



Herts and  
Middlesex

Hertfordshire's  
State of  
**NATURE**

**2020**



» **We must make more space... for nature if we want future generations to be able to enjoy the wildlife experiences that we treasure**



# FOREWORD

Watching a barn owl hunting over hedgerows as sunset approaches, seeing a hedgehog snuffling around your garden after dark, admiring the bluebells swaying gently in a spring breeze... some of our most enduring memories are about our experiences with the natural world.

Most people would agree that our wild places, and the wildlife that depends upon them, should be cherished and protected. But our wildlife continues to struggle.

For the first time, this ambitious report brings together the story of Hertfordshire's wildlife over the last 50 years. Some of this report makes for difficult reading – on average we have lost 3 species every 2 years – but there is hope here too. When organisations and individuals work together we can achieve some real progress for wildlife – the boom in Hertfordshire's bittern population clearly shows us what can be achieved.

Hertfordshire is a county of contrasts – from the urban centres of Watford and Stevenage to the rolling arable farmland around Royston and Bishop's Stortford, and from the chalky grasslands of the Chiltern Hills to the woods of Broxbourne. The county boasts some truly stunning wild places which are home to some wonderful local wildlife.

This report should be seen not just as a story of changes to species and habitats, but of people's relationship with wildlife. Increasingly we are becoming disconnected from wildlife in our everyday lives. We must make more space – both physical and emotional – for wildlife if we want future generations to be able to enjoy the wildlife experiences that we treasure.

At Herts and Middlesex Wildlife Trust we believe that wildlife should be able to thrive alongside our everyday lives and that everyone is better off when they have access to nature. As a local conservation charity, we work to protect wildlife and help people connect with nature. We compiled this report to help give us a clear picture of Hertfordshire's wildlife and the steps we need to take to protect it.

One thing is clear – if we want to see nature thrive in Hertfordshire then we must work together. Herts and Middlesex Wildlife Trust is just part of the story told here and we welcome anyone who would like to work with us to help create a wilder Hertfordshire for generations to come.

We are very grateful to the volunteers and supporters who have made this report possible, in particular the many volunteer recorders who have spent hours over many years surveying wildlife. Without the support of our partners, members and volunteers the Trust simply could not continue our work.

This report is just the beginning. The future undoubtedly holds many challenges and we are looking forward to facing these alongside you and others that believe in a wilder future for Hertfordshire.

Thank you

*Lesley Davies*

**Lesley Davies**  
Chief Executive

*Mike Master*

**Mike Master**  
Chairman of Trustees



» For the first time, we are able to understand how Hertfordshire fits with the national picture of nature conservation

KINGFISHER © SHUTTERSTOCK

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The Hertfordshire State of Nature report builds on work done nationally in producing the UK State of Nature Partnership's reports in 2013 <sup>[1]</sup>, 2016 <sup>[2]</sup> and 2019 <sup>[3]</sup>. It follows the principle that species are the fundamental building blocks of our ecosystems and we regard them as the basic measure of how nature is faring.

Whilst the key issues identified in the national State of Nature reports are relevant to Hertfordshire, some issues are of greater importance in our local context than others. The purpose of this report is to provide a summary of changes in wildlife specific to Hertfordshire and to further understand how we should focus conservation efforts in this particular county. The report therefore does not simply rely on national conservation status of species but combines these with the latest local knowledge on species conservation status and distribution changes specific to Hertfordshire. Through this work, a new dataset of Hertfordshire Species of Conservation Concern has been produced.

In conjunction with the national State of Nature reports and the IPBES Global Assessment Report on Biodiversity & Ecosystem Services <sup>[4]</sup>, the Hertfordshire State of Nature report shows us that we are living in nothing short of a biodiversity emergency. For the first time, we are able to understand how Hertfordshire fits with the national picture of nature conservation and what contribution it can make towards addressing the global crisis.

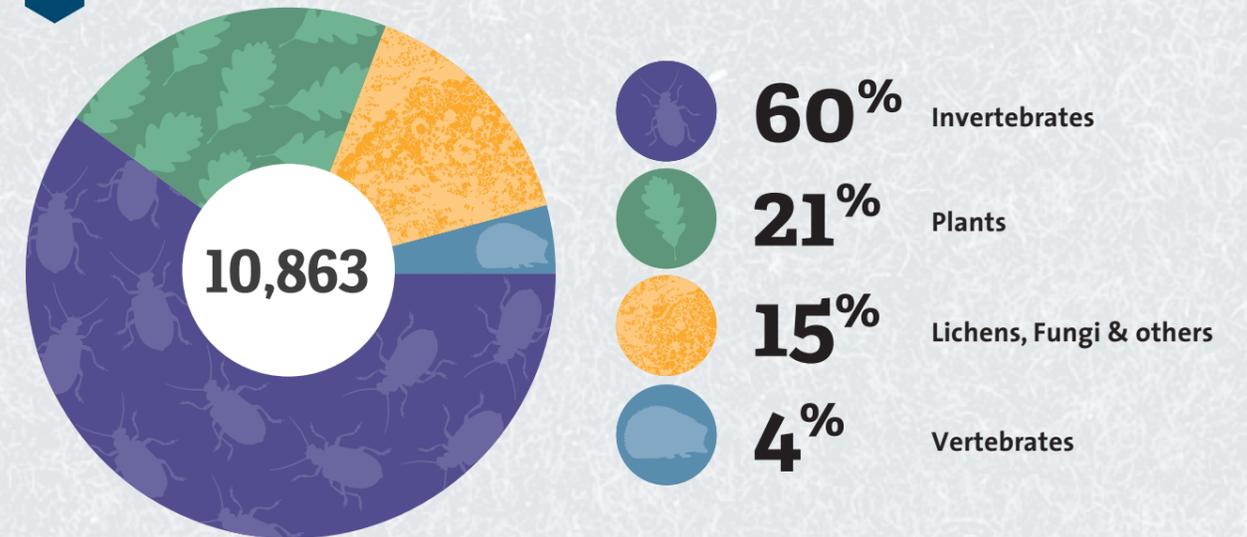


GREEN SANDPIPER © LUKE MASSEY

## By the numbers

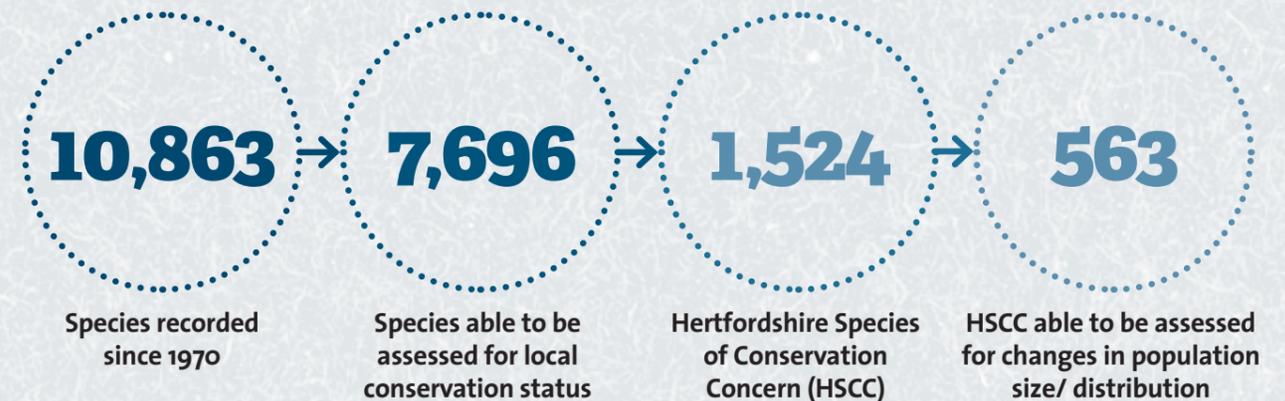
10,863 different species have been recorded in Hertfordshire since 1970. Most of these were invertebrates, followed by plants, reflecting the global distribution of species diversity.

**1** Species recorded in Hertfordshire from 1970 onwards by taxonomic group



Of all species recorded in Hertfordshire during that time, 7,696 species (over 70%) were able to have their conservation status assessed because sufficient data and knowledge existed to make the assessment. A total of 1,524 species (20% of those assessed) were identified as being Hertfordshire Species of Conservation Concern. This included species that are classed as Extinct or Threatened in a Hertfordshire context.

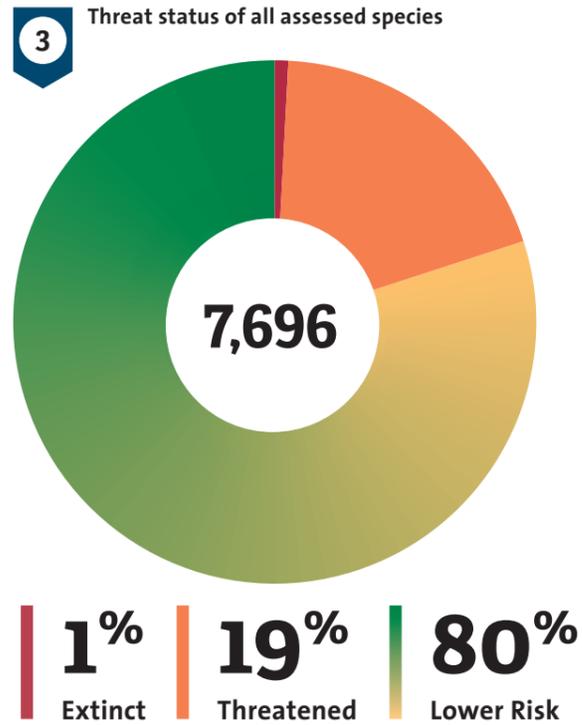
**2** Hertfordshire State of Nature assessment workflow with numbers of species able to be considered at each stage.



### Under threat

In the last 50 years, 76 species (1% of those assessed) became extinct in Hertfordshire; more than three species every two years. Of these, 35 were invertebrates, 26 were plants, 13 were vertebrates and 2 were lichens. 1,446 species (19% of those assessed) are currently threatened with extinction in Hertfordshire. This includes over 1,000 invertebrates and 260 plants.

The remaining 80% of species were classed as Lower Risk<sup>[5]</sup> and were not selected as Hertfordshire Species of Conservation Concern. However, the risk level varies within this group, and for some species may be quite high, but these would have been difficult to distinguish between in a consistent enough way amongst different taxonomic groups with the available data and knowledge. Therefore, the importance of conserving these species should not be undervalued.



### Lost from Hertfordshire



The **burnt orchid** is a rare and distinctive wildflower, restricted to chalk grassland.

Despite its last known location being a Site of Special Scientific Interest (SSSI), it is now considered to be extinct in the county<sup>[46]</sup>. Inappropriate site management is thought to have contributed to its loss.



