existing green space within the urban environment.

### **Newcastle-under-Lyme Borough Local Wildlife Sites**

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 baseline surveys observed an increase of 1% in area despite a decrease in area of 7.6% in BASs in Newcastle Borough.

A further 190ha of LWS has been designated in Newcastle Borough since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.2.5 Stoke-on-Trent City

### Number of designated sites

Site Type	Number of sites in LA area
SSSI	2
Ramsar	0
SAC	0
SPA	0
NNR	1
LNR	9
LWS (SBI)	32
LWS (BAS)	0

### Area Character and Important Habitats

The city of Stoke-on-Trent covers an area of some 9300 hectares and forms part of the Potteries and Churnet Valley Natural and Character Areas. The Potteries conurbation is surrounded by landscapes of great contrast. To the north and north-east are the wild landscapes of Staffordshire Moorlands and Peak District National Park, to the east the wooded valleys and pastures of the Churnet Valley and to the south and south-west lie the agricultural landscapes of mid-Staffordshire, Shropshire and South Cheshire.

Habitats and sites within the city boundary are varied and include semi-natural ancient woodland, hedgerows, heathland, grasslands, waterways (rivers, streams and canals) wetland areas (ponds, lakes and marshes) and mosaic habitats associated with brownfield sites. Remnants of the city's industrial heritage, in particular the Trent and Mersey and Caldon Canals and disused railway lines, help to create a valuable network of green corridors through the city. These linear features help to connect different parts of the city and provide a useful link to the urban fringe and countryside beyond.

Roughly one third of the city area (just over 3000 ha) is greenspace; the majority of this surrounds the city as Green Belt (1772 ha). The city Council has a strong commitment to the management of this greenspace, with approximately 19% of the city area (1746 ha) maintained in a variety of greenspace uses, for example for allotments, recreation areas, parks and small wildlife sites.

There are two statutory designated Sites of Special Scientific Interest (SSSIs) within the city. These are:

- Hulme Quarry (Park Hall) SSSI,
- Ford Green Reedbed SSSI.

There are currently 40 non-statutory Local Wildlife Sites (LWS) within the city.

The Priority Habitats for the city generally fall into the following categories:

- Woodlands,
- Hedgerows,
- Heathlands,
- Grasslands,
- Waterways and wetlands,
- Open-mosaic habitats on previously developed land,

Sites that support protected and Priority Species as defined by current legislation.

### Threats

Being a mostly urban area, the greatest threats to biodiversity here are recognised as: the loss and destruction of habitats through development, clearance and changing land use; and the loss of/reduction in green networks and connective habitats. Both these processes have the potential to reduce biodiversity within the city both directly and indirectly.

Direct effects include the permanent destruction of both habitats and the populations of species reliant upon them or by inadvertently killing Priority Species or damaging breeding/resting places.

However, the indirect impacts of these actions can be just as damaging, for example by reducing habitat connectivity through the loss of key habitat sites or by the re-development of brownfield sites; reducing the ability of wildlife to move and disperse throughout the city. This in turn leads to isolated populations of wildlife, which are more sensitive to further environmental or artificial pressures.

### Current Response

Stoke-on-Trent Council Core Spatial Strategy CSP4 relates to Natural Assets. This seeks to support the achievement of the outcomes and targets of the Staffordshire Biodiversity Action Plan, the UK Biodiversity Action Plan and the Staffordshire Geodiversity Action Plan, achieve significant improvements to the condition of designated sites, avoids and mitigates adverse impacts from development on natural assets and enhances them where possible and seeks to ensure that the ecological value of previously developed land is recognised.

Stoke-on-Trent city Council employs an ecologist on a part-time basis within the planning team. The ecologist provides ecological advice and guidance to internal departments, outside organisations and members of the public. One of the main roles is to provide advice to developers seeking to develop land within the city and to liaise directly with their ecological consultants, providing advice on - Avoidance; Mitigation; Compensation; and Enhancements, clearly detailing:

- When to Survey,
- What to Survey for,
- & how Surveys should be conducted.

The ecologist ensures that the statutory duties with respect to wildlife and nature conservation are implemented across council services.

Stoke-on-Trent do not currently have any specific Supplementary Planning Documents relating to Ecology, however there are a number of SPDs and SPGs that contain ecological elements in particular the Sustainability and Climate Change SPD, the saved Natural Heritage Strategy SPG and the saved Rivers Strategy SPG.

On the Councils own land holdings, the Authority seek to improve and enhance the biodiversity value of all sites where possible and practical. Where the council owns protected/priority habitat it has sought to secure sustainable long term management of these assets, through utilising appropriate management plans and regimes.

Working with external partners the council has been involved in a number of projects to benefit biodiversity such as the Diamond Wood and Blooming Stoke schemes.

### Future aspirations

Stoke-on-Trent City Council will continue to carry out its statutory duties in relation to wildlife and nature conservation.

- Development of future planning policy priorities, to be included within the Joint Local Plan.
- Preparation of a new Green Space Strategy to inform and support the future planning policy direction of the Joint Local Plan.
- Increase the understanding of the current habitat baseline within the city by undertaking ecological surveys.

Engagement with landowners and developers via the planning process to achieve suitable mitigation and enhancement measures on future development sites.

## Local Wildlife Site Analysis

Local wildlife sites in Stoke-on-Trent were not included in the LWS analysis here as Stoke-On-Trent city council manage their own LWS system which does not follow the same principles as those adopted in by the LWS partnership for the rest of Staffordshire.

### 18.2.6 East Staffordshire Borough

#### Number of designated sites

Site Type	Number of sites in LA area
SSSI	6
Ramsar	0
SAC	0
SPA	0
NNR	0
LNR	3
LWS (SBI)	163
LWS (BAS)	72

#### Area Character and Important Habitats

The ecological character of the borough changes dramatically from its most southern extent to its most northern extent. Much of the south of the borough is occupied by the lowland floodplains of the Rivers Blithe, Swarbourne and Trent which support arable farming and extensive sand and gravel quarrying, large man-made water bodies such as Blithfield Reservoir, Cat Holme Quarry, Newbold and Branston gravel pits are also a readily recognisable feature throughout the south of the borough. Furthermore, large settlements and woodlands and hedgerows within the National Forest contribute to create a very mixed use landscape which is the home of many important species in the county.

Progressing northwards from Burton the altitude starts to increase and the landscape begins to change, becoming more rural, the settlements are smaller and more sporadic, large woodlands become less frequent and arable fields are less common in favour of grasslands and pasture. The River Dove acts as the border between Derbyshire the neighbouring county and East Staffordshire forming a large floodplain in the valley bottom between Mayfield in the north and its confluence with the Trent at Burton.

The northern extent of the borough is at a much greater altitude than the south and contains many grasslands of high ecological importance that have good connectivity to grasslands in Derbyshire and Staffordshire Moorlands. Also of importance in this area are diverse road verges which support good quality habitats as well as some areas of heathland.

#### Threats

The main threats to the boroughs habitats are currently:

- Soil erosion and nutrient run-off into watercourses is a large concern due to the amount of arable farming on in the floodplains of several main watercourses.
- Road verges are vulnerable to direct damage from road works and indirect damage from poorly-timed an inappropriate management.
- Further mineral extraction may cause direct losses of habitat as well indirectly impacting associated species.

## Current Response

Strategic policies 29 (Biodiversity and Geodiversity) and 30 (Locally Significant Landscape) from the East Staffordshire borough council local plan set out direct aims for the protection and enhancement of the boroughs biodiversity with policies 28 (Renewable and Low Carbon Energy Generation) and 31 (Green Belt and Strategic Green Gaps) supporting biodiversity indirectly.

## East Staffordshire Borough Local Wildlife Sites

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 baseline observed an overall reduction of 3.8% (83ha) in area, with both SBI's and BAS's reducing in extent by 4.4% and 5.5% respectively. 0.7% (16ha) of the boroughs LWS went into a SSSI designation since the original baseline surveys. The loss of area was in part due to the loss of approximately 60ha of grassland sites to developments.

Despite the reduction in area of resurveyed sites, a further 483ha of new LWS has been designated in East Staffordshire since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

### 18.2.7 Cannock Chase District

#### Number of designated sites

Site Type	Number of sites in LA area
SSSI	2
Ramsar	0
SAC	2
SPA	0
NNR	0
LNR	2
LWS (SBI)	34
LWS (BAS)	15

#### Area Character and Important Habitats

Cannock Chase District covers some 7,990 hectares and falls almost entirely within the Cannock Chase and Cank Wood Character Area. Lowland heath, acidic grassland, woodland and urban areas characterise the District.

Much of the northern part of the District falls within the boundary of the Cannock Chase Area of Outstanding Natural Beauty which is characterised by extensive areas of lowland heath and commercial forestry plantations. Heathland within this area is of international significance and most examples are included within the Cannock Chase Special Area of Conservation.

Extensive heathland extends south from the AONB to provide links and stepping stone sites with similar habitat in the adjoining Lichfield and Walsall local authority areas. The heath in this area differs in character from that in the AONB being poorly drained with areas of wet lowland heath and associated mire and fen communities. These are some of the largest areas of wet heath remaining in Staffordshire and form part of the Chasewater and Southern Staffordshire Coalfield Heaths SSSI.

From Hednesford and Pye Green south to the District boundary there are large areas which are characterised by residential and commercial land uses. Within this zone there are still remnants of those habitats that existed prior to the expansion of towns along with many new urban green spaces. The zone is rich in biodiversity with a wide range of habitat types present including: woodland, species rich neutral grassland, rush-pasture, fen, and open water.

The Cannock Extension Canal Special Area of Conservation extends into the District from the West Midlands boundary to the A5 at Norton Canes. This little used 1.8 mile arm of the Wyrley and Essington Canal supports internationally significant populations of floating water-plantain and other important aquatic plant communities.

There are currently 16 Sites of Biological Interest within the District covering a wide range of habitat types.

### **Threats**

There are many threats facing habitats and species within the District. Urban areas continue to expand resulting in a direct loss of habitat and creating indirect impacts upon those that remain.

The principle threats to the Districts biodiversity are:

- Climate change
- Direct loss of habitats and species due to development
- Habitat fragmentation
- Nitrogen deposition resulting from atmospheric pollution
- Poor water quality
- Increased recreational pressure
- Invasive species
- Plant disease
- Changes in land management practice.

### **Current response**

Cannock Chase Council has strong planning policies within its Local Plan which seek to protect all international, national, and local wildlife sites from harmful development. There is recognition that biodiversity interests are not confined to designated sites and policy seeks to prevent and mitigate harm to priority habitats and species along with those that are legally protected wherever they may occur.

The Design Supplementary Planning Document was adopted in 2016 which contains guidance for developers on how to conserve and enhance biodiversity within developments. It is expected that all developments will where possible include some form of biodiversity enhancement.

Management to maintain and enhance biodiversity is given a high priority within Cannock Chase Councils landholding. There are currently two Local Nature Reserves within Cannock Chase District with a third about to be designated. These three sites cover approximately 177.68 hectares and include examples of heathland, acidic grassland, species rich hay meadow, rush pasture, woodland, open water and fen.