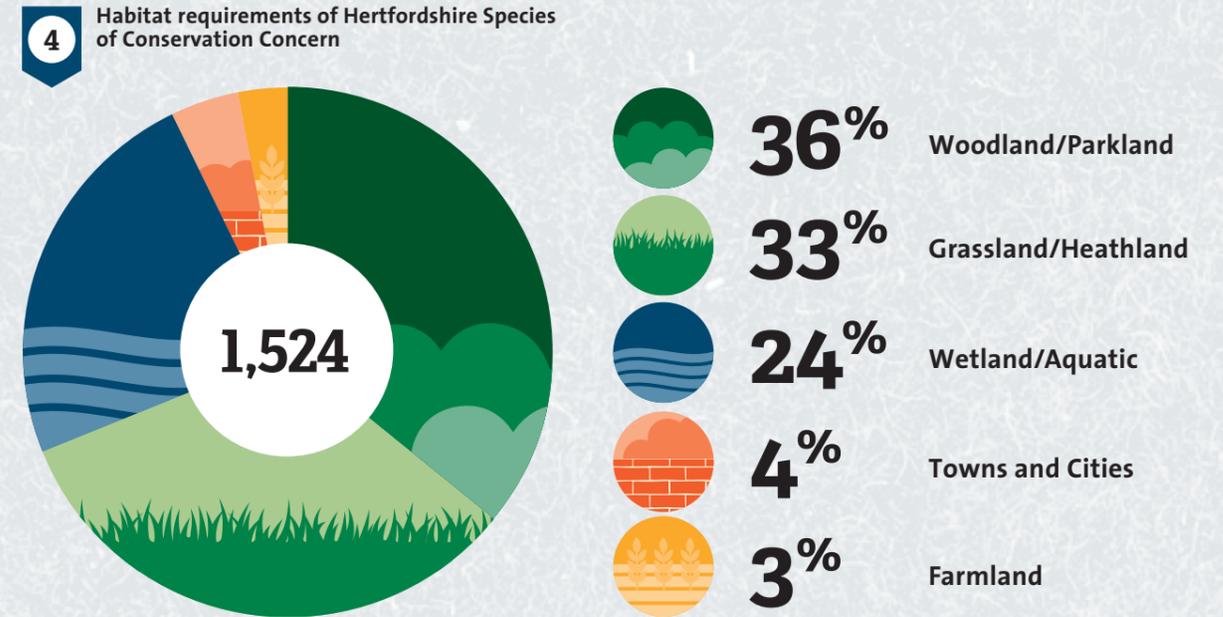
The **white-clawed crayfish** is the UK's only native species of crayfish. It used to be found in Hertfordshire's chalk rivers but became extinct in the county in the 1990s as a result of competition and disease from non-native crayfish released into the wild. This is just one example of damage caused by non-native invasive species released or escaped into the wild, of which there are a number affecting Hertfordshire's wildlife. This issue was identified nationally as one of the key drivers of species declines<sup>[3]</sup>.



The **nightingale**, iconic for its beautiful song, was once a widespread breeding bird in Hertfordshire. It thrived in high quality woodlands with a healthy scrub layer. It no longer breeds in the county, mostly because of the decline of traditional woodland management, namely coppicing<sup>[44]</sup>. Over-maturation of our woodlands resulted in the loss of dense woodland scrub in which the birds breed. Browsing pressure from increasing numbers of deer means that the physical structure of the remaining scrub is no longer suitable.

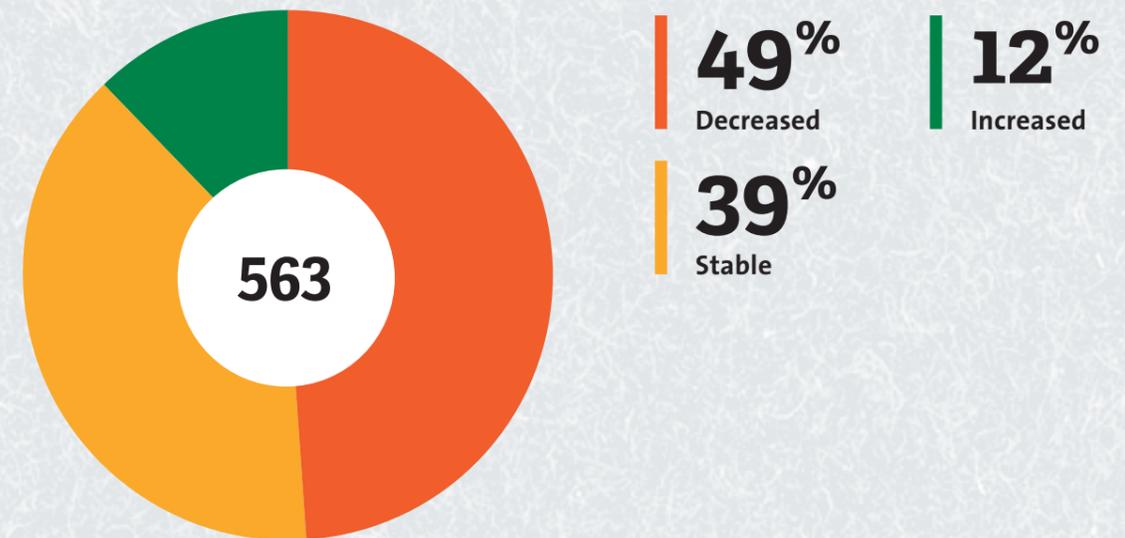
### Hertfordshire Species of Conservation Concern

Most Hertfordshire Species of Conservation Concern were associated with the three main semi-natural habitats of woodland, grassland and wetland. Only 7% were associated with urban and farmland habitats combined.



Hertfordshire Species of Conservation Concern were assessed to understand if they had noticeably decreased, increased or remained stable in Hertfordshire over the last 50 years. It was only possible to make a determination for approximately one-third of species assessed because of a lack of systematic surveys of change for most species at a county level. For those species where a status of change was able to be determined, 49% declined, 39% remained stable and just 12% increased.

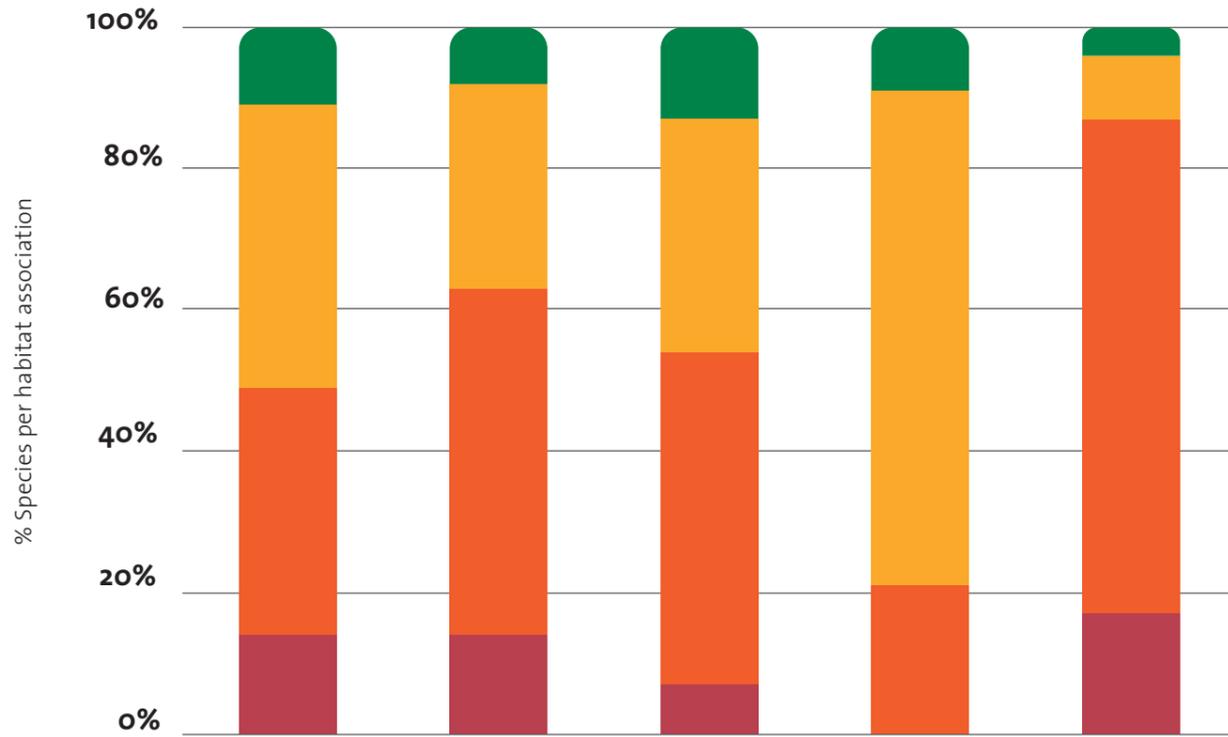
**5** Population changes for extant Hertfordshire Species of Conservation Concern that were able to be assessed for change.



Of the semi-natural habitats, the greatest combined percentage of extinctions and species that have decreased were associated with grasslands, followed by wetlands. Arable farmland showed the highest equivalent percentage of the habitats overall but, although the percentages were high, the actual numbers of species were very small.

6

**Relative breakdown (%) of population changes of Hertfordshire Species of Conservation Concern requiring each type of habitat.** Species counts are given in the table below the chart.



	Woodland/Parkland	Grassland/Heath	Wetland/Aquatic	Town and cities	Farmland
Increased	20	20	21	3	1
Stable	73	69	54	23	2
Decreased	65	113	76	7	16
Extinct	26	34	12	0	4

25 of the Hertfordshire Species of Conservation Concern were further identified as a special responsibility for Hertfordshire to conserve in a national context. These are where Hertfordshire contains a significant proportion of the national population, or an isolated population, perhaps at the edge of the species' current national range.

### Hertfordshire's special responsibility to the UK

For 25 species, Hertfordshire is a particularly important place within the UK and we have a special responsibility to look after those species here because our local actions could have a significant impact on the UK population as a whole.



**Black-necked grebe** first bred at Hilfield Park Reservoir, in Hertsme, in 1990 and raised four young. Since 1998, birds have summered at the site every year with up to nine broods and in 2017 three pairs bred successfully. Nationally the population of black-necked grebes is estimated at between 32-55 pairs. Therefore the Hilfield Park Reservoir population of 5-10 pairs<sup>[44]</sup> is extremely important in a national context. Moreover there are no other breeding colonies in southern England.



**Pasqueflower**, also traditionally known as the 'Easter flower', named after the time of year it blooms, is one of our most magnificent-looking wildflowers. Nationally it is found on only a handful of ancient chalk grassland sites. In Hertfordshire, Therfield Heath near Royston contains the largest population of Pasqueflower of any site in the UK and it is our county flower.



**Down shieldbug** is a species of bug found only on ancient chalk grassland sites. It is associated with the wildflower bastard toadflax but only where its other exacting habitat requirements are in place as well. It was only first discovered in Hertfordshire in 2018, and this is the only known surviving colony of the species in the East of England.





# INTRODUCTION

**Wildlife globally, nationally and locally is in trouble. There has clearly been a rapidly growing public awareness of the climate change crisis we face but this perhaps has partially overshadowed the linked and equally catastrophic biodiversity crisis.**

Biodiversity provides us with an irreplaceable wealth of services, such as clean air, water, food, flood protection and many others that we cannot live without. We depend on biodiversity – our wildlife – for our own life-support. It is important for our economy, health, wellbeing and quality of life. Despite these facts, there is not yet enough public awareness of the alarming rate at which we are losing our biodiversity, and the impacts this is increasingly going to have on us. Moreover, the science is now clear that biodiversity loss and climate change are inextricably linked and to tackle one we need to also tackle the other <sup>[4]</sup>.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which advises governments around the world on biodiversity issues, published a Global Assessment Report on Biodiversity and Ecosystem Services in 2019 <sup>[4]</sup>. It concluded that 1 million species globally are currently at risk of extinction. Nature is declining at rates unprecedented in human history, and the rate of species extinctions is accelerating. The report predicts grave impacts on people around the world. It considers the current response to be insufficient and that transformative changes are needed to restore and protect nature.

The UK is no exception and this report comes at a time when the UK has failed to meet 14 out of 19 internationally agreed biodiversity targets by 2020 under the Convention on Biological Diversity <sup>[6]</sup>. The UK State of Nature Partnership has highlighted the biodiversity crisis specifically facing the UK. It has published three reports to date in 2013 <sup>[1]</sup>, 2016 <sup>[2]</sup> and 2019 <sup>[3]</sup>. The State of Nature project has been collating and analysing species datasets in the UK to understand and quantify how species populations and distribution have changed over the last 50 years, starting from 1970. The reports also summarise the latest knowledge on what has driven these changes. The 2016 report gives an account of species changes and the drivers

behind these individually for each habitat type. The 2019 report takes more of an overall view across all habitats, summarising the general key drivers of change within the UK. Successive reports have brought in new datasets, refined analyses and have been able to look at both long-term and more recent changes in species.

The latest (2019) State of Nature report found that the abundance and distribution of the UK's species has, on average, declined since 1970 and that this decline has continued in the last decade, despite conservation efforts. There has been no let-up in the net loss of nature over the last decade in the UK. Where there were sufficient data to analyse, it was reported that there has been a 13% decline in average species abundance and a 5% decline in average species distribution. 15% of species were found to be currently threatened with extinction from the UK and 2% have already gone extinct since 1970. It is recognised that massive species extinctions occurred prior to 1970 but this cut-off date was used because there were fewer data prior to this and it best reflects recent trends. It is also the period during which conservation efforts have been the greatest. The report finds that public support increased during this period, with a 26% increase in non-governmental organisational spend on nature conservation and a 40% increase in volunteer time spent. However, public sector spending on nature conservation during the same period decreased by 42%.