In addition Cannock Chase Council manage a further 13 sites as nature reserves that do not currently have LNR status. These additional sites extend the area managed as nature reserves by 69.48 hectares.

Cannock Chase Council own and manage their own herd of cattle for conservation grazing purposes. This has allowed traditional management to be re-established on small urban grassland sites that would otherwise not have been possible. The cattle have also made it possible to re-establish grazing on heath and acidic grassland sites at Hednesford Hills which forms part of the Chasewater and Southern Staffordshire Coalfield Heaths Site of Special Scientific Interest.

### **Future aspirations**

Cannock Chase Council will seek to continue with current policies.

### **Cannock Chase District Local Wildlife Sites**

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 survey baseline surveys observed a loss of 0.7% in area overall in Cannock Chase.



A further 305ha of LWS has been designated in Cannock Chase since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.2.8 Tamworth Borough

### Number of designated sites

Site Type	Number of sites in LA area
SSSI	1
Ramsar	0
SAC	0
SPA	0
NNR	0
LNR	3
LWS (SBI)	16
LWS (BAS)	6

### Area Character and Important Habitats

Tamworth Borough is relatively small in comparison to the other Local Authority areas of Staffordshire, at just over 30km<sup>2</sup>. Despite the small size it still encompasses a lot of good quality habitats with one nationally designated site and several non-statutory sites covering almost 10% of the boroughs predominantly urban area.

The borough contains an assembly of habitats with excellent examples of most habitats represented. The Rivers Tame and Anker both converge on the borough along with the Kettle Brook all of which meet in the centre of the town resulting in the formation of numerous associated habitats such as wet grasslands, pools, ponds, wet woodlands and marshes. The Birmingham and Fazeley Canal also passes through the centre of the town and provides yet another wetland feature.

Notable Local Wildlife Sites in the borough are Broad Meadow, an island which supports the boroughs largest area of wet grassland and hosts a good population of Snake's Head Fritillary, one of the only populations of this plant in the county. Warwickshire Moor and Hodge Lane LNR both contain areas of species rich grassland and wet woodlands and are important sites for a number of protected species. Both Tameside Nature Reserve and Bole Bridge are right in the centre of town and contain a range of semi-natural wetland habitats providing opportunities for a number of species in the centre of an urban environment.

The concentration of high quality habitat in such close proximity to areas of dense urban settlement is another asset which is of great credit to Tamworth providing access to high quality open green space for a large number of residents.

### Threats

A major threat to Tamworth's habitats is development; due to the size of the borough and pressures to provide a housing and employment supply into the future, development may pose a direct or indirect risk to existing green infrastructure in the borough in future.

People inflict a significant pressure on Tamworth's habitats as green spaces and people are so intertwined in the borough that activities such as fly-tipping, arson and vandalism are serious threats on several sites in the borough.

Due to the confluence of two rivers in the borough flooding is often an annual occurrence. Whilst flooding does not necessarily pose a direct problem to habitats, some habitats such as Broad Meadow, Egg Meadow and Warwickshire Moor benefit from high water levels, however due to the proximity of the urban and particularly industrial areas to watercourses flooding can potentially lead to diffuse pollution issues through run-off of chemicals and other pollutants.

### Current Response

True strengths lie in the pro-active work that occurs across the Borough, including environmental education and practical habitat improvement work (see case study Wild About Tamworth in the built environment chapter).

Conservation organisations currently play key roles in helping to conserve and enhance the habitats of Tamworth.

### Future Aspirations

Continuation of the practical conservation work carried out by the Local Authority and other conservation bodies.

### Tamworth Borough Local Wildlife Sites

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 baseline surveys observed an overall reduction of 3.1% of habitat in Tamworth Borough, including the loss of roughly 50% of the Boroughs Biodiversity Alert Sites (BAS). There was however an increase in the area of SBI by 21.4% meaning the area of higher quality habitat in the borough increased despite an overall loss of designated habitat.

Despite the reduction in area of resurveyed sites, a further 19.9 ha of LWS has been designated in Tamworth since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.2.9 Lichfield District

### Number of designated sites

Site Type	Number of sites in LA area
SSSI	4
Ramsar	0
SAC	1
SPA	0
NNR	0
LNR	1
LWS (SBI)	88
LWS (BAS)	56

### Area Character and Important Habitats

The Lichfield District covers some 33,125 ha of land and falls within three Natural England National Character Areas (NCAs): Cannock Chase and Cank Wood; The Trent Valley Washland; and Needwood & the South Derbyshire Claylands, with each area supporting distinctive and differing habitats and species. In line with the NCAs present the priority habitats for protection, restoration, enhancement and creation within the district are considered to be: lowland heathland; woodland and semi-natural ancient woodland; grasslands; rivers; and ponds and wetland areas.

There are several areas of high nature conservation quality both within and adjoining the District. Of greatest importance is the River Mease Special Area of Conservation (SAC) a portion of which flows through the north eastern part of the Lichfield District. Cannock Chase SAC, although not within the District, lies close to its western boundary. As such the impact of actions occurring within the District (such as new developments) upon this important area of protected habitat often need to be considered and accounted for.

There are also 5 designated Sites of Special Scientific Interest (SSSIs) within the District that need careful management and protection. These are:

- Chasewater and Southern Staffordshire Coalfields SSSI
  - Comprising of the areas of: Chasewater; Brownhills Common; Norton Bog; Cuckoo Bank; Bleak House; Wharf Lane; Hednesford Hills and Biddulphs Pool.
- Gentleshaw Common SSSI
- Stowe Pool and Walkmill Claypit SSSI
- River Mease SSSI

There are currently 78 Sites of Biological Importance (SBI) and Biodiversity Alert Sites (BAS) within the Lichfield District; however the total number of sites changes periodically.

The priority habitats for the district generally fall into the following categories:

- Ancient semi natural woodland and pasture woodland
- Hedgerows
- Grasslands, both semi and unimproved
- Heathland
- Wetland and open water
- Sites that support Priority Species as defined by the UK BAP and SBAP

## Threats

Being a mostly rural District with Priority Habitats characterised (in the most part) as requiring low nutrient soils, the two greatest threats to biodiversity here are recognised as: the destruction of habitat through development and changing land use; and the intensification of agricultural practices. Both these processes have the potential to reduce biodiversity within the District both directly and indirectly.

Direct effects include the permanent destruction of both habitats and the populations of species reliant upon them or by inadvertently killing Priority Species through the increased use of pesticides. However, the indirect impacts of these actions can be just as damaging, for example by reducing habitat connectivity through the loss of key habitat sites or by the removal of hedgerows; reducing the ability of wildlife to move and disperse throughout the District. This in turn leads to isolated populations of Priority Species, which are easily wiped out via further environmental or artificial perturbations.

## Current Response

Lichfield District Council currently has a policy in our Local Plan that ensures all developments comply with the mitigation hierarchy in terms of species and habitats and that all achieve a net gain to biodiversity. Further to this the authority has produced a Biodiversity and Development Supplementary Planning Document (SPD) which expands upon policies of the Lichfield District Local Plan: Our Strategy guides developers through the planning process ensuring a best practice approach for protected/Priority Species and Habitats.

The SPD guides developers through the ecological mitigation hierarchy of: Information; Avoidance; Mitigation; Compensation; and New Benefits, clearly detailing:

- When to Survey,
- What to Survey for,
- & how Surveys should be conducted.

It provides developers with a clear “plain English” step-by-step guide for working with protected and priority species and habitats that are likely to be impacted upon by their proposed developments. The SPD details Lichfield District Council’s requirements for applicants to build nature conservation features into developments, ensuring that a measurable net-gain to the districts biodiversity is always achieved.

The SPD also highlights the importance that applicants protect and enhance existing nature conversation features within proposed developments, following best practice guidance and the mitigation hierarchy. On occasions where it is not possible the SPD details what Lichfield District Council requires a developer to consider when incorporating ecological compensation (including Biodiversity Offsets) within their development scheme.

The Council has also adopted a policy for the creation of linked habitat corridors. The policy encourages new habitats and links between habitats that are created to enhance biodiversity and to mitigate against climate change by providing opportunities for the movement of species. All new habitats should be compliant with the Lichfield Habitat Opportunity Map.

On the Councils own land holdings, the Authority seeks to improve and enhance the biodiversity value of all sites where possible and practical. Where the council owns protected/priority habitat it has sought to secure sustainable long term management of these assets. The Council designated its first Local Nature Reserve, Christianfields, in 2010.

### **Future aspirations**

Lichfield District Council’s vision is to adopt the ‘Lawton principle’ of bigger, better and more connected habitats where species have the opportunity to thrive. This will provide benefits for both nature and people. To achieve this vision it has been recognised that in addition to the ongoing works, the following future works also need to be pursued by the Authority:

- Creation and adoption of a revised Biodiversity Strategy.
- Increase the understanding of the current habitat baseline within the District via Phase 1 Habitat Mapping (including on our own landholdings).
- Engage with local communities on the declaration of further Local Nature Reserves.

Greater engagement with landowners to promote ecologically sustainable farming practices and where appropriate highlight the potential for new habitat creation within their landholdings which is both ecologically and financially viable.

### **Lichfield District Local Wildlife Sites**

Local Wildlife Sites (LWS) resurveyed since the original 1996-2000 baseline surveys observed an overall loss of 4.6% of area. There was a reduction of 25.9% of SBI and 9.5% BAS in this period, however 18.1% of the reduction of SBI is accounted for by the fact that a large section of LWS was designated as SSSI since the baseline was gathered and is and is now afforded more protection as a result, illustrating that there are some positive outcomes despite the overall decline in area of LWS in Lichfield.

Despite the reduction in area of resurveyed sites, a further 118.3ha of LWS has been designated in Lichfield since the original 1996-2000 baseline surveys through continued survey effort of the LWS partnership and development and progression of the designation criteria.

## 18.3 Key messages for your area

### Common themes across all of Staffordshire:

- Protect and improve existing sites by securing and maintaining appropriate conservation management.
- Reduce habitat fragmentation and increase connectivity by linking, buffering and expanding existing sites of importance
- Recognise the value of ecosystem services. Staffordshire's habitats play an important role in providing valuable ecosystem services, especially water quality and flood prevention.
- Ensure no net loss of habitat within developments, and aim for net biodiversity gain and utilise opportunities for habitat creation through the planning system, e.g. by providing bat roosts, otter holts, or wildflower areas, and to facilitate species movement, e.g. by allowing hedgehogs easy access through gardens.

### Stafford Borough

- Connect wetland habitats. Ensure developers consider provision for species such as otters, harvest mouse and water shrew.
- Achieve net biodiversity gain through HS2 Ltd.: Carry out opportunity mapping and aim to designate any new Local Wildlife Sites (LWSs).

### Staffordshire Moorlands District

- Prevent the decline of moorland waders. The area is currently a stronghold for nationally declining wader species.
- Protect water voles. The Cecilly Brook in Cheadle supports a healthy and important population of water voles.
- Increase the area of important habitats: continue to identify opportunities for habitat creation as part of quarry restoration.

### South Staffordshire District

- Increase populations of lesser horseshoe bat and water voles. South Staffordshire is the only district where lesser horseshoe bat has been recorded and the watercourses around Coven are important for water voles.
- Reconnect the southern heathlands: provide ecological connectivity between sites such as Highgate Common, Kinver Edge and Penn Common.

### Newcastle-under-Lyme Borough

- Protect and reconnect populations of hazel dormouse. The only natural sites in the County lie within Newcastle Borough.
- Achieve net biodiversity gain through HS2 Ltd.: carry out opportunity mapping and aim to designate any new Local Wildlife Sites (LWSs).
- Further create grasslands on restored opencast coal sites such as Apedale Community Country Park

## **Stoke-on-Trent City**

- Provide opportunities for key species to move across urban areas: provide suitable quality greenspace and brownfield sites.
- Improve wetland habitats: carry out habitat improvements on watercourses, including installing otter holts, and creating and protecting fringe habitats.

## **East Staffordshire Borough**

- Provide opportunities for key species to move across urban areas: provide suitable quality greenspace, protect fringing habitats along watercourses and install otter holts.
- Increase the area of important habitats and continue to identify opportunities for habitat creation as part of quarry restoration.

## **Cannock Chase District**

- Protect Cannock Chase SAC: mitigate the impact of development and recreation on Cannock Chase SAC and link heathland sites in the Cannock Chase to Sutton Park area in collaboration with Lichfield District, South Staffordshire District and Stafford Borough.
- Retain a mosaic of brownfield habitats in the District.

## **Tamworth Borough**

- Provide opportunities for key species to move across urban areas: provide suitable quality greenspace, protect fringing habitats along watercourses and install otter holts.
- Increase the extent of nature conservation quality grassland on Broad Meadow, host to one of Staffordshire's two native populations of snake's head fritillary.

## **Lichfield District**

- Provide opportunities for key species to move across urban areas: provide suitable quality greenspace, protect fringing habitats along watercourses and install otter holts.
- Achieve net biodiversity gain through HS2 Ltd: carry out opportunity mapping and aim to designate any new Local Wildlife Sites (LWSs).

There are a number of projects that are underway that are attempting to address some of the issues that have been described above and showing how Local Authorities can influence benefits for wildlife. One of these is highlighted as a case study below:

### **CASE STUDIES**

- Case study 1 - Burntwood Milestone Way Strategic Development Allocation (Authors and contributors: Justine Lloyd, Chris Walsh)

Burntwood Milestone Way Strategic Development Allocation

**Habitats & species:**

**Habitats:** Open mosaic, ponds, wet woodland, lowland dry acid grassland.

**Species:** Common lizard, dingy skipper.



**Photo:** Common lizard, Rory Middleton

**Key messages**

- Strategic Development Allocation determined that the most sustainable location for approx. 350 new dwellings was on a Site of Biological Importance.
- Lichfield Districts Council's Ecology Team, supported by Staffordshire Wildlife Trust, negotiated that the best habitats would be saved and translocated; all protected species be appropriately relocated; and that the developer would provide a financial contribution to the council sufficient to allow for the creation/restoration of 9.1 hectares (ha) of heathland and its future management for a period of 25 years.
- £416,409 (index linked) was provided to re-establish a defunct network of heathland sites.

**Overview**

The Burntwood Milestone Way Strategic Development Allocation is a previously developed site on the edge of the urban area, close to Burntwood Business Park and town centre and provides approximately 350 new dwellings in the Lichfield District. The development, whilst considered sustainable, necessitates the loss of some habitat. There was a mosaic of habitats on the site including areas considered to be of UK Biodiversity priority (ponds, wet woodland, lowland dry acid grassland and open mosaic on previously developed land).

There were no European protected species resident or breeding on site, however there was a small population of common lizard (species subject to UK protection against killing or injury). Additionally, there were a number of UK BAP species including the dingy skipper.

Adhering to best practice, legislation and complying with the mitigation hierarchy and in conjunction with the master planning process, it became apparent that the habitats lost to development would largely be open mosaic on previously developed land.

**Contact**

Justine Lloyd  
Lichfield District Council

**Partners**

Lichfield District Council's Ecology Team were supported by Staffordshire Wildlife Trust

**Funding**

Funding for all works was provided by the development partners of the Burntwood Milestone Way Development

## Objectives

- Ensure a net-gain to biodiversity value achieved by the development scheme.
- To increase the total area of priority habitat within the district and secure its future management.
- To increase habitat connectivity to re-establish a heathland network within the district.

## Approach, Outcomes & Future Work

Lichfield Districts Council's Ecology Team, supported by Staffordshire Wildlife Trust, negotiated that:

- The best habitats would be saved, translocated and managed within the development site.
- All protected species would be captured and relocated to nearby sites of suitable habitats.
- New high quality priority habitat would be created on the development site to increase connectivity to surrounding habitats and for the benefit of Priority Species such as the dingy skipper.
- Funding was provided for the mitigation of impact to Chasewater Heaths and Southern Staffordshire Coalfields SSSI.
- £416,409 (£44,300 per ha of development) would be provided via S106 Agreement for a Biodiversity Offsetting Scheme to be implemented by Lichfield District Councils Ecology Team for the strategic creation/restoration of 9.1 ha of heathland over 25 years. This value is based on actual costs for previous heathland creation projects and includes staff costs. It was agreed that any re-creation/restoration of natural habitat should be mindful of the wider strategic needs and add to the lowland heathland resource. This was the preferred option rather than a 'like for like' creation of open mosaic habitat on previously developed land, which is not consistent with the wider ecological network. The creation/restoration of lowland heathland is to occur on key heathland stepping stone sites within the strategic corridor which is a priority for heathland creation. These sites are Pipehill Crossroads, Muckley Corner Common and Ironstone Heath. Works proposed include the creation of heathland, scrape creation, dense and scattered scrub control and bracken and Japanese knotweed control.

This development creates a significant net gain to the Districts biodiversity and habitat connectivity. The development was approved in 2015.



**Photo:** Dingy skipper, Rory Middleton



# 19. Why is nature changing and what needs to happen

## 19.1 Why is nature changing?

Following the overview of Staffordshire's habitats and species provided on the previous pages, it is evident that the overall picture for the State of Staffordshire's nature includes both losses and some gains. Staffordshire's remaining habitats and species are still under threat: many species are in decline, some areas of habitat are still being lost, and the majority of Staffordshire's most important wildlife sites are not in Favourable condition. However, a number of notable wildlife benefits have been achieved in recent years.

### 19.1.1 Threats to nature - nature declining

Declines in Staffordshire's wildlife results from three broad issues: habitat losses, habitat fragmentation and reduced habitat quality. Loss of habitat has resulted from, for example, urbanisation, historical agricultural intensification, drainage of wetland habitats and modification of watercourses. These pressures have resulted in habitats becoming fragmented, thereby reducing species abilities to move across landscapes. Reasons for poor habitat quality include lack of appropriate management or neglect, the spread of non-native species, and pollutants such as pesticides and fertilisers.

Government funding for conservation work, such as agri-environment schemes, has come under increased pressure in recent years. The decision for the UK to leave the EU has also resulted in uncertainty regarding the long-term future for agri-environment funding. However with uncertainty comes opportunity to implement a range of policies for farming, fishing and wildlife protection that will help improve our natural environment.

### 19.1.2 Positive stories - nature improving

Targeted use of agri-environment schemes and appropriate options have made a positive contribution to the quality of habitats, especially on farmland where options for hedgerow management and bird cover plots has benefitted some farmland bird species.

Improvements to the quality of Staffordshire's watercourses since the 1970s have resulted in increasing population numbers for species such as otter and wintering wildfowl, and can partly be attributed to reductions in pollution, river restoration schemes and incorporating nature conservation benefits into planning schemes.

Although the quantity of lowland heathland in Staffordshire declined by nearly 90% between 1775 and 1990, the quality of much of the remaining habitat has improved in recent years as a result of appropriate management.

Many habitats are also being created and restored through the action of landowners, managers, organisations and businesses and the contribution of voluntary groups to the conservation of species is significant.

## 19.2 What needs to happen

### 19.2.1 Planning and policy

There is a wide range of European and national legislation and national guidelines that put a number of duties and responsibilities on Local Planning Authorities (LPAs) when both forming planning policies and determining applications. However, these national policies also grant Local Authorities (LAs) significant powers to protect and conserve species and habitats and promote significant gains to nature.

The key legislation, policies, guidelines and strategies that LPAs within Staffordshire need to consider when exercising their functions are:

- The Conservation (Natural Habitats etc) Regulations 1994 (as amended 2010); often referred to as the habitat regulations. They are the mechanism through which the EU Habitats and Species Directive is implemented in the UK, detailing and providing protection for both European designated sites and European protected species.

- The Wildlife and Countryside Act 1981 (as amended 2010); the principal act relating to the protection of wildlife at designated sites in Great Britain. Species listed for protection are in schedules 1, 5 and 8.
- The National Planning Policy Framework 2012; (also see below)
- The Protection of Badgers Act 1992; an act that brings together all legislation that is specific to badgers, with the exception of their inclusion in Schedule 6 of the Wildlife and Countryside Act 1981.
- Natural Environment And Rural Communities Act 2006; Lichfield District Council has a statutory duty under the Natural Environment and Rural Communities Act 2006 to have regard, so far as is consistent with the proper exercise of its functions, to the purpose of conserving biodiversity.
- The Countryside and Rights of Way Act 2000
- National Parks and Access to the Countryside Act 1949
- The Environment Act 1990
- The Hedgerow Regulations 1997
- Governments Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services
- Government circular 06/2005
- UK Biodiversity Action Plan
- West Midlands Biodiversity Pledge
- Staffordshire Biodiversity Action Plan

### **The National Planning Policy Framework 2012**

The National Planning Policy Framework (NPPF) sets out the government's planning policies for England and how these are expected to be applied. The framework acts as guidance for LPAs and decision-takers, both in drawing up plans and making decisions about planning applications. As such an applications ability to accord to the guidelines detailed within this document is often at the core of an LPA granting or refusing planning permission.

The NPPF 2012 enshrines the importance of improving biodiversity value and safeguarding priority and protected species and habitats as key requirements of sustainable developments; stating where developments fail to account for and protect Priority Species and Habitats; adhere to the ecological mitigation hierarchy; or are unable to demonstrate they will result in no net-loss to biodiversity value that an LPA should refuse planning permission.