» **Biodiversity provides us with an irreplaceable wealth of services, such as clean air, water, food, flood protection.**



The key pressures identified in order of importance were agricultural management, climate change, hydrological change, urbanisation, pollution, woodland management and invasive non-native species.

The UK State of Nature partnership identified that the UK is one of the most nature depleted countries in the world, with a Biodiversity Intactness Index (BII) of just 81%. This is well below the 90% threshold considered to indicate that the Planetary Boundary for biosphere integrity has been crossed.

Nearly all of Hertfordshire is estimated to have a BII below the national average. This reflects the pattern of the lowest BII scores found in areas of the country where there is the most intensively-managed agricultural land, urbanisation and high population density. It highlights the importance of understanding how the local situation might differ from the national picture and gaining a more in-depth understanding of what are the most important issues locally in order to best target local conservation efforts. This is the aim of the Hertfordshire State of Nature report.

Following as similar an approach as possible to the national State of Nature project, a data cut-off of 1970 was used for the Hertfordshire project, allowing analyses to be focused on the last 50 years. Where there were sufficient data, known species associations were used to look at specific patterns for different habitats.



# HABITATS OVERVIEW

Hertfordshire has a diverse mixture of different natural character areas <sup>[7]</sup>. The majority of the county is divided between four natural character areas, with another two covering smaller areas.

This means that Hertfordshire is not known for a single dominant natural character; instead its character varies enormously in different areas. A brief description of Hertfordshire's important habitat features is provided below. A more in-depth description and history can be found in the 2014 Hertfordshire Ecological Networks report <sup>[8]</sup>.

The north of the county is dominated by surface chalk soils, making this the most important part of the county for chalk grassland. It includes Therfield Heath Site of Special Scientific Interest (SSSI) and Hexton Chalk Pit Nature Reserve.

The east of the county contains many of our chalk rivers, which are a special responsibility because most of the world's chalk rivers are only found in southern and eastern England. Most of Hertfordshire's ash-maple-hazel woodlands are also found in the east of the county, as are the best remaining examples of neutral grassland, such as Hunsdon Meads SSSI. Important wetland areas are found in the Stort Valley, including Thorley Wash SSSI and the internationally important Lea Valley SPA and Ramsar site.

The west of the county also holds a number of our chalk rivers and includes the Chilterns designated Area of Outstanding Natural Beauty (AONB). There is an interesting mix of soils resulting in some of the most important chalk grassland and acidic areas. Chalk grassland sites such as Aldbury Nowers SSSI are in close proximity to the internationally important acidic woodlands and grasslands at Ashridge Special Area of Conservation (SAC).

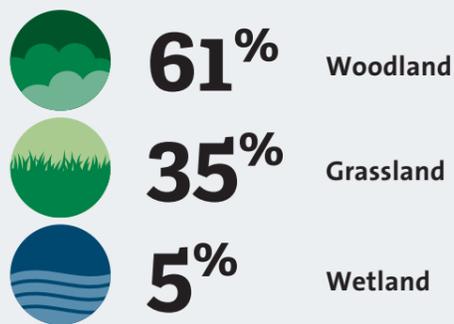
The south of the county is mostly acidic and has a highly distinctive character, extending down into much of Middlesex. This is the most wooded part of Hertfordshire and also contains the majority of the county's remaining heathland and acid grassland. It includes the Broxbourne Woods National Nature Reserve (NNR) and the adjacent Wormley-Hoddesdon Park Woods Special Area of Conservation (SAC).

There is a rich history of traditional land uses of commons, parkland and wood pasture. The woodlands are oak-hornbeam, some of which are highly dominated by hornbeam, which is a special feature of this area and very uncommon elsewhere in the UK. These woodlands are a special responsibility of Hertfordshire to protect and conserve.

The far south west of the county includes the important Colne Valley wetlands, which continue down through Hillingdon in Middlesex, including the Mid-Colne Valley SSSI.

Sitting on the edge of London and within south-eastern England, Hertfordshire's natural environment has been under enormous pressure for a very long time. There has been a large amount of urbanisation and much of the remaining rural land area is intensive agriculture. Golf courses cover over 3,455 ha, some five times the land area of Herts and Middlesex Wildlife Trust nature reserves. Major roads and other transport networks physically divide and fragment Hertfordshire's habitats.

There is currently approximately 27,000 ha of semi-natural habitat in Hertfordshire covering 16% of the county's area.



HEATHER © ANDREW PARKINSON2020VISION

**Table 1.** Semi-natural habitat in Hertfordshire in 2012

Broad habitat type	Area (ha)	Percent of semi-natural habitat	Percent of total land cover
Woodland	16,360	61%	10%
Grassland and heathland	9,340	35%	6%
Wetland	1,298	5%	1%
<b>Total</b>	<b>26,998</b>		

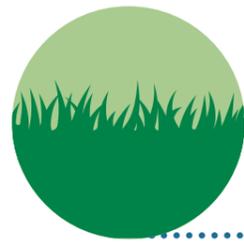
Full audits of Hertfordshire's habitats were carried out in 1996 and 2012, so this is the only time period for which habitat changes can be assessed. Only four habitats were able to be compared directly because of differences in how the others were defined and classified between the two datasets. For habitats where comparable data exists, Table 2 shows the change in reported habitat extent between the 1996 survey and the current habitat inventory surveyed in 2012. Due to technological improvements, the 1996 survey figures are not as accurate as the 2012 data and therefore the change figures calculated in the table should be treated as approximate.

**Table 2.** Comparison of semi-natural habitat cover in Hertfordshire between the 1996 and 2012 habitat surveys. Only directly comparable habitat categories between the two surveys were used.

Habitat type	Habitat area from 1996 survey (ha)	Habitat area from 2012 survey (ha)	Area change (ha)	Percent change
Unimproved chalk grassland	177	148	-29	-16%
Semi-improved chalk grassland	300	218	-82	-27%
Unimproved neutral grassland	950	280	-670	-71%
Woodland	15,030	16,360	1,330	9%

Over the 16 years between surveys, grassland habitats have continued to decline significantly. On average across the comparable types, this was an approximate 50% decrease. Conversely woodland has increased by around 9%; over 1,300 ha.

From a conservation perspective, grasslands are classified by both their soil characteristics and how agriculturally improved they are. Agricultural improvement is detrimental to wildlife and hence the best grasslands for wildlife are 'unimproved', followed by 'semi-improved'. Losses of high quality unimproved grasslands are not just down to conversion to other land uses. Many are a result of deterioration to less diverse grassland categories, such as to semi-improved or improved, through more intensive management, or a lack of management allowing growth of scrub and woodland. Through both tree planting and natural succession, woodland cover has increased partly at the expense of grasslands.



# The State of... **GRASSLAND & HEATHLAND**

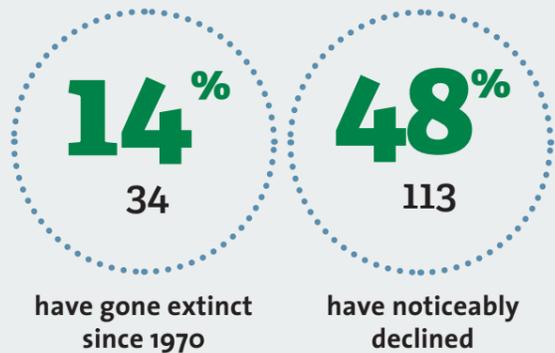
Semi-natural grasslands consist of meadows and pasture under less intensive management and with a greater diversity of species than improved grassland.

In Hertfordshire these include neutral, acidic and chalk grassland. Together with heathland, these are some of Hertfordshire's most threatened habitats. Mostly prior to the recent time period analysed here, Hertfordshire has probably followed a very similar pattern to the rest of the country, where over 97% of semi-natural grassland was lost in the fifty years prior to 1984 [9].

More recently, for the three grassland types able to be compared in extent in Hertfordshire between 1996 and 2012, there were significant further declines. Heathland is now one of the rarest of Hertfordshire's habitats and is all but wiped out, with just 13 ha remaining [8].

In Hertfordshire, over the last 50 years, grassland and heathland have seen a greater extent of noticeable species decline than any other habitat.

Of the species associated with grassland/heathland and with sufficient data in Hertfordshire to be analysed,



The key reasons for loss of grassland and their species identified in the 2016 national State of Nature report were agricultural intensification, afforestation, urban development and neglect [2]. Nitrogen deposition,

disturbance, inadequate or inappropriate land management, and habitat loss and fragmentation are all cited as barriers to grassland species' recovery.

All of these factors are relevant to Hertfordshire and most of the agriculture here is now arable. With very little extensive livestock farming left in Hertfordshire, there is little commercial value in semi-natural grassland, which has resulted in a move towards intensive land uses or abandonment.

A new, perhaps previously unconsidered, threat to grasslands is the recent ambition to plant trees to offset climate change impacts. If this occurs on semi-natural grasslands, it could result in unintended destruction of existing biodiversity. The importance of grasslands for storing carbon has often been underestimated [10]. Extensively managed grasslands can accumulate large stores of carbon in the soil. The greenhouse gas carbon equivalent net sequestration benefits of restoring or maintaining pastures through conservation grazing may be significantly greater than planting trees on them [11].

Hertfordshire's semi-natural grasslands desperately need a resurgence of grazing which, when managed with conservation in mind, is the most effective way of maximising invertebrates in most grasslands [12]. Where it is not possible to graze, management needs to be aimed at both reducing nutrients and creating variety. Uniform cutting regimes without leaving areas uncut are particularly harmful to most grassland invertebrates. It is always essential to remove any cuttings to prevent nutrient build-up and smothering of vegetation and bare ground.

Because grasslands and heathlands are some of our most threatened habitats, and each type is geographically restricted by specific soils, they are always an important consideration for habitat restoration and creation wherever the soils are suitable.



WILDFLOWER MEADOW © IAN CARLE



The **green tiger beetle** is a species of open heathy areas with bare soil.

This agile and iridescent species is one of our fastest running insects. It hunts other invertebrates on the ground by sight and needs to be able to spot its prey from a distance away.

It has declined because of a loss of heathland and because of scrub encroachment and nutrient enrichment on remaining heathlands, reducing the bare open areas vital for the species' survival.



**Eared willow** is a shrub that used to be most commonly found in heathy wood-pasture commons, particularly in south-east and central Hertfordshire.

However, it has gone from many of these former localities including both Bricket Wood and Broxbourne Woods and is now rare in the county.

The main reason for the decline in this species is disuse of the commons for grazing, leading to increased woodland cover [46].



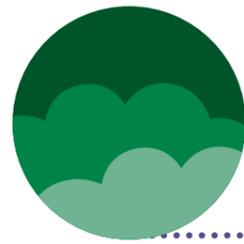
**Basil thyme** is a herb found in short, nutrient-poor, slightly disturbed turf over chalk.

It has decreased markedly and is now only found on a small number of sites. This is due to an overall loss and deterioration of chalk grassland sites, along with nutrient enrichment of unsympathetically managed road verges.



The lichen **Cetraria aculeata** is found growing on the ground on heathlands in the county. It has declined due to a loss of habitat and nitrogen enrichment.

» In Hertfordshire, over the last 50 years, grassland and heathland have seen a greater extent of noticeable species decline than any other habitat

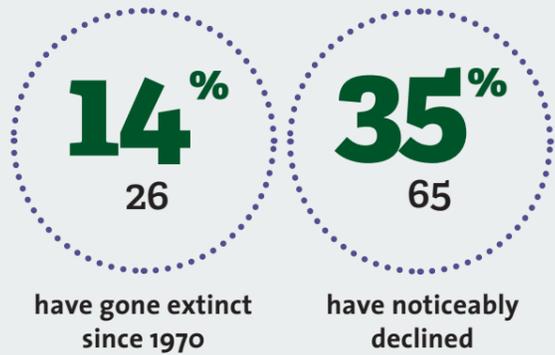


# The State of... **WOODLAND**

Hertfordshire has a similar percentage coverage of woodland to England as a whole, with woodland covering over 16,000 ha in Hertfordshire, some 10% of the total land cover.