The key paragraphs of the NPPF 2012 in relation to ecology and the requirements they place upon both developer and LPA are summarised below:

- Upon submission of a planning application the applicant must be able to display that the development will not result in a net-loss to biodiversity value, otherwise it will be in conflict with the guidance of paragraphs 9, 109 and the requirements of paragraph 118. Paragraph 109 requires developments to achieve a net gain where possible. Natural England advises that in applying this national policy and conforming to international standards, it should be assumed that achieving a net gain is always possible, unless a developer is clearly able to justify as to why it is not possible; including via the incorporation of offsite compensative measures to achieve an overall net gain to biodiversity within a district (i.e. a Biodiversity Offsetting Scheme).
- Paragraph 2 places upon LPAs the obligation to "reflect and where appropriate promote relevant EU obligations and statutory requirements" and so the requirements of the EU Biodiversity Strategy 2020 that development provides a measurable net gain to biodiversity should be adhered to.
- Paragraph 117 details all LPAs should create planning policies which;
  - Plan for biodiversity conservation and improvement at a landscape scale
  - Preserve, restore and re-create area of Priority Habitats and work to re-establish ecological networks
  - Further protect and aid in the recovery of populations of Priority Species
- Paragraph 118 makes mandatory developments adherence to the mitigation hierarchy (information; avoidance; mitigation; compensation).
- Paragraph 118 also requires LPAs refuse permission to development that negatively impacts upon Sites of Special Scientific Interest, either directly or indirectly, in all but exceptional circumstances. However, where a developments primary objective is to conserve or enhance biodiversity it should be permitted.

## **Forward Planning**

Forward planning (the creation of policies within a districts local plan) should be viewed as a positive tool for the implementation of landscape-scale conservation. In accordance with the NPPF 2012, planning policies should be adopted to further strengthen an LPA's ability to protect Priority Habitats and Species; create new areas of Priority Habitat; and enhance and/or increase connectivity between areas of existing Priority Habitat or designated sites.

Thought should be given in the drafting of both the wording and scope of such policies to insure that they are implementable, achievable from the point of their adoption and that any requirements a development must meet in order to be constant with such policies are not unnecessarily onerous or deviate in a significant manner from those detailed within the NPPF.

## **Biodiversity/Ecological Information and Impact Assessments Required to Support Planning Proposals within Staffordshire**

All developers are advised to enter pre-application discussions with their relevant LPA. Such discussions may establish the potential impact of a development; helping to outline the scope of surveys and assessments required to support an application.

Where there is potential for a proposed development to cause harm to internationally, nationally or locally designated sites, protected or Priority Species or Habitats, then the applicant must undertake appropriate surveys and assessment to a nationally recognised standard prior to the submission of a planning proposal.

The information gained from the site survey and assessment should be up-to-date (i.e. less than two years since the survey was conducted) and sufficient to allow the impact of the development to be appropriately assessed.

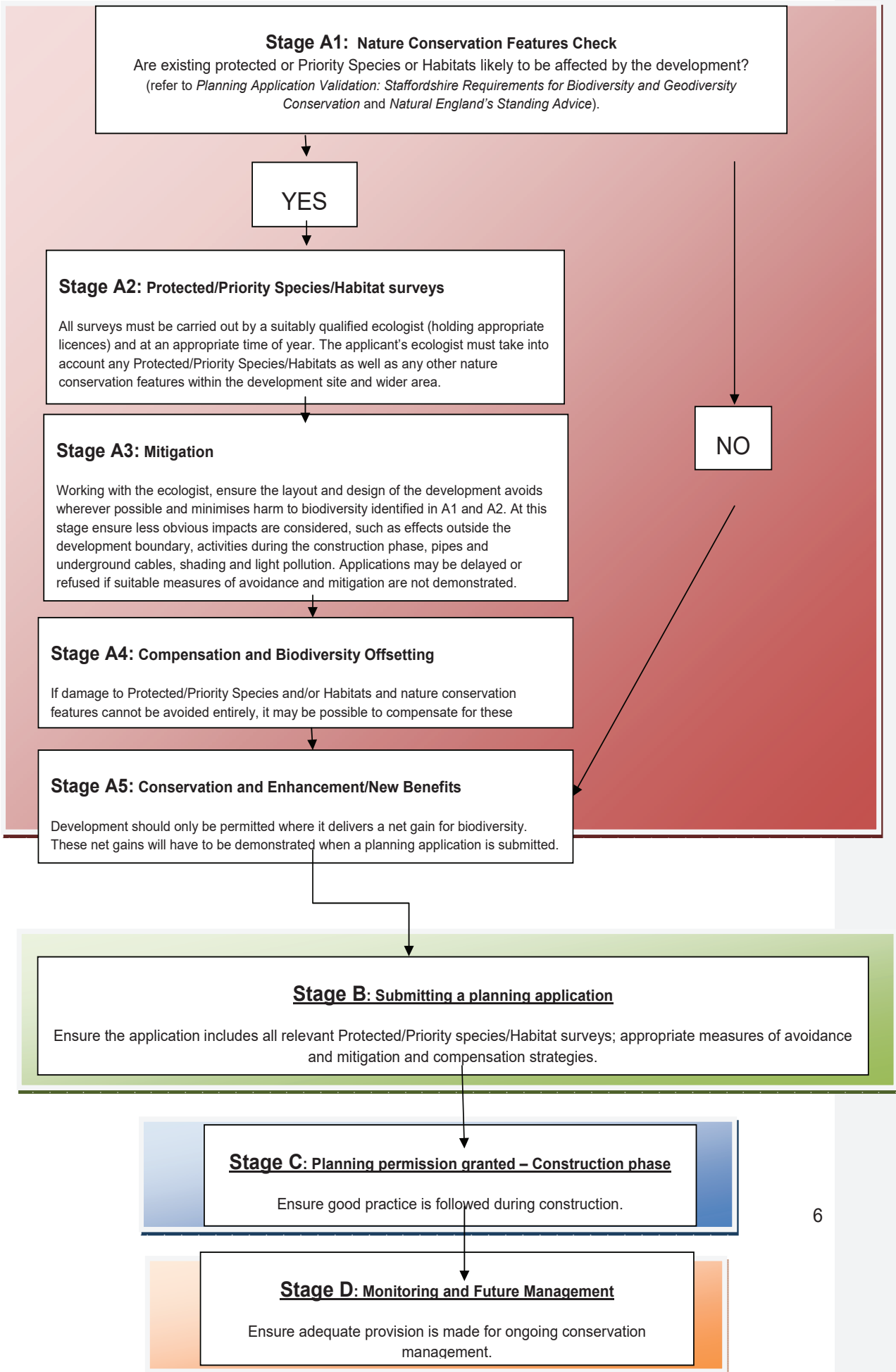
The likelihood that a protected or Priority Species or Habitat will be affected by development proposals should be established before a planning application is submitted. For further guidance to assess the likelihood of such a habitat and/or species being affected by a development proposal, applicants are advised to refer to both Natural England's Standing Advice and Planning Application Validation: Staffordshire Requirements for Biodiversity and Geodiversity Conservation.

Failure to provide accurate information in relation to a development's likely ecological impact is a reason for an LPA to refuse the registration of a planning application or else should result in its subsequent refusal at the moment of its determination.

The advance planning of ecological works should always be considered early in a project. Some developments may require the collation of ecological data over an extended period of time in order to present the most suitable scheme of mitigation.

A Step by Step Guide to insure Ecological/Biodiversity Impacts of a planning application are recognised and a net gain to biodiversity is achieved by a development

By adopting the approach summarised in Table 1, applications should progress expediently in relation to ecology and will comply with domestic and European legislation and demonstrate best practice.



## Provision within LPA's for Appropriate Ecological Expertise

Due to the inherent complexity of the legislation, policy and guidance and their relationship to the natural systems they seek to conserve, all LPA's must ensure that they have access to ecological expertise, this is best provided via in-house support.

Due to the responsibilities placed upon them, LPA's may find it beneficial to have access to professional ecological advice in the following situations:

- Determination of a planning application
- Phrasing of planning conditions
- Phrasing of S106 Agreements
- Creation and implementation of policy
- Pre-application advice
- Sustainability Appraisals of Strategic Development Allocations
- Liaising with developers, local interest groups, statutory bodies, wildlife organisations

### 19.2.2 How you can help Staffordshire's wildlife to flourish

Landowners, conservation groups, local authorities and statutory agencies are crucial to ensuring Staffordshire is rich in wildlife for future generations, however, a wide range of other partners, such as businesses, local communities and schools all have an important role to play. Each section below highlights specific actions that we must work together to achieve.

"More, Bigger, Better and Joined" (The Lawton Principle) (Lawton *et al.*, 2010)

To ensure the survival of Staffordshire's wildlife, additional new habitats need to be created and all habitats need to be larger, in a better condition, and better connected within landscapes to facilitate species movement. The keystone of this is the conservation and enhancement of what we already have. This is what we call landscape scale conservation. We need to work collectively to achieve a landscape rich in wildlife that benefits society through the ecosystem services it provides.

**To achieve this, partners need to work together:**

- **Protect and improve Staffordshire's habitats and create more areas for wildlife**
- **Ensure wildlife is a key consideration within developments.** Local authorities should seek ecological advice to assist with assessment of applications and securing mitigation of impacts, utilising biodiversity offsetting where appropriate. Development can provide significant opportunities for habitat creation and enhancement in strategic locations.
- **Local Authorities should adopt strong biodiversity policies,** through their Local Plans, biodiversity action plans and the use of existing or new biodiversity and green infrastructure strategies and planning documents.
- **Ensure that important habitats are protected,** through increasing survey coverage and designation of important habitats as Local Wildlife Sites. Continue to use local authority plans and policies to protect Local Wildlife Sites.

We need to improve the condition of our habitats, particularly aiming to reach Favourable condition on our designated sites. By utilising the expertise of landowners and managers, and by providing support through resources and ecological advice, improvements can be made.

- **Work towards achieving Favourable condition on all SSSIs** - adopt an interim target toward achieving Natural England's target of 50% of SSSIs in Favourable condition by 2020 (DEFRA, 2011) and carry out regular monitoring to assess progress towards meeting the target.
- **Continue to improve the habitat quality of Local Wildlife Sites** - increase monitoring of sites and provision of advice. Local Authorities should consider new targets for the proportion of Local Wildlife Sites in appropriate management, expanding on previous targets from the 2011 Local Area Agreement Target.
- **Pollution control** – work with landowners and facility managers to find creative solutions to reducing pollution and minimising chemical and pesticide use, particularly near watercourses.
- **Deliver a co-ordinated programme of control of invasive non-native species.**
- **Promote the importance of habitat variation** – including provision of a range of niche habitat features such as bare ground with pioneer vegetation or the provision of deadwood.

- **Continue and improve agri-environment schemes to maximise environmental benefits** – provide a supportive framework for profitable farming and best environmental practice through agri-environment schemes and the promotion of voluntary initiatives, such as the Campaign for the Farmed Environment.

We need to work together to create new habitat to form better connected landscapes for wildlife.

- Undertake habitat connectivity mapping and use this to inform strategic planning - work collectively to undertake habitat connectivity mapping across the county. This should bring together existing information, best practice guidance and biodiversity opportunity maps into one location.