Woodland is by far the most common semi-natural habitat in Hertfordshire, comprising 61% of all semi-natural habitat cover. Unlike other habitats, woodland cover has increased in Hertfordshire over the recent time period analysed.

Despite the increases in woodland cover over the time period analysed, of the species associated with woodland and with sufficient data in Hertfordshire to be analysed,



The state of woodland in Hertfordshire is very similar to the overall national situation. The national 2019 State of Nature report identified that overall woodland area increased by 9% between 1998 and 2018, whilst associated species declines and extinctions continued. The species declines were linked with changes in the structure and condition of established woodlands due to introduced tree diseases, increased browsing pressure by deer, human recreational disturbance, changes to management practices and neglect. At a national level, abundance indicators for woodland birds and butterflies were able to be analysed. This identified that old woodlands with a high level of structural diversity and open spaces are needed to support many specialist species. It is not just woodland age that is important; equally critical is the longstanding continuity of traditional woodland management practices that these woods have experienced.

Ancient woodlands support the highest diversity of species of any woodland type. These cover just 2.4% of the UK and 4% of Hertfordshire. Their age, combined with centuries of traditional woodland management practices, such as coppicing, created the necessary structural complexity to support a large number of specialist species. These are irreplaceable, and newer woodlands will never support the diversity of life of ancient woodlands without long-term management that achieves a similar level of structural complexity<sup>[12]</sup>. Most recent woodlands without ongoing conservation management become dense, overly-shaded, structurally simple habitats, able to support relatively little biodiversity compared with woodlands and other semi-natural habitats that have had a long continuity of traditional management.

The biggest threat to woodland biodiversity nationally<sup>[3]</sup> and in Hertfordshire is a lack of beneficial woodland management, not necessarily total woodland extent. Whilst habitat creation is an important aim for all habitats, management of existing woodlands, particularly ancient woodlands, is of the highest priority for this habitat category.

Veteran trees outside of woodlands, such as in parkland and hedgerows, are also extremely important for biodiversity and a high priority for conservation. Veteran trees in both woodlands and more open settings provide a multitude of different features important for biodiversity, such as rotting wood, sap runs and cavities. Recent survey work in Hertfordshire has found important colonies of the barbastelle bat in a number of sites. This species is highly dependent upon veteran features of peeling bark, cracks and splits. For many specialist invertebrates associated with veteran trees, continuity of those features is critical<sup>[12]</sup> and it is important both to conserve existing veteran trees and plan for the future to ensure required habitat features will always be available. Loss of veteran tree features, even over a short time period, will cause local extinctions of some species.



COBIONS WOOD © LESLEY DAVIES



© LUKE MASSEY PHOTOVISION

Despite its name, the **marsh tit** is primarily a woodland bird.

It has undergone a marked decline recently, probably mainly related to changes in woodland structure, similar to most of Hertfordshire's other declining woodland species. Most woodlands have gradually lost the well-developed shrub layer that this species requires, due to lack of active management and increased deer browsing.

» **The biggest threat to woodland biodiversity nationally and in Hertfordshire is a lack of beneficial woodland management.**



© DANNY GREEN

**Hazel dormouse** is an iconic woodland mammal that has declined so much in Hertfordshire that it is potentially on the brink of extinction here.

The Hertfordshire Natural History Society is currently working on a new atlas of mammals, amphibians and reptiles, which will be able to give the latest knowledge of this species' current distribution. The reasons for its decline are a complex mixture of factors, summarised by loss and fragmentation of habitat, reduction in habitat quality and a changing climate<sup>[30]</sup>. Poorer woodland structure is clearly an important factor, as is loss of high quality hedgerows connecting up woodlands, particularly important for arboreal species such as the hazel dormouse, which avoid coming down to the ground.

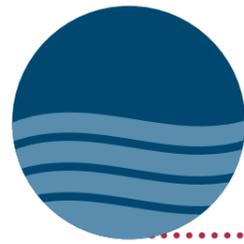


© DON SUTHERLAND

**Pearl-bordered fritillary** went extinct in Hertfordshire in the 1970s<sup>[47]</sup>.

It is a butterfly associated with woodland clearings, open rides and recently coppiced coupes. They fly in the spring, feeding on nectar from woodland flowers such as bugle. They need warm open areas with very short ground vegetation.

The decline of traditional management practices, such as coppicing, will have played a large part in this butterfly's decline over a long period of time. This is likely to have been exacerbated by other interacting factors, such as nitrogen deposition, coniferous plantations in ancient woodlands, increasing populations of deer and perhaps subtle climate change effects.



# The State of... **RIVERS & WETLAND**

Both nationally and locally, there is much less wetland than the other broad habitat types. This is mostly due to historical drainage, modification of floodplains and groundwater abstraction [3].

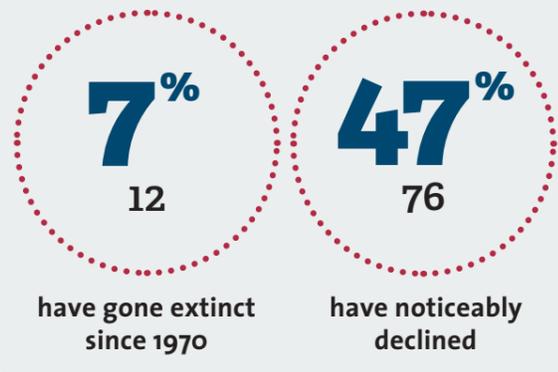
Many of the pressures currently affecting the distribution and quality of wetlands relate to these hydrological changes. Wetland comprises only 5% of the semi-natural habitat in Hertfordshire. This covers less than 1% of the total county area, poorer than the national 3% wetland cover [2].

Much of our wetland is the result of large-scale gravel extraction in Hertfordshire, leaving behind water-filled gravel pits throughout the lower River Lea and Colne valleys. Whilst many of these, such as Amwell Nature Reserve, are now excellent sites for wildfowl and other birds, most are relatively simple habitats that do not support the majority of Hertfordshire's other wetland species.

Other than these gravel pits, the most abundant and continuous wetland cover is found in the Stort Valley on the border with Essex. There is very little wetland associated with the majority of Hertfordshire's rivers, many of which are chalk streams, and the rest of Hertfordshire's wetlands and ponds typically occur in small isolated fragments scattered throughout the county. Small pockets of acidic wetland habitats are home to a number of Hertfordshire Species of Conservation Concern, such as star sedge and cross-leaved heath, nine aquatic water beetles and nine species of sphagnum. They are found in wet features on drier sites such as Hertford Heath, Patmore Heath and Bricket Wood Common. Small isolated features such as these are vulnerable to drying out and nitrogen deposition.

Hertfordshire has a national and international responsibility for protecting its special chalk rivers, which have a unique ecology due to their clean, mineral-rich water and consistent flows. It is critically important to address the multiple reasons for which the rivers are not achieving good ecological status.

Of those species associated with wetland and with sufficient data in Hertfordshire to be analysed,



This includes restoring stretches of river to improve geomorphology, water quality and light. However, these restorative measures on their own are not enough if flows cannot be increased. South-eastern England receives the lowest rainfall in the country and, possibly due to climate change, we have experienced some of the hottest and driest summer months on record in recent years. This is exacerbating the already serious and continually worsening issue of water demand in this part of the country. All of this has resulted in serious depletion of groundwater levels, which feed the chalk rivers from the aquifer. This is not an issue just for chalk rivers; it is a serious and increasing pressure on a wide range of wetland features and the species associated with them. Over-abstraction issues must be urgently addressed as a high priority, such as designing in a more resilient water supply. As well as this, climate and hydrological change adaptation measures must be urgently explored for important wetland sites.



TEWINBURY © JOSH KUBALE



© DAVID FERRIS (DPC) WIKIMEDIA

**Opposite-leaved pondweed** is an aquatic plant of clear spring-fed pools and fast-flowing clear streams such as high quality chalk rivers.

It declined particularly in East Hertfordshire in the 1980s where its rivers flow through arable land, suffering from eutrophication of the water. It has suffered elsewhere from the droughts of the 1990s and more recently, where we have seen long sections of chalk rivers drying out.

» **Hertfordshire has a national and international responsibility for protecting its special chalk rivers**



© SHUTTERSTOCK

**Little ringed plover** breeds in open gravel and sandy areas near freshwater.

This bird nests on the ground on stones with little or no plant growth. In Hertfordshire this is a very transient habitat mostly resulting from sand and gravel quarrying. They have declined as vegetation grew over their former sites.



© VAUGHAN MATTHEWS

The **bordered beauty moth** is found in damp woodland, and it requires sallow for its larvae to feed on.

In Hertfordshire the causes of decline are not clear but it is thought to be a result of development and a lowered water table, drying out previously suitable sites [31].

Where ancient remnants of wetland habitats exist in the county, these are a high priority for restoration. Opportunities should be sought for expanding and connecting them, particularly where they lie alongside rivers because this is where there is the highest potential for ecological connectivity.

Because gravel pits comprise the single largest proportion of Hertfordshire's remaining wetland extent, it is also important to improve the biodiversity of these sites by increasing their structural complexity. A particular priority is to increase marginal and emergent vegetation through re-profiling lake edges and maintaining a balance between open and wooded margins.

Ponds are an important wetland feature, the oldest of which support a unique biodiversity. New ones are able to be created easily because they do not individually require much land area and pond species are generally good at finding new sites to colonise. Well managed ponds in farmland act as multipliers of biodiversity, adding insect and plant diversity to an area, which in turn increases bird populations [33]. However, it is essential not to damage other habitats by inappropriately digging ponds over existing important features.



# The State of... **FARMLAND**

Farmland is defined here as 'enclosed farmland'. This is directly comparable to the farmland definition used in the national State of Nature reports as per the National Ecosystem Assessment [14].

It includes arable and horticultural land and improved grassland, as well as associated features such as fallow land, field margins and hedgerows. Nationally it covers 40% of the land area, of which 19% is arable and horticultural and 21% is improved grassland. In Hertfordshire, the percentage land area of farmland is much greater than nationally, with up to 90,000 ha (55%) used for arable crops [15]. Including improved grassland, the total farmland figure is substantially greater than this.

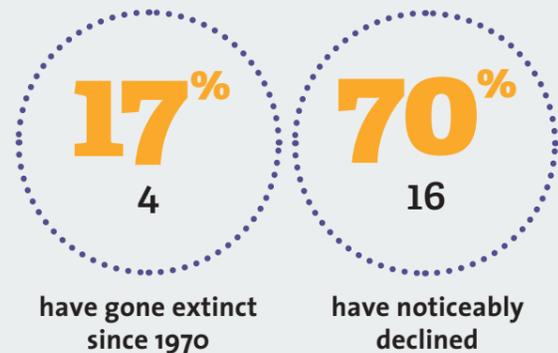
Agricultural management has been cited as the single biggest driver of biodiversity loss in the UK, primarily due to intensification and a drive to maximise yields [3] [16]. A change from spring to winter sown cereals, larger machinery, herbicide and pesticide use, and more specialised farming systems have all tended to simplify the farmland habitat and make it unsuitable for most species.

For the analyses of Hertfordshire's farmland species, only those species directly associated with farming were included. Many other species found in the wider farming landscape are not associated with farmland *per se* but with other habitats and are found in features such as hedges and ponds. Less than 3% of Hertfordshire Species of Conservation Concern were associated with Arable farming. These included farmland birds such as the stone curlew, now extinct in Hertfordshire, and a number of rare arable plants associated with field margins on chalk, highlighting the importance of these features.

While there appeared to be a higher percentage of species decreased associated with farmland than any other habitat, this category only included 23 Hertfordshire Species of Conservation Concern. Because the number of species was small, the data are interpreted with caution.