### **Recognise the value of Staffordshire's nature in decision making**

As well as their inherent value, wildlife and habitats provide important 'ecosystem services' that benefit us all. We need to raise the profile of the vital roles Staffordshire's habitats and species play in the economy and well-being of people, such as those related to pollination and reduction of flooding. Ecosystem services should be considered in land use decision making.

### **Direct more resources towards ensuring Staffordshire's habitats are protected and enhanced for wildlife and public benefit**

It is important to have the resources required to create a county richer in nature by supporting land managers to deliver environmental benefits alongside a thriving farming sector. We also need to ensure we have the resources to survey, monitor and understand Staffordshire's nature as this is key to effectively conserving it. Although the decision to leave the EU has caused uncertainty, there is an opportunity to look at how future agri-environment schemes and land subsidies can deliver more benefits for wildlife and the public.

### **Work in partnership**

To achieve gains for Staffordshire's wildlife, businesses, conservation organisations and many others must work together. Existing partnership projects such as Transforming the Trent Valley Washlands and Connecting Cannock Chase, and partnership work with farmers and quarry companies, must be continued, whilst innovative and new partnerships need to be formed and expanded.

### **Improve the knowledge of Staffordshire's nature**

To adequately protect and enhance Staffordshire's habitats we must fully understand what habitats there are; currently only 53% of Staffordshire is mapped by habitat type with many records over 10 years old.

- Each Local Authority should aim to have 100% up-to-date habitat mapping coverage.

There needs to be more recording of Staffordshire's species

- Increase targeted surveys and monitoring across Staffordshire through the continuation and expansion, where appropriate, of national monitoring programmes such as butterfly transects.
- Support and work with volunteers and specialist species conservation groups to maintain and improve understanding of the species found in Staffordshire and their needs.
- Increase the use of species as indicators of habitat quality. Analysis systems, such as the Invertebrate Species – Habitat Information System, should be more widely used to provide an indication of habitat condition and the provision of specific niche habitat features such as deadwood.

We need to continue to store this information in an effective way through Staffordshire Ecological Record (SER), but also look to expand the work of SER.

- Manage additional data and computerise historical data so that we can better understand how nature has changed.

Provide more opportunities for people to get involved and engage with nature

In order to secure a sustainable future for our wildlife and habitats it is important that as many people as possible are involved.

- Improve access to high quality green space for wildlife, particularly in urban areas, and promote the value of habitats for human health and well-being.
- Provide more opportunities for people of all ages to learn about wildlife.
- Volunteers can play a key role in helping to protect and manage Staffordshire's habitats and species.
- Support community-led initiatives and schemes that get people involved in citizen science, carrying out surveys and monitoring wildlife in their local area.
- Provide more opportunities to increase involvement through volunteering.

From small gardens to a large areas of habitat and industrial land, you can make a difference to Staffordshire's wildlife. We can help you identify opportunities and advise on how best to achieve them.

- **MPs and Councillors** can use their influence to bring about change at a local, regional and national level. Help us to put wildlife at the heart of relevant policies and make a pledge for the environment. Ensure that the UK leads on climate change and create a countryside richer in wildlife by supporting farmers and landowners to deliver environmental benefits.
- **Parish councils** can draw up effective neighbourhood plans that help protect biodiversity and identify opportunities to enhance and create habitats.
- **Local authorities** - see Key Messages for Local Authorities section.
- **Businesses** can make the most of biodiversity opportunities on their land, which can be aided by the production of a biodiversity action plan. By ensuring nature is protected and not harmed through everyday business practices and by highlighting the importance of nature to stakeholders, companies will have a wider positive impact on Staffordshire's wildlife. Businesses can also organise staff team building days to carry out important improvements to Staffordshire's habitats and get involved in wildlife surveys in their local area. Providing funding for larger scale habitat creation or restoration can make an even more significant contribution to the local environment.
- **Developers** can help by ensuring that developments are designed with the best possible gains for biodiversity, taking opportunities to go beyond the compulsory biodiversity work required. There may also be opportunities to contribute to strategic priorities by acquiring sites for habitat creation in locations that connect existing habitats.
- **Land managers** can help by ensuring they have the most up-to-date knowledge of how best to manage their land to benefit the wildlife that depend upon it. More information on specific habitats and species are provided on the following pages.
- **Volunteer / local groups** can help by campaigning for better wildlife protection, raising awareness of the importance of wildlife, helping improve knowledge of Staffordshire's wildlife by carrying out surveys, getting involved in enhancing the local environment or offering time to help a local conservation organisation.
- **Individuals** can help by managing gardens to benefit biodiversity, getting involved in wildlife surveys, volunteering to help conserve and enhance habitats, campaigning for better wildlife protection and supporting local conservation organisations.

## CASE STUDIES

- Case study 1 – Habitat network mapping in the Churnet Valley (Authors and contributors: Mike Shurmer)
- Case study 2 - Whittington Heath Golf Course, HS2 phase 1 Biodiversity Offset Scheme (Authors and contributors: Justine Lloyd, Chris Walsh)

## 19.3 Conclusions

Flora conclusions that could be included:

- There has been generally little negative change to the areas compared. They are centred around SSSIs and Local Wildlife Sites which have generally been the focus of site protection and conservation efforts through landowner liaison work, agri-environment schemes and work carried out by conservation organisations. The data therefore demonstrates the importance of such work.
- Separately these two analyses appear to be contradictory; the monad analysis indicates that there has been little apparent habitat loss in the selected areas, which is a somewhat different result than for the comparison between the two Flora periods, where species change indicates that semi-natural habitats have been lost. This could be due to a difference in the time periods analysed, which would imply that the rate of habitat loss was greater in the mid 20th Century. It is, however more likely to be due to the way in which the monads were selected, having focussed on areas where conservation effort was greatest.
- The comparison of the two Floras is also not a direct measure of habitat quality, because it examines species presence / absence only, indicating a very broad picture using large-scale data. Analysis of this type of data has been shown to be stable and the results are consistent with other similar work (ref Staffs Flora Ch 10, Birmingham and B C Flora, my PhD). The analysis concentrating on monads examines habitat maps from two distinct periods and is a direct measure of habitat change within the limitations of that data; its main drawback is that it focuses on areas where semi-natural habitats are most abundant and therefore probably where conservation effort has been most intense.
- Over the whole county, the picture is generally that of decline in species of semi-natural habitats and probably also a decline in those habitats themselves. In areas where conservation effort has been concentrated, the picture is more usually more positive with most habitats remaining stable and lowland heathland condition improving. Increasing effects of urbanisation (under-represented by analysis) and intensification of agriculture have the potential to threaten the integrity of remaining habitats.

### Summary from Response for Nature - What Nature Needs Section

#### 1. Set an inspiring Vision

Nature needs to be part of our lives. To achieve this, the Government must set a trajectory for nature's recovery. Saving nature cannot be the job of just one Government department. The 25-year plan to restore biodiversity must be owned and supported across Whitehall. We need recognition that restoring nature is a key solution to some of our most pressing social, environmental and economic problems.

#### 2. Set goals for nature and natural capital

To help encourage nature's recovery, the plan should include realistic but ambitious outcomes. For example, we need to safeguard more of our land and sea. The Government's plan should include:

- A short-term outcome to ensure the implementation of international commitments to secure the effective management of a sixth of land for nature by 2020.
  - A long-term (2040) goal on the sustainable management of land and sea.
3. Defend and implement the laws that conserve nature
  4. Deliver an ecological network on land and at sea
  5. Safeguard species
  6. Improve people's connection to nature
  7. Provide smarter financial instruments
  8. Develop greener institutions and embed nature across Government
  9. Set five-year milestones with accountability to Parliament
  10. Support people working together for nature



## State of Staffordshire's Nature Report - Case Study Number 1

### Habitat network mapping in the Churnet Valley

#### Habitats & species:

**Habitats:** Woodland, grassland.

**Species:** Woodland and grassland birds, invertebrates and plants.

#### Key messages

- Habitat network mapping has been produced for priority woodland and grassland habitats in the Churnet Valley.
- Priority zones for habitat creation and restoration and enhancing landscape character were identified at the landscape-scale.
- Churnet Valley vision and advocacy document has been produced, using the outputs of this work.

#### Overview

The Churnet Valley is rich in natural and cultural heritage. A mosaic of woodland and grassland habitats includes several SSSIs and other important sites for wildlife, and holds regionally important populations of many wildlife species. Since 2012 the Churnet Valley Living Landscape Partnership (CVLLP), led by Staffordshire Wildlife Trust, has undertaken a number of heritage projects across the area.

The aim of this project was to better understand the health of habitat networks in the Churnet Valley, using innovative new modelling approaches. Information on the extent of important woodland and grassland habitats and records of Priority Species were used to assess existing habitat connectivity and the ability of wildlife to move through the landscape.

This was combined with Landscape Character Assessments to identify priority zones for habitat creation and restoration, and to create a vision map for the Churnet Valley, supporting the future work of the CVLLP.

#### Contact

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RSPB

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#### Partners

The RSPB, Staffordshire Wildlife Trust, Staffordshire County Council, Natural England and the wider Churnet Valley Living Landscape Partnership.

#### Funding

The project was funded by Natural England's North Mercia Innovation Fund and HLF via the Churnet Valley Living Landscape Partnership.

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**Contact**

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**Partners**

The RSPB, Staffordshire Wildlife Trust, Staffordshire County Council, Natural England and the wider Churnet Valley Living Landscape Partnership.

**Funding**

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Whittington Heath Golf Course, HS2 Phase 1 Biodiversity Offset Scheme

**Habitats & species:**

**Habitats:** Open mosaic, ponds, wetland, lowland dry acid grassland, lowland heathland.



**Photo:** Heathland habitat, SWT

**Key messages**

- A portion of Whittington Heaths Golf Course Site of Biological Interest (a heathland site) is to be destroyed by the future creation of HS2 phase 1.
- Through a partnership approach approx. 13 hectares (ha) of new heathland and associated habitats has agreed to be created and managed as part of the redesign of the Golf Course.
- This habitat creation work is being funded by HS2, making it their first Biodiversity Offset site.

**Overview**

Whittington Heath Golf Course (WHGC) is a 63 ha site situated to the southeast of Lichfield. The site is both an active Golf Club and a Site of Biological Importance (SBI), designated for its mosaic of lowland heathland and acid grassland. However, the route of HS2 Phase 1 cuts directly through the centre of the site, causing the destruction of approx. 3.7 ha of the SBI.

In order for WHGC to remain viable, 28 ha of new land was to be purchased by HS2 to allow the course to be remodelled. Lichfield District Council's Ecology Team recognised the opportunity to create significant new areas of heathland and associated habitats as part of this redevelopment; allowing for a net-gain to biodiversity to be achieved; new areas of priority habitat to be created; the remaining heathland to be expanded and buffered; and habitat connectivity within this part of the district to be substantially increased.

**Contact**

Chris Walsh  
Lichfield District Council

**Partners**

Lichfield District Council's Ecology Team, Whittington Heath Golf Club, HS2 limited

**Funding**

HS2 limited

## **Objectives**

- To compensate for lost biodiversity value caused by HS2.
- To increase the total area of priority heathland/acid grassland habitat within the district.
- To expand and buffer the remaining SBI heathland and increase habitat connectivity.
- To establish the principle of HS2 Biodiversity Offsetting Schemes.

## **Approach, Outcomes & Future Work**

The Ecology Team requested that the opportunity to achieve a net gain in biodiversity be taken, and funded by HS2 limited, within the councils petition to the house of commons, and also met extensively with both WHGC and HS2 limited to negotiate that the new area of land provided to the golf course also become HS2 limited's first Biodiversity Offset Site.

As a result of this partnership approach to the redevelopment of WHGC, approx.13 ha of new heathland and associated habitat will be created and managed with the aim that it will reach a habitat quality to allow for its eventual designation as an extension to the remaining SBI.

This new habitat creation ensured not only that the planning application to redevelop WHGC (granted permission in 2016) provide a measurable net-gain biodiversity value but also allowed HS2 to pre-emptively mitigate for its future biodiversity impacts both to the SBI and elsewhere along its route.

All habitat creation works and future good management were secured by Lichfield District Council through planning conditions. At this time the site remains the only location where HS2 has agreed to fund compensative habitat creation beyond the boundary of the land designated within the hybrid bill.

# APPENDIX A - Generic issues and recommendations

## Section 1 - General issues

### Habitat Management Issues

1. Dominant species control - Ongoing management of encroaching scrub and other invasive species such as bracken.
2. Pollution
3. Nutrification
4. Runoff from roads and car parks
5. Runoff from land uses, e.g. urban areas, agriculture, forestry.
6. Runoff - Impact of chemical runoff into watercourses in the control of invasive / non-native species control.
7. Lack of / under grazing- Difficulties in getting sites grazed and maintaining correct stocking densities.
8. Overgrazing
9. Access / disturbance of sensitive habitats through recreation pressures.
10. Habitat fragmentation and severance
11. Resources - resource availability to carry out management
12. Nitrogen Deposition
13. Neglect
14. Inappropriate management, e.g. inappropriate grass cutting regimes
15. Intensive agriculture, e.g. fertiliser application
16. Habitat loss to development
17. Land drainage
18. Invasive non-native species – control and eradication of species such as Himalayan balsam and Japanese knotweed

## Section 2 - General recommendations

### Habitat size and connectivity

HC1. Increase habitat size and connectivity - improve habitat connectivity through the creation of new sites and the expansion of existing sites, taking into consideration best practice guidance on distances from existing sites and ideal sizes for new sites.

### Management of habitats

M1. Increase bare ground habitat - higher recognition of the value of bare ground habitats for the benefit of invertebrates and other groups.

M2. **Manage for structural habitat diversity** - increase the recognition of the value of varied habitat structure and the value of the scrub and bramble, of varied ages and in varied aspects. Gradual transition to woodland edge.

M3. **Increase resources** - Further resources to increase management, particularly on sites with little management at present

M4. **Ensure appropriate grazing** - Protect from inappropriate grazing, instigate and continue appropriate grazing regimes.

M5. **Improvements in planning & use of chemicals** -Improvements in the planning of the use of chemicals for the control of invasive species and their potential runoff into watercourses.

M6. **Implementation of Sustainable Drainage Systems (SuDs)** - near car parks/roads/major paths near watercourses and sensitive habitats.

**M7. Innovative management of recreation pressures** - Innovative management of recreation pressures to reduce impact on sensitive species and habitats.

**M8. Consider potential recreation impacts on habitats & species when planning management** - When planning habitat management works, take further consideration of the impact of recreation on the habitats, i.e. for sensitive species/sites avoid creating good ground nesting bird habitat near paths which have the potential for disturbance from dogs.

**M9. More integrated planning and management of sites across ownership boundaries.**

**M10. Integrated use of volunteer groups** - More integrated use of different volunteer groups.

**M11. Use of by-products from management** - Increased use of birch bundle makers and other crafts in the control of scrub.

**M12. Sustainable management** - Look for more sustainable methods of controlling scrub through the uses of timber and marketability.

**M13. Survey and monitoring** - More complete monitoring of habitats, including vegetation, invertebrates and other taxa and the use of results to inform habitat condition and management.

**M14. Instate suitable mowing regime.**

**M15. Manage hedgerows by rotational winter cutting.**

**M16. Manage woodlands for age and habitat diversity**

**M17. Increase research, and links with universities, colleagues and schools**

## **Other**

**DM1. Agri-environment schemes** - Use opportunities through agri-environment schemes and any targeting of the schemes to create and manage habitats.

**DM2. Habitat creation through the planning system** - Use opportunities through planning to create new habitats. Biodiversity offsetting could be a major method of delivering new habitats if it is adopted widely in future.

**DM3. Increase uptake of grants** - Continue to apply for grants to fund project work and habitat works (e.g. Landfill Community Fund grants, EU Life projects, Heritage Lottery Fund, Interreg, could fund on site practical works, although additional match funding is usually also required).

**DM4. Guidelines for planners** - Development of guidelines for planners, i.e. guidelines for the creation of various habitats, particularly guidance on distances from existing habitats, locations and size etc.

**DM5. Large-scale habitat creation projects** – Use The National Forest as an example of a large-scale habitat creation project - The National Forest may be a good model to emulate, where a range of mechanisms are being used to deliver a new, wooded landscape across the 200 square mile project area. The National Forest Company leads the creation work and is a non-departmental public body sponsored by the Department for Environment, Food and Rural Affairs (Defra) established in April 1995.

## APPENDIX B: List of case studies

Chapter	Title	Author(s)
<b>Introduction</b>	Staffordshire Ecosystem Assessment	Sarah Bentley (SCC)
<b>Designated sites</b>	Chasewater and the Southern Staffordshire Coalfield Heaths SSSI	Ali Glaisher (SCC), Jaclyn Lake (Natural England)
<b>Designated sites</b>	Doxey and Tillington Marshes SSSI flood compensation works	Jeff Sim (SWT)
<b>Woodland</b>	25 years of The National Forest	Sam Lattaway (NFC)
<b>Woodland</b>	Staffordshire Wood Fuel Project	James Cartwright (SCC), Ali Glaisher (SCC)
<b>Woodland</b>	Woodland bird recovery in the Churnet Valley	Mike Shurmer (RSPB)
<b>Grassland</b>	Blooming Stoke	Victoria Brooks (SWT), Bernadette Noake (SWT)
<b>Grassland</b>	Friends of Motte Meadows	Ruth Green (Friends of Motte Meadows), with contributions from from Tim Coleshaw and Friends of Group
<b>Grassland</b>	Restoring species-rich grassland at Cauldon Quarry	Victoria Brooks (SWT), Ali Glaisher (SCC), with contributions from Dan...
<b>Lowland heathland</b>	Connecting Cannock Chase	Jeff Sim (SWT), Bernadette Noake (SWT)
<b>Lowland heathland</b>	Heathland restoration at Kinver Edge	Simon Barker (NT), Ewan Chapman (NT), Andrew Perry (NT)
<b>Lowland heathland</b>	Heathland restoration at Barlaston & Rough Close Common	Bill Waller (SBC)
<b>Moorland</b>	Brund Hill Plantation	Helen Dale (SWT)
<b>Moorland</b>	Low intensity mixed grazing	Jon Rowe (SWT), with

	at The Roaches Nature Reserve	contributions from Helen Dale (SWT) and Jeff Sim (SWT)
<b>Wetlands</b>	Friends of the Wom Brook	Anita Ferguson (Friends of the Wom Brook)
<b>Wetlands</b>	Wetland restoration - Perkins Engines Limited	Shaun Rimmer (SWT)
<b>Wetlands</b>	Middleton Hall and Dosthill Quarry Restoration	Nick Mott (SWT)
<b>Built environment</b>	Burton-upon-Trent i-Tree Project	Vicki Liu (SWT) with contributions from Dianne Hewgill (SCC), Sarah Bentley (SCC), Chris Jones (SCC)
<b>Built environment</b>	Love Your River - Stoke & Urban Newcastle	Stephen Cook (Groundwork West Midlands)
<b>Built environment</b>	Wild About Tamworth	Shelly Pattison (SWT)
<b>Farmland</b>	Mottey Meadows Rural Sustainable Drainage Systems (RSuDS)	Anna Maxwell (SWT)
<b>Invertebrates</b>	Increasing opportunities for nesting solitary bees and wasps	Hayley Dorrington (SWT), Jeff Sim (SWT)
<b>Invertebrates: Lepidoptera</b>	Butterfly surveys in the Churnet Valley	Rory Middleton (SWT)
<b>Fish</b>	Gayton Brook Catchment Partnership 2010 - 2014	Nick Mott (SWT)
<b>Amphibians and reptiles</b>	Amphibian translocation at i54	Dan Saberton (SCC), Ali Glaisher (SCC), Lucy O'Toole (SWT)
<b>Amphibians and reptiles</b>	Redhill Business Park	Ali Glaisher (SCC)
<b>Birds</b>	Staffordshire Barn Owl Action Group	Helen Cottam (BOAG)
<b>Birds</b>	Staffordshire lapwing survey 2014	Scott Petrek (SWT)
<b>Mammals</b>	Otters in Staffordshire	Derek Crawley (SMG), Debby Smith (SMG)
<b>Mammals</b>	Harvest mice	Derek Crawley (SMG), Debby Smith (SMG)
<b>Mammals</b>	Staffordshire Bat Group	Vicky Worrall (SBG)



<b>Plants</b>	Himalayan balsam control	Lucy O'Toole (SWT), Kate Dewey (SWT)
<b>Plants</b>	Snake's head fritillary population at Broad Meadow LNR, Tamworth	Shelly Pattison (SWT)
<b>Plants</b>	Woodland Wildflower Project, Forest of Mercia 2001 - 20015	Kate Dewey (SWT)
<b>Areas</b>	Burntwood Milestone Way Strategic Development Allocation	Justine Lloyd (LDC), Chris Walsh (LDC)
<b>Why is nature changing &amp; what needs to happen</b>	Habitat network mapping in the Churnet Valley	Mike Shurmer (RSPB)
<b>Why is nature changing &amp; what needs to happen</b>	Whittington Heath Golf Course, HS2 Phase 1 Biodiversity Offset Scheme	Justine Lloyd (LDC), Chris Walsh (LDC)

## APPENDIX C: Methods

Habitat Changes in 68 km grid squares, comparing 1978-83 data with 1995-2015 data  
Overview and methods.