Whilst the previous sections have been focused on semi-natural habitats, farmland is not. Here the priorities are protecting specific farmland species where they exist, finding farming methods that better balance production

Of those species that were able to be associated with farmland and with sufficient data in Hertfordshire to be analysed, there were just 23 identified as Hertfordshire Species of Conservation Concern. Of these,



with wildlife, and creating new semi-natural habitats within and around the farmed land. Opportunities may be highest where soils are least suitable for farming and where linear corridors already exist, such as alongside hedges, and also adjacent to existing habitats found on Local Wildlife Sites and nature reserves.



The **grey partridge** nests in farmland, usually in field margins on the ground close to hedges or other vegetation.

Adults eat seeds and invertebrates. A good supply of invertebrates is particularly important for its chicks, which can eat nothing else for the first 10 days of their lives. Like many other species reliant on invertebrates for food, increased pesticide use and loss of hedges and other habitat features have led to the grey partridge's decline. Despite conservation of this species targeted by agri-environment schemes, it has continued to decline in Hertfordshire. On a positive note, a recovery project involving sympathetic landowners near Royston has led to an increase in grey partridge numbers in that area, showing what can be achieved by local, coordinated action.



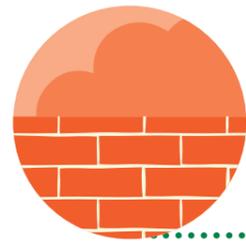
**Ground pine**, an arable plant, was always rare in Hertfordshire but has now become extinct.

This species used to be found in margins of chalky arable fields and despite frequent searches of its former area has not been seen for over 45 years. Of particular relevance are increased herbicide and fertiliser use. Reduced field margins are a major issue for many rare arable plants.

In a global context there is a debate about whether a land-sparing or land-sharing approach is better for biodiversity for a given level of food production. Using some measures, it has been suggested that a land-sparing approach is best, whereby agricultural land should be managed as productively as possible whilst leaving more land specifically for biodiversity [17]. However, not all ecological and wider environmental impacts were taken into account, particularly knock-on effects in the

wider environment. The situation is also likely a much more complex set of consumer choice, waste, political and economic issues far beyond the scope of this report. However, a combination of solutions for Hertfordshire's farmland are clearly desperately needed. These include both sparing more land for biodiversity in the farmed landscape to create wildlife havens and finding ways of adjusting farming practices to better balance food production and wildlife [16].

» **Agricultural management has been cited as the single biggest driver of biodiversity loss in the UK**



# The State of... **TOWNS & CITIES**

**There is a greater percentage of urban land in Hertfordshire, some 17% (27,510 ha), compared to the UK amount of 7% [2].**

This large proportional area in Hertfordshire makes the urban environment a higher priority for nature conservation efforts here than perhaps some other parts of the UK.

A high density of people and buildings leaves little space for wildlife in the urban environment. Most urban wildlife does not seek out human development, but rather survives in the patches of green within urban areas [2]. These include parks, gardens, allotments, churchyards, road verges and brownfield sites. However, not all green spaces are managed for wildlife or achieve their biodiversity potential. There is no single available dataset on extent of urban greenspaces, but national datasets suggest that these cover approximately half of the total urban area in England [14].

Increasing urbanisation is identified as one of the main drivers of change in biodiversity nationally [3]. Development for housing, infrastructure and industry is continuing to result in direct habitat loss, as well as damage, fragmentation, hydrological change, pollution and disturbance to surrounding semi-natural habitats.

In Hertfordshire, local planning authorities have identified housing need for nearly 100,000 new homes between 2018 and 2031 [18].

It was difficult to analyse Hertfordshire Species of Conservation Concern associated with urban habitats because most species in the urban environment are using features similar to those found in other habitats that they are primarily associated with.

Whilst the urban habitat is poor for most wildlife, there is growing evidence that urban areas increasingly may be more important for some species than rural areas. Hedgehogs have declined significantly nationally [19] and this decline has also been recognised in the Hertfordshire records. The national surveys found that declines have been much worse in the countryside than in urban areas. Moreover, in recent years the surveys indicated that hedgehogs may actually be increasing again in urban areas. A national field-based study found that hedgehogs were positively associated with urban areas [20].



BUFF-TAILED BUMBLEBEE © PAUL HOBSON



HEDGEHOG © TOM MARSHALL

Many pollinating insects are also faring better in urban areas than rural [21]. However, not all urban areas are as good, and pollinators are positively associated with lower-density urbanisation [22] [23]. Of particular importance are flower-rich allotments, gardens and parks. So whilst many pollinator species may generally be faring better in urban areas, it is critically important that urban areas retain high levels of quality and connected greenspace features that support them. Urban areas are growing and their existing importance for pollinators means that improving the urban environment must be part of any pollinator strategy [24].

There are a number of reasons why hedgehogs and pollinating insects are currently faring better in urban rather than rural areas, but most important are thought to be intensive agriculture and pesticide use in farmland [25] [26] [19] [20]. This highlights the importance of not using pesticides in gardens and urban greenspaces.

Peregrines have no natural nesting features in Hertfordshire because they require high cliff faces, but they have nested successfully on tall buildings in towns, such as Watford. For some species where nesting sites are naturally severely limited in Hertfordshire, building artificial sites into the urban environment can make a big difference, such as swift nest boxes on Lister Hospital in Stevenage.

There are a number of lichens that are found only on stone, and churchyards are an important stronghold for 47 lichens that are Hertfordshire Species of Conservation Concern.

So whilst urban areas are poor for most wildlife, they are some of the most important areas for a number of Hertfordshire Species of Conservation Concern, but mostly where there is only a low density of urbanisation. Some species have come to rely on artificial features

that we provide. Bird and bat boxes can be retrofitted to existing buildings and incorporated within new developments – these are part of good design in the planning system. For other species, it is not necessarily the urban environment that is important but instead the provision of habitat features within the built environment, relatively free of the pesticides found in the countryside. Good design of new developments should aim to maximise habitats, and where important features exist these need to be protected. Pesticide use should be avoided. Flowers in gardens can support pollinators but extreme caution is needed to avoid buying plants grown from seeds treated with residual pesticides such as neonicotinoids. These are spread to all parts of the plant as it grows and can even make its nectar toxic to pollinating insects [27].



GREY HERON © BERTIE GREGORY 2020/VISION

**» Most urban wildlife does not seek out human development, but rather survives in the patches of green within urban areas**



# Climate CHANGE

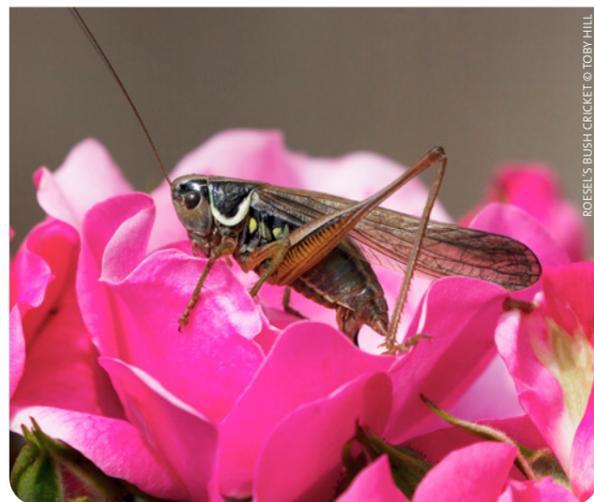
## Climate change affects wildlife across all habitats and is one of the biggest drivers of change to biodiversity globally<sup>[4]</sup> and nationally<sup>[3]</sup>.

The two issues of climate change and biodiversity loss are completely interlinked. Not only is biodiversity affected by climate change but climate change is accelerated by biodiversity loss<sup>[4]</sup>. This is because high quality natural and semi-natural habitats store carbon in soils and vegetation.

Climate change affects UK wildlife in several ways. These include changes in distribution and range, particularly movement northwards<sup>[28]</sup>; changes in timing, such as nesting season<sup>[29]</sup>; and changes in population size<sup>[3]</sup>.

Many of the general findings in the national State of Nature reports in relation to climate change are relevant to Hertfordshire. At a local level there are not sufficient data or research projects to be able to pick out many of the species-based changes analysed at the national level but there are some issues clear at the habitat level that are particularly pertinent in a local context. The most visible of these is the effect of ever-increasing water stress on Hertfordshire's rivers and wetlands.

Although in the UK the last decade has been 8% wetter than the 1990-1991 average, rainfall has been more variable<sup>[3]</sup>. Also all the top 10 warmest years since records began have been in the last 30 years.



Following two successive very dry winters and hot summers in Hertfordshire, the summer of 2019 saw catastrophic drying out of approximately 50 km of chalk rivers and many wetland features on important nature reserves, such as the wetlands at King's Meads and ponds at Hertford Heath.

It is not just wetland features that are suffering from climate change. Beech woodlands on thin soils in the west of the county have become more inhospitable environments to plants, particularly evident in poorly vegetated, dusty conditions in recent dry summers. The green-flowered helleborine is a Hertfordshire Species of Conservation Concern, previously found in beech woodlands and now precariously existing at only one site. The narrow-lipped helleborine may have been lost altogether.

For many species, climate change is likely to have played a part in the declines seen in Hertfordshire, such as that of the hazel dormouse. Dormice are susceptible to unseasonable or extreme weather, which can affect the availability of foods such as insects, flowers and fruits<sup>[30]</sup>. A changing climate can also affect hibernation patterns. Warmer, wetter winters are likely to be detrimental, especially if seasons are unpredictable. However, climate change is often likely to be one of several other factors affecting declines, making it difficult to know how much of the decline can be attributed to climate change and how much to other factors. We are mindful of the gap in knowledge internationally about which species are being impacted by climate change and how these impacts might develop over time.

» **In Hertfordshire, climate change appears to be exacerbating already existing issues of over-abstraction of ground water.**



» **The interrelation between climate change, biodiversity and human wellbeing is clear and compelling**

Richard Kinley, Deputy Director of the UN Climate Secretariat.

KING'S MEAD DRIED UP © TIM HILL

» **Stabilising the climate is only possible over the long-term by ensuring the health and protection of biodiversity and ecosystems**

Sir Robert Watson, Chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and former Chair of the Intergovernmental Science-Policy Platform on Climate Change.

It is clear that some species have noticeably moved their range into and through Hertfordshire as they move northwards and further inland in response to climate change. Similarly to the national report, this is mostly seen in species from commonly studied and highly mobile groups, such as birds, dragonflies, grasshoppers and crickets. The 1990s saw the arrival in Hertfordshire of long-winged conehead, Roesel’s bush-cricket and lesser marsh grasshopper due to range expansion. Previously, these three species were found only in the southern coastal counties of England.

At around the same time little egret arrived as a breeding bird on the south coast of England and began colonising the country with the first confirmed breeding records for Hertfordshire from 2011. In the last 10 years, Hertfordshire has been colonised by new species of dragonfly and damselfly, with the arrival of willow emerald damselfly, Norfolk hawker and scarce chaser. Change is happening in other species groups too. The Moths of Hertfordshire published in 2004<sup>[31]</sup> included one record of the Jersey tiger moth from 1934. This species can now be found almost anywhere in the county. Downland villa, a species of bee-fly confined to a handful of chalk grassland sites in Oxfordshire, has recently colonised Hertfordshire and seems to no

longer be restricted to chalk grassland but is also now associated with other flower-rich habitats containing bare ground.

Relatively few of Hertfordshire’s species are towards the southern edge of their range here. This is important and encouraging because generally species found in Hertfordshire will not need to move out and become extinct here due to range contraction from climate warming. Moreover, there are opportunities for new species to colonise Hertfordshire from England’s southern coast and from Europe, potentially increasing our biodiversity. There are two big caveats to this – firstly, other than the most mobile species, most are probably unable or reluctant to cross large areas of unsuitable land in our highly fragmented landscape. This would require a much greater quality and connectedness of habitats<sup>[32]</sup>. Secondly, those new species that do arrive in Hertfordshire may cause increased competition and pressure on existing species. More, better quality and better connected habitats on a landscape scale are required to reduce these pressures.

We need natural solutions to both mitigate and adapt to climate change<sup>[4]</sup>. IUCN defines these as “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits”. Put simply, we need to create more semi-natural habitat in Hertfordshire and existing habitat needs to be managed better for wildlife. Both of these biodiversity-focused activities lock up more carbon in vegetation and, most importantly, in the soil<sup>[10]</sup><sup>[33]</sup>. They can also help to protect groundwater and regulate flooding<sup>[34]</sup>.

Where more caution is needed is in the detail of choices between habitats. There is a crucial importance of



NORFOLK HAWKER © TOM DAY



LITTLE EGRET © JOSH KUBALE

creating the right habitat in the right place. One habitat type must not be promoted to the detriment of another, such as planting trees on semi-natural grassland, because that will result in biodiversity loss<sup>[35]</sup><sup>[4]</sup>. A third of all Hertfordshire Species of Conservation Concern were associated with grassland, over 500 species, which would further be put at risk by planting trees in inappropriate places. Woodland may not always be the best answer, even where no habitats currently exist. The importance of carbon sequestration by soils in semi-natural grasslands<sup>[10]</sup> is significant and often overlooked. Wetlands can also be some of the highest soil carbon stores of any habitat<sup>[11]</sup>. Rather than looking at single issues in isolation, we need to balance the needs of biodiversity and climate change to solve both issues together. Natural solutions to climate change need to take into account the state of Hertfordshire’s nature and be tailored according to the local circumstances.

When climate change adaptation benefits are also considered, these clearly point to a strategic approach of connecting up habitats appropriately to form a functioning network, allowing wildlife to move in response to climate change<sup>[32]</sup><sup>[4]</sup>. In Hertfordshire, priority areas and habitat choices can be informed by the Hertfordshire Ecological Network Map<sup>[8]</sup>, which is maintained by the Hertfordshire Environmental Records Centre.



GREEN-FLOWERED HELLEBORINE © SHUTTERSTOCK



# A wilder FUTURE?

## Hertfordshire's wildlife is in a poor state but we really can reverse the deterioration and find a better place for wildlife within our modern lives.

This report has highlighted what has been lost over the last 50 years and just how many species are now threatened with extinction in Hertfordshire. Simply halting the loss is not enough; existing habitat patches are now too small and far apart to prevent further species extinctions, even under good conservation management. The next fifty years must see a massive reversal of these losses. In order to achieve resilient functioning ecosystems and allow our wildlife to adapt to climate change, we may need to roughly double the area of habitat cover in Hertfordshire. This is based on a suggested target of 30% habitat cover being the theoretical point at which the spatial distribution and area of habitat is sufficient to provide connectivity for a range of species<sup>[36][37]</sup>. That means approximately a further 22,000 ha over 50 years, or 440 ha per year, of new habitat needs to be created in Hertfordshire. Excluding land that is already semi-natural habitat, on average, roughly 16% of the area across all other land uses needs to be converted to new semi-natural habitat. This target may seem difficult but we can all do something; every bit helps.

Not only do we need to increase the area of habitat, but we also urgently need to increase the amount of existing habitat managed positively for conservation. Managing and protecting existing important habitats is of the highest priority. This is because it will be many years before newly created habitats reach their potential. In the meantime, we will continue to see species declines and extinctions if we don't look after what we already have. In keeping with landscape-scale conservation principles, existing sites are essential for allowing species to colonise new habitats, and the best places to create habitats are next to existing ones. Only 3,200 ha (12%) of existing semi-natural habitat is managed by conservation organisations or is a Local Nature Reserve (LNR). This means there is approximately 24,000 ha (88%) of semi-natural habitat in Hertfordshire outside of these targeted conservation actions. Some of this area is managed beneficially for conservation, both through funded schemes and landowners' own good stewardship of their land, but much of it may

be receiving little or no conservation management. These latter places are where there is currently the greatest threat to species of conservation concern. Some areas are designated as Sites of Special Scientific Interest (SSSI) or Local Wildlife Sites (LWS) but only about half of SSSIs are in favourable condition and less than 12% of LWS are known to be under conservation management relevant to their features of interest.

Although the drivers of change in biodiversity may differ for each type of habitat and there are often complex combinations of reasons why wildlife is declining, much of it is predominantly due to a cessation of traditional land management practices. In most cases they have



TREEBUMBLEBEE © JON HAWKINS - SURREY HILLS PHOTOGRAPHY

been replaced by damaging intensive land uses or management practices. In a highly commercial world and with land values so high in this part of the country, land that can be operated intensively for commercial benefits has become unsuitable for much of our biodiversity and land that is not commercially effective is usually neglected. In most cases neglect leads to habitats deteriorating and becoming structurally simple and homogenous, unable to support their previous communities of specialised species. Whether it is a woodland, semi-natural grassland or wetland, simply discontinuing management for a long period of time is not rewilding; it is abandoning wildlife. Instead we need to find ways of replicating the effects of traditional management practices to ensure continuity of habitat complexity and important features. This may involve targeted conservation management or, where there is sufficient scale of new habitat creation, a rewilding approach may be appropriate.

Whilst on a general level all land uses can contribute towards increasing wildlife through a landscape-scale approach of 'more, bigger, better and joined'<sup>[32]</sup>, specific actions and funding mechanisms may vary between land uses. Some of the biggest land uses in Hertfordshire have been identified as farmland, towns & cities, golf courses and transport networks, and the 2014 'How to build a Living Landscape' report suggested some solutions that could be applied to each<sup>[38]</sup>.

We are fortunate in our area to have many organisations and individuals already committed to and delivering positive action for our local wildlife. It is by working together that we can all ensure a wilder future for Hertfordshire. We have identified the following groups of stakeholders, who between them can make the biggest potential contribution to nature's recovery.

» **Simply halting the loss is not enough; existing habitat patches are now too small and far apart to prevent further species extinctions**



STAG BEETLE © TERRY WHITTAKER 2020VISION

### Important invertebrates

We need to pay particular attention to the needs of invertebrates. This group contains the most biodiversity, provides important services such as pollination and is an important food source on which many other species depend. Over 1,000 invertebrates were found to be Hertfordshire Species of Conservation Concern. This is approximately two-thirds of all Hertfordshire Species of Conservation Concern. Moreover the full extent of the situation is likely to be much worse than the available Hertfordshire data can show. There are not the local datasets to be able to track abundance changes of invertebrates on individual sites. There has been a massive decline in invertebrates around the country<sup>[24]</sup>. Invertebrates are often very sensitive to changes or lack of management and have particular requirements for habitat features at different times of year<sup>[12]</sup>. Pesticide use and 'tidying up' the countryside are some of the biggest drivers of invertebrate loss. Even conservation mowing of grasslands can severely threaten invertebrates unless there are always some areas left uncut. Our most diverse sites for beetles in Hertfordshire are where there has been a longstanding continuity of important features on which they depend<sup>[45]</sup>. To retain high diversity it is essential to ensure ongoing continuity of important features in every single year, so as not to break the life-cycle of short-lifespan species.



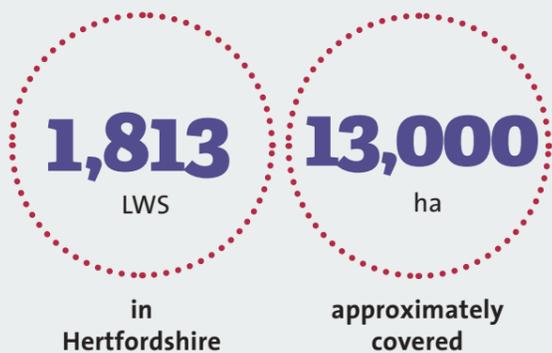
## Creating a wilder future with... **FARMERS & LANDOWNERS**

Managers and owners of agricultural land, estates, golf courses and parks and other greenspaces all have the potential to be a major part of the solution.

Between around 90,000 ha of arable farmland, thousands of hectares of improved grassland and a further 3,500 ha of golf courses in Hertfordshire, there is the greatest collective potential to close the county's deficit between the current habitat cover and the target 30% of land that supports spatial connectivity for species. This could be achieved through a combination of incorporating more of a habitat network within the existing commercial use and converting some areas completely to create new habitats.

This is a much larger area than the protected areas of SSSIs and nature reserves, and where a lot of populations of threatened species already exist. They are also the places where species can spread out into the surrounding countryside. They are a high priority for restoration and positive management for wildlife and for identifying nearby land which could be managed for wildlife.

### Local Wildlife Sites



Due to today's commercial pressures, it is recognised that landowners usually need to find a means of deriving an income from conservation actions. The UK Government's agri-environment schemes have funded many biodiversity improvements on farmland. Whilst there has been a general frustration with administration and effective delivery of these schemes, there is hope for change with the new Environmental Land Management (ELM) scheme under development at the time of this report. This is anticipated to be aimed at paying farmers for providing public goods, such as biodiversity, in a more efficient and outcome-focused way. Conservation organisations are working to help ensure that the government's new scheme delivers the best outcome both for wildlife and the farmers upon which its success depends.

There are promising new income generation mechanisms for further exploration, which include biodiversity net gain through the planning system and carbon offsetting. Biodiversity net gain is part of government policy <sup>[39]</sup><sup>[40]</sup>, and the draft Environment Bill at the time of this report proposes a mandatory measured 10% net biodiversity gain to be delivered by new development. Given the large number of houses planned for Hertfordshire over the coming years, this could be a significant funding mechanism and driver for new habitat creation and uplift of existing habitats. Carbon offsetting also could be a very important funding mechanism. Natural solutions to climate change are clearly important actions we can take towards combating climate change, and businesses are increasingly looking to fund habitat creation schemes on others' land to help offset their carbon footprint.

There also may be some potential for other enterprises such as wood fuel, conservation grade meat and ecotourism.



BERKHAMSTED COMMON GOLF COURSE © HOWARD CRAFT



# Creating a wilder future with... **LOCAL AUTHORITIES**

Hertfordshire is served by the County Council, 10 district and borough councils, 11 town councils and 102 parish councils. Many of these authorities own and manage land and therefore much of the previous section on landowners applies equally here.

There are 870 ha of land within Local Nature Reserves, which the declaring authority either owns or has some legal interest in. These are managed primarily for nature conservation and people's enjoyment of wildlife. However, local authorities own many other areas of land of high potential to benefit wildlife including road verges, greenspaces and land managed for a commercial income. All of these have the potential to contribute towards nature's recovery.

Parks, cemeteries and allotments are some of the most important urban features for wildlife and the most important places for those species doing disproportionately well in urban areas, such as hedgehogs and pollinating insects. Due to insect pollinators' relatively small functional requirements – habitat range, life cycle and nesting behaviour – pollinators put high-priority and high-impact urban conservation within reach [21]. In a rapidly urbanising world, transforming how environmental managers view towns and cities can improve people's engagement and contribute to the development of more sustainable urbanisation.

Many areas of land owned by local authorities, particularly amenity grassland greenspaces, are managed primarily for recreational public benefit but often are not managed with enough consideration given to enhancing biodiversity [2]. This is a missed opportunity because biodiversity provides major complementary public benefits of its own [41] [42]. Greenspaces in urban areas could be some of the most effective places to provide health and wellbeing benefits from wildlife to people because of their proximity to human populations. In many cases, local authorities can better optimise public benefits on greenspaces by giving further weight and consideration to biodiversity-based objectives.

A good example of this can be seen at Harpenden Common which is managed by Harpenden Town Council. In 2019 strips of grass were left unmown

until the following year. This is benefitting late flowering plants, such as the harebell, a Hertfordshire Species of Conservation Concern. It is also benefitting invertebrates that require the shelter and structure provided by unmown grassland over the winter. There is often a need to positively engage and educate local people as to the reasons for these changes and the benefits. Following a public survey at Harpenden, 97% of respondents considered this to be a positive change.

Road verges are another land area owned by local authorities where big wins for wildlife are possible with little impact on existing objectives. They can be incredibly important for biodiversity. For example, road verges are the last remaining locations in the county of great pignut, a Hertfordshire Species of Conservation Concern that has declined significantly.