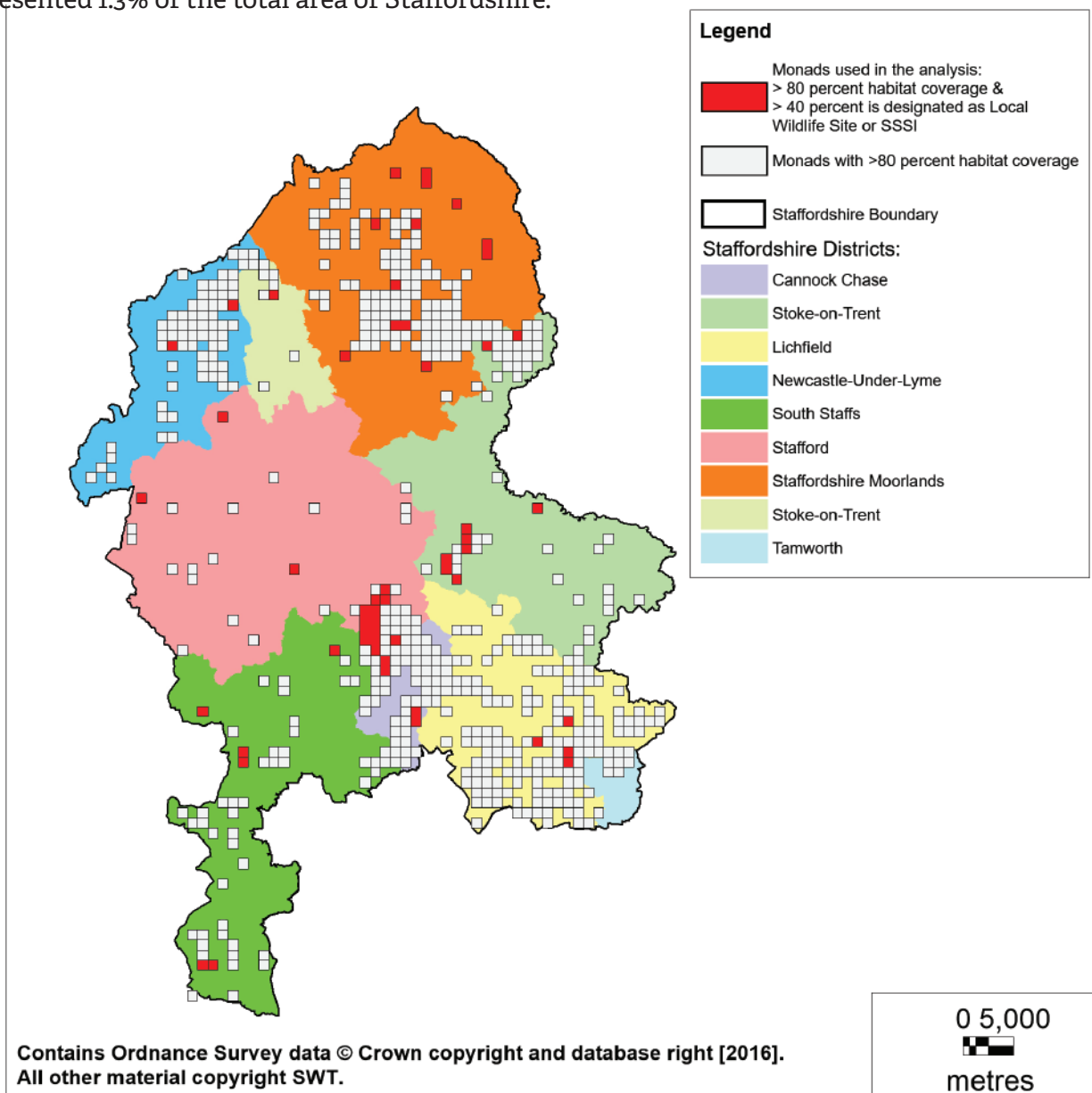
In order to analyse changes in habitat type that have happened in locations mapped on the Staffordshire Ecological Record (SER) system, a selection of 1 km grid squares were identified for analysis that represented all of Staffordshire's Districts (approximately 53% of Staffordshire is mapped on the SER system).

Historical habitat surveys of much of Staffordshire were carried out between 1978 and 1983, however, this data is on paper maps and has not been digitised. More recent surveys have been undertaken and stored digitally on the Staffordshire Ecological Record GIS system. Therefore, in order to analyse changes in habitats since 1978, it was necessary to select a sample of the historical data to digitise and compare with the more recent habitat data (1995-2015). Habitats from the first survey were translated into nearest Phase 1 codes, as a different methodology was used (pre-Phase 1) and current NVC habitats were also translated into Phase 1.

Neither survey period had 100% coverage of Staffordshire. It was therefore decided to select 1km grid squares with > 80% habitat coverage in a grid square in the current GIS system (this was 573 1km grid squares). Since the first survey did not generally map agricultural land, it was then decided to select 1km grid squares with a high proportion (>40%) of designated sites (SSSI or Local Wildlife Site), since there was likely to be a higher coverage of mapping on the paper maps in these areas.

This resulted in 68 1km grid squares being selected (Figure 1) in order to compare habitats between 1978-1983 (years of the official County Habitat Survey project when most of the surveys were carried out, however some surveys were carried out in 1977 (Peak District) and possibly some as late as 1985) and 1995-2015 ("modern" survey, current GIS habitat layer, "Habitat Composite", excluding data from 1982-94), with all habitats in the 'modern' layer older than 1995 being removed.

In addition, all geographical areas where there was only habitat in only one of the survey periods were removed; data was only analysed where there was habitat coverage mapped in both survey periods for the same locations so that like with like was compared. After the removal of area of land not mapped in both surveys, 3386.75 ha was included in the analysis (50% of the area of the 68 grid squares). This represented 1.3% of the total area of Staffordshire.



**Figure 1. Map of the 68 1km grid squares analysed for habitat changes. Grid squares that met all criteria and were used in the analysis are red.**

As the selection of grid squares was biased towards those with a high proportion (more than 40%) of designated sites (habitats of recognised importance that should be better protected) and due to the small sample size, the results are not representative of the wider countryside and cannot be generalised for the county as a whole.

### Explanation of results

The results of the analysis are summarised in Table 2, as well as detailed in each of the habitat chapters. Columns in green show the total amount of habitats in the selected 1km grid squares from the first survey (1978 – 83). The total amount of the different habitats in the second survey period (1995–2015) are shown in the bottom purple row.

The main body of the table shows how much of each habitat type has changed to another habitat type, or stayed the same. The cells in yellow/orange show the amounts of the different habitats that have not changed habitat categories between the survey periods. NB; while a similar amount of habitat may be recorded between the survey periods, the locations of such habitats may have changed. Finally, the total overall change in hectares and percentage are shown in the pink columns to the right of the table.

Category in 1978 - 83 Survey	Total Area in 1978 - 83 Survey (ha)	Current habitats (habitat data from 1995 - 2015) (hectares)																				Overall Change						
		Category in 1995-2014 Survey																				Increase or decrease	Overall Change (%)					
		Deciduous Woodland	Coniferous Woodland	Lowland Acid Grassland	Upland Acid Grassland	Neutral Grassland	Calcareous Grassland	Poor Quality Grassland	Lowland Heathland	Upland Heathland	Lowland Mire (Bogs, Flush and Springs, Fen, Bore Peat)	Upland Mire (Bogs, Flush and Springs, Fen, Bore Peat)	Swamp & Open Water (Open Water, Running Water, Swamp, Marginal and Inundation categories)	Unspecified Woodland	Mixed Woodland	Parkland & Scattered Trees	Recently Felled Woodland	Scrub	Bracken	Built-up	Rock Exposures	Tall Herb	Arable	Cultivated/Disturbed	Bare Ground			
Deciduous Woodland	607.84	438.27	66.44	4.30		8.33	0.04	7.50	18.48	0.99			3.29	2.48	37.32	0.01	2.03	1.86	14.48	0.20	0.00	0.76	0.28	1.28	1.28	127.11	20.91%	
Coniferous Woodland	769.64	40.80	645.96	3.82		11.48		0.57	28.42				0.25	1.11	21.46	0.02	4.42	0.88	5.84	1.16		0.14			0.68	0.03	0.00%	
Lowland Acid Grassland	239.81	35.32	8.19	19.09		9.12		28.35	102.48				0.03	10.03				11.30	11.60						3.91	-186.17	-77.63%	
Upland Acid Grassland	23.09	1.46			1.88	3.88	0.15	4.79					0.02					0.10			0.01	0.50				0.03	-16.35	-66.48%
Neutral Grassland	168.15	19.64	2.10	2.80	0.18	76.38	0.72	47.78	0.02	0.01			1.31	3.15	0.01			1.07	3.77	7.30	0.02	1.57			0.11	32.56	19.36%	
Calcareous Grassland	25.16	1.07			2.02																0.05					20.14	80.06%	
Poor Quality Grassland	108.64	13.63	0.21	0.43		21.18		4.00	195.00				5.80	1.87	0.73			2.35	0.02	8.16	0.58	3.03	1.09	0.02	5.19	132.95	122.02%	
Lowland Heathland	246.68	11.76	6.65	8.24		3.12		4.00	177.34				0.06	9.44				2.12	5.82	0.01	0.10				0.28	211.28	85.65%	
Upland Heathland	380.49	5.98	0.77		5.56	16.65		2.00					0.00					0.19	2.04		0.04	0.07			0.00	-186.86	-48.89%	
Lowland Mire (Bogs, Flush and Springs, Fen, Bore Peat)	18.57	5.48		0.62		3.26		0.61	5.73				0.14	0.46	0.00			0.13	1.61		0.06				0.06	0.04	-18.01	-96.96%
Upland Mire (Bogs, Flush and Springs, Fen, Bore Peat)	5.60			0.36		1.02		0.77		1.32			0.14								0.01					166.97	2983.41%	
Swamp & Open Water (Open Water, Running Water, Swamp, Marginal and Inundation categories)	62.49	3.91	0.95	0.28		3.43		2.61	0.74				48.93					0.08	0.16	0.04	0.02	0.07	0.15		0.11	8.26	13.21%	
Unspecified Woodland	1.54	1.22						0.03	0.00					0.29												3.93	255.76%	
Mixed Woodland	93.23	34.30	27.08	0.14		0.49		0.30	4.46	0.07			0.07	24.14				0.00	1.43	0.03						53.77	57.67%	
Parkland & Scattered Trees	203.05	26.65	0.02	0.30		7.61		84.00	5.65				0.25	0.11	18.70			0.07	1.43	0.07			58.18			-184.31	-90.77%	
Recently Felled Woodland	7.41	0.03		7.37																						-0.96	-12.97%	
Scrub	87.47	35.43	0.43	2.30		10.97	0.03	10.29	8.10	0.98			0.95	1.82				5.46	1.81	0.32	7.21	0.04			0.50	0.83	-54.37	-62.15%
Bracken	242.15	49.05	1.50	8.84	0.00	4.34	1.56	1.96	85.97	3.03	0.02	0.40	0.01	36.23	0.00			1.82	44.64	0.01					2.76	-146.73	-60.59%	
Built-up	6.57	0.19																0.00	6.39							17.12	260.39%	
Rock Exposures	53.47	10.24	0.01	0.41		11.15	0.18	1.85	0.26	0.92			9.28	0.88				3.92	0.42		11.36		2.04		0.49	-34.10	-63.77%	
Tall Herb	35.72	0.51	1.62	0.04		1.58	30.31	0.16	0.00	0.12								0.97	0.35	0.00	0.01	0.03			0.01	-29.41	-82.35%	
<b>Total (ha)</b>	<b>3386.75</b>																											
<b>Total Area of habitat in 1995-2014 Survey (ha)</b>	<b>734.96</b>	<b>769.67</b>	<b>53.64</b>	<b>7.74</b>	<b>200.70</b>	<b>45.30</b>	<b>241.19</b>	<b>457.96</b>	<b>194.63</b>	<b>0.56</b>	<b>172.57</b>	<b>70.75</b>	<b>5.46</b>	<b>147.00</b>	<b>18.73</b>	<b>6.45</b>	<b>33.10</b>	<b>95.42</b>	<b>23.69</b>	<b>19.37</b>	<b>6.31</b>	<b>65.01</b>	<b>0.80</b>	<b>15.72</b>	<b>3386.75</b>			

Notes - Orange text shows the amount of habitat which has not changed category i.e. the same locations were the same habitats in both survey periods.  
 - Look at the end two columns for the overall gain or loss of the habitat

Table 1. Habitat change shown from an analysis of 68 1km grid squares.