HAREBELL AT ALDBURY © PAUL THURISH

There has been some recent action in some parts of Hertfordshire to manage road verges better. For the last 10 years, Stevenage Borough Council has been managing three road verges through a conservation-orientated annual hay cut and collect, rather than the normal intensive road verge cutting. Working with Herts & Middlesex Wildlife Trust, monitoring included botanical and butterfly surveys. The variety of plant species was found to nearly double in the space of one year on all three verges. In 2013 the Whomerley Road verge was recognised as a Local Wildlife Site on account of its botanical value.

Hertfordshire County Council has recently announced a new trial scheme to better manage highways verges for wildlife. This project is desperately needed throughout Hertfordshire. Through long-term implementation of such a scheme, there is huge potential for habitat creation and enhancement. Wildflowers will benefit from a more relaxed cutting regime with removal of the cuttings. For the benefit of pollinators and other invertebrates, it is also essential to ensure that there are always some bits left uncut in any given year. Wildlife-rich road verges managed well for both plants and invertebrates are important as habitats not only in their own right but also as critical linear movement corridors for wildlife. This way, our roads can become wildlife highways too.

All planning authorities can contribute to minimising further biodiversity loss and maximising new biodiversity gains through setting strong biodiversity-focused policies, promoting good design [43], ensuring housing allocations and smaller scale developments avoid existing habitats, and promoting habitat networks through both plan-making and development management functions. Biodiversity net gain is a policy area where planning authorities can make a big difference. The need for biodiversity net gain is already in national policy and some of the districts have explicitly incorporated net gain into their local plan policies. There is a need for a robust countywide approach to delivering biodiversity net gain as one of the main potential drivers for habitat creation and uplift.

HARPENDEN COMMON RETAINED LONG GRASS STRIP WITH HAREBELLS © TIM HILL



## Creating a wilder future with... **INDIVIDUALS & COMMUNITIES**

**While it is vital that change is achieved on a landscape scale, there is so much that individuals and communities can do to contribute to giving wildlife a better future.**

Anyone with a garden can make changes which benefit their local wildlife, from selecting plants which attract pollinators and provide winter berries, to avoiding pesticides, creating a wildlife pond and making holes in fences for hedgehogs and places for them to hibernate. Resisting the temptation to be too tidy by mowing the grass less frequently and allowing seed heads to remain over the winter makes a big difference, particularly to insects.

Volunteering provides the backbone to nature conservation and there are many ways to participate such as conservation work parties on nature reserves and events to inspire people about wildlife. Herts & Middlesex Wildlife Trust alone has more than 600 active volunteers, alongside the many volunteers involved with conservation organisations such as the Herts Natural History Society, the Herts Bird Club, Butterfly Conservation, the Bat Group and the Badger Group, to name but a few. Joining one of these groups provides a great way to learn new skills, meet like-minded people and be inspired.

We can all stand up for wildlife, especially making our voices heard to our local and national politicians. Expressing concerns where species and habitats are under threat from housing and infrastructure development or where policy and legislation needs to be strengthened is important, particularly when many voices are heard.

Community organisations play an important role too, helping to manage a local park for wildlife, running activities to get children outside and see wildlife up close, campaigning and teaming up with one of the many conservation groups that are found in Hertfordshire.

### **Wildlife monitoring**

Monitoring species and habitats is vital and most of this relies upon volunteers. The Hertfordshire State of Nature report would not have been possible without the Hertfordshire Natural History Society, its expert recorders and the many other volunteers who give their time to making records and sharing these with recording schemes and the Herts Environmental Records Centre. More individuals training to become recorders is critical to being able to understand how to effectively target conservation efforts into the future, upon which our wildlife depends. Wherever an individual's interest lies, be it butterflies, birds, bats, beetles or bryophytes, there is an important role to play.



**» There is so much that individuals and communities can do to contribute to giving wildlife a better future**

© TOM MARSHALL



# Success through PARTNERSHIP

Of those Hertfordshire Species of Conservation Concern that were able to be assessed for change, 12% noticeably increased in the last 50 years and 39% were more or less stable.

It is often not clear why some species have increased whilst others have declined, but for many species that have increased, this is at least partly due to conservation efforts.

There are a number of organisations working to conserve and improve wildlife in Hertfordshire, all of which have contributed to maintaining stability and increasing species populations. There are also a number of sympathetic farmers and other land managers we already know are doing great things for wildlife on their land, and there are likely to be many more who we don't yet know. Herts & Middlesex Wildlife Trust would like to work with partners to develop projects, collaborate on strategic initiatives, carry out surveys, share knowledge, advise on funding opportunities and manage land. We also work to involve and engage people with wildlife, including providing education, training, public events and hands-on opportunities. Some examples of conservation successes we have helped achieve in partnership are outlined below.



### Living rivers

Starting in 2012, Herts & Middlesex Wildlife Trust has been hosting catchment partnerships in the River Lea and its tributaries. An Environment Agency-supported initiative, these partnerships are made up of a large number of stakeholder organisations, landowners and local individuals all working together to protect and restore many of Hertfordshire's rivers, including chalk rivers for which we have a truly international responsibility here. To date, these partnerships have restored or enhanced 60 km of chalk river habitat through improving in-stream geomorphology and removing some of the trees from overly-shaded sections. These actions benefit a range of Hertfordshire Species of Conservation Concern, including water vole.

### Woodland restoration

In 2012, a partnership between Stevenage Borough Council and Herts & Middlesex Wildlife Trust restored two rides through Whomerley Wood in Stevenage. This allowed light back into the woodland floor and the next spring the rides were lined with wild flowers, including early purple orchid, a species that had not been seen there for over 20 years.

### Heathland creation and restoration

With heathland now being one of Hertfordshire's rarest habitats, Herts & Middlesex Wildlife Trust has worked with several golf course managers to create and restore heathland, amongst other habitats. Mid-Herts Golf Club has for instance created new areas of common heather on their golf course grounds, a Hertfordshire Species of Conservation Concern.

### Wetland enhancements

A partnership between Affinity Water and Herts & Middlesex Wildlife Trust is improving three Local Nature Reserves owned by Affinity Water. Not only are these sites improving for wildlife but they are also providing an enhanced visitor experience allowing more people to enjoy and understand wildlife.



### An increase in bitterns and action for waders

A partnership between Herts & Middlesex Wildlife Trust, the RSPB, the Lea Valley Regional Park Authority and Tarmac is responsible for the increase in the bittern population in the county. This Hertfordshire Species of Conservation Concern has increased significantly in the last 20 years. The bittern is a secretive bird, only found in reedbeds, to which it is perfectly adapted with its camouflaged plumage and long legs. The partnership almost doubled the area of reedbed in Hertfordshire from 12 ha in 2000 to 22 ha in 2010. This resulted in the number of wintering bittern increasing from 6-7 birds to a maximum of 10-12 birds during that period. The nature reserves of Amwell, Rye Meads and Tring Reservoirs are the most reliable places to see bittern in Hertfordshire. The work has also benefitted birds such as snipe, reed warbler, sedge warbler, reed bunting, as well as otter and species of fish.

The same partnership is working together in a coordinated landscape-scale approach to improve conservation of wading birds across the Lea Catchment. This was in response to the recent atlas of birds in Hertfordshire [44] published by Herts Natural History Society, which highlighted the decline of breeding and wintering waders in the county. One action provided suitable habitats of bare mud and gravels required by the little ringed plover and lapwing, which are both Hertfordshire Species of Conservation Concern that have decreased. In the last two years, work has taken place at Amwell Nature Reserve and Panshanger Park, resulting in breeding at both sites.



### Preventing water voles from going extinct

The water vole is an iconic species that was once widespread and common in our waterways and wetlands. It burrows in river banks and eats marginal wetland plants. It is a Hertfordshire Species of Conservation Concern and has declined significantly in the last 50 years. In conjunction with loss of habitat the biggest reason for its decline is predation by non-native American mink. It was lost from much of Hertfordshire and has become extinct in some of our neighbouring counties. It is no exaggeration that it would probably be extinct by now in Hertfordshire as well without targeted conservation efforts by Herts & Middlesex Wildlife Trust, in partnership with the Environment Agency and the Lea Valley Regional Park Authority, and support from many volunteers. The initiative has raised awareness, co-ordinated mink control, restored habitats and hosted a water vole reintroduction project. As a result, water voles are now increasing again and they have re-colonised the Ash and Stort valleys, as well as parts of the Lea and Beane valleys. They have increased their range in the Mimram, Colne and Chess valleys. The Box Moor Trust has also successfully reintroduced water voles on the River Bulbourne.



# CONCLUSION

Drawing on the results of thousands of hours of wildlife monitoring and recording, the Hertfordshire State of Nature report is a major milestone for wildlife in this county, shaping the direction and priorities for nature conservation over the coming years.

Particular thanks go to the volunteers who have supported this work over many years and who have inspired many others to become involved. Without their dedication this would not have been possible and we thank them all.

Recognition of their leading role in the analysis of thousands of species and the preparation of the report goes to Tom Day, Head of Living Landscapes at Herts and Middlesex Wildlife Trust, Ian Carle and Alexandra Waechter at the Herts Environmental Records Centre and to the recorders whose expertise made it possible.

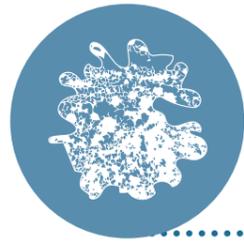
Society is facing an ecological and climate emergency and action has to be taken now. The overriding message of the report is that everyone can make a real difference for the future of wildlife, whether a farmer, business, local authority or individual. It is more than that though. As a species, we rely upon a healthy natural environment and as individuals the evidence is strong that being connected to the natural environment brings improvements to our own health and wellbeing. The Hertfordshire State of Nature report aims therefore to be the catalyst for action and to inspire people to care and become actively involved in creating a better future for wildlife.



COMMA ALDBURY © PAUL THRUISH

» The Hertfordshire State of Nature report is a major milestone for wildlife in this county

KESTREL © RUSSELL SAVORY



# Appendix 1

## METHODS

### Species analysis

Herts Environmental Records Centre (HERC) used 2.8 million species observations to generate summary lists of species recorded from the modern county of Hertfordshire, showing for each how the records were distributed over time, and identifying any that had an existing national or local conservation status. These data were supplemented by unpublished data from local sources. Records from the National Biodiversity Network Atlas and iRecord were only used if they were marked as ‘accepted’ – unconfirmed records were not used. Further data cleaning was also carried out.

For those species identified as a Hertfordshire Species of Conservation Concern (see inset box), the recorders identified population changes since 1970, classifying these as Increased, Stable, Decreased, Extinct (or Unknown where there was insufficient evidence).

The recorders also identified the main habitat type used by each Hertfordshire Species of Conservation Concern. These were classified into Woodland/Parkland, Grassland/Heath, and Wetland/Aquatic. Most species were able to be classified into these three semi-natural categories, although certain others showed a stronger relationship with either the built environment (e.g. lichens that are most commonly found on stone walls and headstones; birds such as swift that have adapted to urban nesting alternatives; synanthropic invertebrates that are very strongly linked to certain human activities), or to niches created as a result of crop farming (e.g. birds that rely almost entirely on crop stubbles for their time in the county, plants of arable margins, invertebrates that rely on a particular crop for a foodplant).

To accommodate those species, Arable and Urban were added to the list of habitat associations.

Many taxonomic groups have recorders in Hertfordshire. These are recognised experts who collate, validate and share records of their particular group of species of interest. For some taxonomic groups this role is done for Hertfordshire at a more regional or national level. The summary lists were shared with the most appropriate recognised local and national experts who used the data in conjunction with their expert knowledge to identify **Hertfordshire Species of Conservation Concern** using the following criteria:

- Species with a **national IUCN** status of Near Threatened or greater, unless a given species should not be considered as Threatened in a Hertfordshire context; for instance because of a range increase since the last national assessment or because their presence in Hertfordshire is only of an incidental, vagrant, escape or release nature (e.g. Swallowtail butterfly);
- Species that are **rare in Hertfordshire**, in most cases using the definition already in established use by the Hertfordshire Natural History Society of ‘present at 5 or fewer localities’;
- Species that have experienced a **decline of 50% or more** (in geographic range or population estimate) in Hertfordshire since 1970. Often expert judgement was applied where there were no comparable systematic surveys within the timeframe;
- Species whose national welfare could be particularly affected by their status in Hertfordshire – **‘Hertfordshire responsible’**. This was defined as species for which a significant proportion of the national population occurs in Hertfordshire, or an isolated population, perhaps at the edge of the species’ current national range;
- Species that have become **extinct in Hertfordshire** since 1970



The recently published atlas of beetles found in Hertfordshire <sup>[45][48]</sup> was used to identify the information required for this analysis for beetles.

Species groups where expert local knowledge was unavailable in sufficient detail were under-represented in the new dataset of Hertfordshire Species of Conservation Concern because for these groups only species with an existing national status could reliably be included.

For species groups where a national IUCN assessment has not been done and where there was no active local expert, these species were excluded from the analysis. Some species groups will be under-represented in the analysis because their national datasets contain mainly ‘unconfirmed’ records.

Only species judged to be present in the county from 1970 onwards were included in analyses. The 1970 cut-off was necessary to ensure comparability but it is recognised that there may be some species excluded from our analysis that are still present in the county undetected. To illustrate the likelihood of this, a beetle *Ophonus laticollis* was first recorded near Hertford before 1839. It was then only found in 1925 in another locality before being recently re-found in Bengoe in 2003, confirming that it had survived in the Hertford area for nearly 170 years without being seen <sup>[45]</sup>.

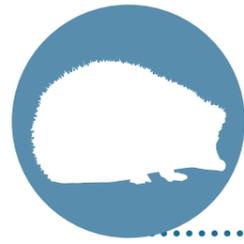
### Habitat analyses

There have been only two available county-wide habitat surveys in the last 50 years, one in 1996 and the latest in 2012. Total figures for the broad habitat types identified by both surveys were compared. The difference in survey methodology and habitat categorisation between the two surveys made it difficult to compare most habitat types. Even for those habitats that were compared there may be some errors in the results due to comparability issues.

### Calculating land cover of urban and farmland habitats

The highest-resolution land cover/land use dataset available for the UK is the CORINE Land Cover (CLC) Inventory <sup>[15]</sup>, generated in the UK using high-resolution satellite imagery. The most recent 2018 dataset was used. The vector data were clipped to the Hertfordshire county boundary, which allowed total Hertfordshire areas for all land cover classes to be calculated and compared to the national UK figures.

CLC employs a minimum mappable unit (MMU) of 25 ha, which means that features smaller than this area threshold are likely to become subsumed into the surrounding land use. In a highly heterogeneous landscape, the 25 ha MMU leads to a high degree of generalisation and some error in the figures as a result. However, as the survey methodology (including the size of the MMU) was consistent across the UK, the comparisons of Hertfordshire and national land cover areas are valid. It is reassuring to note that the figures derived from CLC are consistent with figures reported in the 2016 State of Nature report <sup>[2]</sup> obtained from the National Ecosystem Assessment <sup>[14]</sup>.



# Appendix 2

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# Appendix 3

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More than 2.8 million records were used in the analysis for this report, over 2.1 million of which were provided by local recorders, primarily those operating under the auspices of the Hertfordshire Natural History Society (HNHS). These are essential data for understanding presence and distribution of species in the county over time, and for informing conservation decisions. The Hertfordshire State of Nature report would not have been possible without these records and we are grateful for the tireless and meticulous dedication of recorders and observers for finding and identifying species and keeping the records. These are the unsung heroes of nature conservation and we would like to acknowledge the enormous amount of time and expertise given by them.

We would like to thank everyone that has submitted a record to HNHS recorders, national recording schemes and directly to HERC. These records increase natural history knowledge in the county and contributed to our analyses.

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Aquatic Heteroptera Dataset – Aquatic Heteroptera Recording Scheme

Atomariine Beetle (Coleoptera) records for Britain and Ireland to 1992 - BRC

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Bat Conservation Trust Field Survey (2018)

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UKBMS - Contains UK Butterfly Monitoring Scheme  
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Conservation, the Centre for Ecology & Hydrology,  
British Trust for Ornithology, and the Joint Nature  
Conservation Committee

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See <http://www.dassh.ac.uk/terms-and-conditions>

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via iRecord

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by the Royal Horticultural Society – Royal Horticultural  
Society



# Appendix 4 SPECIES GROUPS

			Nationally assessed	Locally assessed	# Species recorded	# Extinct pre-1970	Assessed for HSCC		Hertfordshire Species of Conservation Concern				Qualifying Criteria HSCC		Population Trend Herts Threat'd / Resp.								
							#	% of Recorded	Lower Risk		Extinct since 1970		Threatened		Responsible‡		Nat'l	Local	↑	↔	↓	?	
Lichens, Fungi, Other	Lichens	Lichen & Lichenicolous Fungi	y	y	430	25	405	94%	294	73%	2	0.5%	109	27%	1	0.2%	5	106	7	32	6	64	
	Fungi	Bolete Mushrooms	y	n	30	0	30	100%	26	87%	0	0%	4	13%	0	0%	4	0	0	0	0	4	
		Other Fungi & Fungoids	n	n	1218	36	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other	Bacteria, Protozoa & Slime Moulds	n	n	44	2	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Invertebrates	Arachnida	Spiders & Harvestmen	y	y	317	3	314	99%	310	99%	1	0.3%	3	1%	0	0.0%	2	2	0	0	1	2	
		False Scorpions, Ticks & Mites	n	n	42	2	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Coleoptera	Wood-boring Beetles & Allies†	y	y	18	1	17	94%	14	82%	0	0%	3	18%	0	0.0%	1	2	0	1	1	1	
		Clown Beetles & False Clown Beetles	y	y	25	5	20	80%	9	45%	0	0%	11	55%	0	0.0%	0	11	1	0	3	7	
		Darkling Beetles & Allies	y	y	105	14	91	87%	58	64%	0	0%	33	36%	0	0.0%	2	31	2	1	3	27	
		Ground Beetles	y	y	195	26	169	87%	104	62%	0	0%	65	38%	0	0.0%	3	62	1	7	15	42	
		Leaf Beetles & Allies	y	y	203	28	175	86%	106	61%	0	0%	69	39%	0	0.0%	4	65	2	5	18	44	
		Soldier Beetles & Allies	y	y	75	11	64	85%	50	78%	0	0%	14	22%	0	0%	2	12	0	0	2	12	
		Stag, Dor & Dung Beetles, Chafers & Allies	y	y	52	11	41	79%	25	61%	0	0%	16	39%	0	0%	0	16	2	3	4	7	
		Water Beetles	y	y	180	19	161	89%	102	63%	0	0%	59	37%	1	0.6%	4	55	1	2	3	53	
		Other Beetles	n	y	1664	415	1249	75%	863	69%	0	0%	385	31%	1	0.1%	50	336	16	9	52	309	
		Crustacea	Woodlice & other Crustaceans	n	y*	35	3	1	3%	0	0%	1	100%	0	0%	0	0.0%	0	1	0	0	0	0
	Diptera	Hoverflies	y	n	144	1	143	99%	139	97%	0	0%	4	3%	0	0%	4	0	0	0	0	4	
		Soldierflies & Allies	y	y	74	8	66	89%	37	56%	0	0%	29	44%	3	5%	3	26	3	15	11	0	
		Craneflies	y	n	146	25	121	83%	119	98%	0	0%	2	2%	0	0%	2	0	0	0	0	2	
		Nationally-reviewed scarce Fly families*	y*	n	311	12	36	12%	34	94%	0	0%	2	6%	0	0%	2	0	0	0	0	2	
		Other True Flies	n	n	673	30	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Mayflies	y	y	18	1	17	94%	16	94%	0	0%	1	6%	0	0%	1	0	0	0	0	1	
	Hemiptera	Aquatic Bugs	n	y	49	1	48	98%	43	90%	1	2%	4	8%	0	0%	0	5	0	0	0	4	
		Shieldbugs & Allies	y	y	39	0	39	100%	32	82%	0	0%	7	18%	1	3%	0	7	3	1	0	3	
	Hymenoptera	Other True Bugs	n	n	341	3	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Bees, Wasps & Sawflies	n	n	433	50	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Lepidoptera	Ants	n	y	24	0	24	100%	13	54%	0	0%	11	46%	0	0%	0	11	0	0	1	10	
		Butterflies	y	y	49	6	43	88%	29	67%	5	12%	9	21%	0	0%	12	2	2	5	1	1	
	Neuroptera	Moths	n	y	1679	128	1551	92%	1266	82%	25	2%	260	17%	0	0%	11	274	4	69	40	147	
		Lacewings & Allies	n	y	53	3	50	94%	44	88%	0	0%	6	12%	0	0%	0	6	0	0	1	5	
	Odonata	Dragonflies & Damselflies	y	y	36	1	35	97%	25	71%	1	3%	9	26%	6	17%	4	6	7	0	1	1	
Orthoptera	Grasshoppers, Crickets & Allies	y	y	32	1	31	97%	28	90%	0	0%	3	10%	0	0%	0	3	0	3	0	0		
Plecoptera	Stoneflies	y	y	11	0	11	100%	8	73%	0	0%	3	27%	0	0%	0	3	0	0	1	2		
Trichoptera	Caddis flies	y	y	100	7	93	93%	84	90%	1	1%	8	9%	0	0%	0	9	0	0	0	8		
Other	Other Invertebrates**	n	n	252	11	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Plants	Higher Plants	Higher Plants	y	y	1931	35	1896	98%	1632	86%	26	1%	238	13%	8	0.4%	127	137	4	59	72	103	
		Mosses & Liverworts	y	y	372	18	354	95%	332	94%	0	0%	22	6%	1	0.3%	2	20	0	1	11	10	
	Lower Plants	Stoneworts	y	y	9	0	9	100%	9	100%	0	0%	0	0%	0	0%	0	0	0	0	0	0	
		Algae	n	n	4	0	0	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vertebrates	Birds	Birds	y	y	313	13	300	96%	250	83%	13	4%	36	12%	3	1%	41	9	9	6	22		
	Fish	Fish	n	y	34	0	34	100%	30	88%	0	0%	4	12%	0	0%	1	3	0	0	0	4	
	Herpetofauna	Amphibians & Reptiles	n	y	13	0	13	100%	12	92%	0	0%	1	8%	0	0%	0	1	0	0	0	1	
	Mammals	Mammals	y	y	49	4	45	92%	29	64%	0	0%	16	36%	0	0%	8	8	1	2	8	5	
<b>All Groups</b>					<b>Totals</b>	11822	959	7696	65%	6172	80%	76	1%	1446	19%	25‡	0.3%	295	1229	65	221	277	885

† Wood-boring Beetles, Spider Beetles, Woodworm, False Powder-Post Beetles, Hide Beetles & Allies  
 \* Only a subset of the species in this group has been assessed. Crustacea: only the status of Austroptamobius pallipes is known with sufficient confidence to be included. Nationally-reviewed scarce fly families are: Atelestidae, Dolichopodidae, Empididae, Microphoridae, Nematocera, Atelestidae, Bolitophilidae, Ditomyiidae, Diadocidiidae, Keroplatidae, Mycetophilidae, Trichoceridae, Mycetobiidae, Ptychopteridae, Dixidae, Culicidae, Thaumaleidae, Ceratopogonidae, Platypezidae, Opetiidae, Phoridae, Lonchopteridae, Pipunculidae. With the exception of the 14 species of Platypezidae, Opetiidae and Lonchopteridae where every species has been nationally IUCN-assessed, only species that were identified in Falk (1991) as notable were further assessed using IUCN criteria.  
 \*\* Molluscs, Centipedes and Millipedes, Silverfish, Fleas, Springtails, Worms, Barkflies, Freshwater Cnidaria, Thrips  
 ‡ Herts Responsible species may also have qualified as Herts Threatened, so the numbers of species of Herts 'Extinct since 1970' plus 'Threatened' plus 'Responsible' plus 'Lower Risk' is slightly greater than the total number of species Assessed.

The following numbers show species count per taxon group and as a % of Assessed Species within the group

The following numbers show counts of species

Assessed Species = have had either a National IUCN or a local assessment and have been recorded in the county from 1970 onwards



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Middlesex**

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