# Local Wildlife Site Analysis

## Overview and methods

A comparison of the area change of Staffordshire's Local Wildlife Sites (LWS) was made based on baseline data gathered from annual monitoring surveys carried out by the LWS partnership between 1996 – 2000 and the modern resurveys of these sites present in 2016.

Firstly, a full inventory of habitat data collected from the initial 96-2000 LWS surveys was generated using a Geographic Information System (GIS) package and Microsoft Excel to provide a baseline. The same inventory was then generated for the sites present in 2016, however this included all sites (i.e. those which were resurveyed from the original 1996-2000 surveys as well as new sites designated since 1996-2000) meaning that the initial overall area of habitat data gathered was greater than the baseline. The output from the GIS package was then broken down by each individual area of habitat, with associated site name and its area in hectares so the 1996-2000 and current coverage could be compared and checked on a site-by-site basis. The extra information gathered for sites designated since 1996-2000 was also utilised to analyse the area of habitats entering into a designated site designation since 2000.

Habitat data gathered as part of LWS surveys are predominantly using standard 'Phase 1' habitat categories with a small amount of data using National Vegetation Classification (NVC) habitat categories. These specific habitat categories were easily translated into the broader wide scale habitat categories used in this report, e.g. woodland, grassland etc. The GIS data structure for the LWS areas makes it simple to distinguish the Local Authority in which the site is located in, allowing the habitat analysis to be easily broken down by Local Authority area.

## Limitations

The original baseline survey data did not use the same defined LWS criteria that the modern resurveys are based on, and tended to be based around the subjective views of the surveyor who was carrying out the survey at the time. As a result, several sites from the original LWS surveys do not have any background habitat data associated with them, leading to problems in directly comparing actual area of habitat between the 96-2000 baseline and the modern resurvey.

## Current Habitat Coverage in Staffordshire

### Overview and methods

The amount of habitat in Staffordshire was calculated using data held by Staffordshire Ecological Record (SER). Habitats were grouped into simplified broad categories grouped by Staffordshire Wildlife Trust, as illustrated in Table 1 (see section above). The amount of habitat in urban areas was calculated by analysing habitat data using JNCC broad habitat categories that occur within the in-house created layer of main conurbations.

The amount of habitat classed within Sites of Special Scientific Interest (SSSI) was derived from figures supplied by Natural England. All SSSI data was correct as of 4th December 2015, when it was downloaded from the Natural England Designated Sites website. To calculate the habitat condition for different habitats, the information on the "main habitat" in each SSSI unit was used as the habitat for that unit. As there may have been other habitats within the unit, the condition of different habitats presented should be treated with this understanding. Some SSSI habitats have been combined to make simplified overall groupings for the habitat pages in this report, and some are included in more than one overall grouping as they are relevant to that habitat as well. This has been indicated throughout the report where applicable.

## Current species records for Staffordshire

### Overview and methods

The number of species in Staffordshire was either calculated by County Recorders, Special Interest Groups or by interrogating the Staffordshire Ecological Record (SER) database. Table 3 explains the dates used as a cut off for each taxonomic group when running searches. Different dates were used depending on the taxonomic group; some groups are better recorded permitting a more recent cut-off date to be used.

Table 3. The source of data and cut off years used to calculate the number of species of each taxonomic presented in this report

Taxon Group	Cut off	Data Source
Invertebrates (incl Lepidoptera)	1990	Staffordshire Ecological Record
Butterflies	Unknown	Butterfly Conservation West Midlands
Moths	1990	Staffordshire Ecological Record
Fish	1990	Staffordshire Ecological Record
Fungi (not reliable FG has full list)	1990	Staffordshire Fungus Group
Birds	none	County Bird Recorder, West Midlands Bird Club
Mammals (excl marine)	1990	Mammal Society
Amphibian & Reptiles	none	Staffordshire Ecological Record
Vascular Plants	1995	A Checklist of the Flora of Staffordshire, revised 2016 (BSBI)

## APPENDIX D: Glossary

**Biodiversity offsetting** - A system used predominantly by planning authorities and developers to fully compensate for biodiversity impacts associated with economic development, through the planning process. Offsets should aim to achieve no net loss and preferably a net gain of biodiversity, and be managed/ maintained in perpetuity.

**Citizen science** - The collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

**Ecological Networks** - A way of thinking about landscapes and how we can create linkages between key wildlife areas to benefit habitats and species. Ecological networks are created by identifying opportunities to connect habitats through provision of corridors, stepping stones and buffer zones.

**Ecosystem services** - These are the processes by which the environment produces resources utilised by humans or that are beneficial to humans including carbon storage, flood mitigation, and food production.

**Good Overall Status** - An assessment of the biological quality of UK watercourses based on standards set in accordance with the Water Framework Directive and other EU water directives.

**Local Wildlife Sites** - Areas that are locally important for the conservation of wildlife. They are identified and selected for the significant habitats and species that they contain.

**Natural Flood Management** - Natural flood management is the alteration, restoration or use of landscape features, working with natural hydrological and morphological processes, in order to reduce flood risk.

**Priority Species** - These are defined as including those listed as NERC Act 2006. Schedule 41: Species of Principal Importance in England, and Staffordshire Biodiversity Action Plan (SBAP) Priority Species.

**Protected Species** - These are defined as those listed on the Birds Directive, Habitats Directive, Badgers Act, and the Wildlife and Countryside Act 1981 excluding those on Schedule 9(5) Sale only.

**Site of Special Scientific Interest (SSSI)** - SSSI is a statutory designation placed on an area of land that is considered to be of special interest by virtue of its fauna, flora, geological or geomorphological features. Owners and occupiers of SSSIs are required to obtain consent from Natural England if they want to carry out, cause or permit to be carried out within the SSSI any activity that may affect the interest of the site.

- **Condition status of SSSIs** - The condition of SSSIs in England is assessed by Natural England. There are six reportable condition categories: Favourable; Unfavourable Recovering; Unfavourable No Change; Unfavourable Declining; Part Destroyed and Destroyed. Favourable and Unfavourable Recovering are most frequently referred to within this document, and are defined by Natural England:
  - **Favourable** - The designated feature(s) within a unit are being adequately conserved and the results from monitoring demonstrate that the feature(s) in the unit are meeting all the mandatory site specific monitoring targets. A unit can only be considered favourable when all the component designated features are favourable.
  - **Unfavourable Recovering** - Often known simply as 'recovering'. Units/features are not yet fully conserved but all the necessary management mechanisms are in place. At least one of the designated feature(s) mandatory attributes are not meeting their targets. Provided that the recovery work is sustained, the unit/feature will reach favourable condition in time.

**Special Area of Conservation (SAC)** - A Special Area of Conservation (or SAC) is a site designated under the Habitats Directive.

**Sustainable Drainage Systems (SuDS)** - SuDs are a natural approach to managing drainage in and around properties and other developments.

# APPENDIX E: Corrections

Correction to the State of Staffordshire's Nature 2016 Summary Report

## **P.25 Headlines**

should read Six of these are Priority Species and four are legally protected.

## **Lowland heathland figures...**

### **Headline findings 2015 – 2016**

- It was reported that 23,582 hectares (8.7%) of Staffordshire is covered by a nature conservation or geological designation. The correct figures are that 21,642.78 hectares (8%) of Staffordshire is covered by a nature conservation or geological designation.



# APPENDIX F: References

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## **APPENDIX G: Partnership information**

The State of Staffordshire's nature report has been produced by a partnership of organisations, with Staffordshire Wildlife Trust acting as joint publisher with Staffordshire Ecological Record. The project was led by Staffordshire Wildlife Trust with the support of a steering group, with significant advice and input from a wider partnership of organisations and specialist groups, some of whom were also chapter authors.

### **Steering Group**

Staffordshire Wildlife Trust  
Staffordshire Ecological Record  
Dr Sue Lawley, Staffordshire Flora expert  
RSPB  
Staffordshire County Council  
Butterfly Conservation  
Lichfield District Council  
Geoconservation Staffs  
Staffordshire Invertebrate Group  
Staffordshire Mammal Group  
Natural England

### **Wider Partnership**

British Geological Survey  
Buglife  
BSBI  
BTO  
Butterfly Conservation West Midlands Branch  
Campaign for the Farmed Environment (Staffordshire)  
Cannock Chase District Council  
Cannock Chase AONB  
East Staffordshire Borough Council  
Environment Agency  
Forestry Commission  
Individual recorders/experts for Lichens, Mosses and Flora  
Lichfield District Council  
The National Forest Company  
The National Trust  
Newcastle-under-Lyme Borough Council  
Peak District National Park Authority  
Potteries Museum & Art Gallery  
South East Staffs Bat group  
Severn Trent Water  
South Staffordshire Council  
South Staffordshire Water  
Stafford Borough Council  
Staffordshire Amphibian and Reptile Group  
Staffordshire Barn Owl Action Group (BOAG)  
Staffordshire Bat Group  
Staffordshire County Council  
Staffordshire Fungus Group  
Staffordshire Invertebrate Group  
Staffordshire Mammal Group  
Staffordshire Moorlands District Council  
Staffordshire Moth Group  
Stoke-on-Trent City Council  
Tamworth Council  
West Midland Bird Club/ County Bird Recorder  
Wild about Tamworth



# APPENDIX H: Acknowledgements

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**Volunteers**

This report would not have been possible without the thousands of wildlife sightings recorded and submitted by volunteers each year to recording schemes and Staffordshire Ecological Record. Much of our knowledge of the state of Staffordshire's nature is based upon this data and for this we are very thankful. We also recognise the value of volunteers and land managers who work with conservation organisations on projects on the ground aimed at improving areas or habitats for the benefit of wildlife across the county, as shown by case studies throughout this report. We hope to continue to work together with volunteers, recorders and land managers to further increase our knowledge and better inform our future conservation efforts.

