

# Oxfordshire's Local Nature Recovery Strategy

Draft version 06 September 2024.



The draft LNRS documents are available for consultation [online](#) from 15 October 2024 to 26 November 2024 for people and organisations to request changes or make comments and suggestions.

## Foreword



*Richard Benwell is chair of Oxfordshire Local Nature Partnership and chief executive of Wildlife and Countryside Link. Previously he has been policy adviser to the Secretary of State at Defra, and worked on policy and advocacy at WWT and RSPB.*



*Matt Whitney is the Manager of Oxfordshire Local Nature Partnership and has worked closely with the Local Nature Recovery Strategy whilst developing initiatives across Oxfordshire focusing on delivering nature's recovery.*

Chalk and limestone grasslands, extensive open wetlands, and scrubby wet woodland are some of the many fragile, fantastic habitats found in Oxfordshire. Brush through a flower-packed grassland on a sunny summer's day and you might be lucky enough to see an Adonis Blue or a Duke of Burgundy butterfly rise into the air.

Restoring, linking, and expanding these now-rare habitats are just some of the priorities in this Local Nature Recovery Strategy. If we're successful, Oxfordshire will have more wonderful wildflower meadows, clean freshwater habitats, and other habitats which, with luck, will enable the wildlife that depend on them to thrive across our County.

Successfully restoring populations of species, like these butterflies and the habitats that support them can be our Butterfly Effect — a series of actions, that together, add up to significant worldwide change.

Oxfordshire's Local Nature Recovery Strategy (LNRS) is part of an LNRS latticework across England, which aims to halt the decline of wildlife in this country by 2030. That target, in turn, is Westminster's contribution towards a global mission to stop biodiversity loss. The worldwide decline of biodiversity is the story of a billion local losses every day. Turning round the fate of our animals, plants, and fungi, including the 800-900 species which are known to be at risk from local extinction here in Oxfordshire is our responsibility to the world.

That's why, in this LNRS, you'll find targets to achieve Oxfordshire's share of the change that nature needs for national and local nature recovery. To improve the state of nature in Oxfordshire, the county needs to restore around thousands of hectares of "priority habitat" and create around tens of thousands of hectares of semi natural habitat by 2030. The types of habitat and their suitable locations are driven by the priorities set by those who have engaged with the LNRS, overseen by ecologists, and using evidence from an understanding of soil data and geology. This combination of knowledge has helped the LNRS to create a focused set of priorities and, where particularly suitable, a map of focused opportunity areas showing a county-wide route that could create resilient, connected ecosystems and save threatened wildlife. It is also driven by common sense and pragmatism, identifying priorities that work for communities, businesses, and local people as well as nature.

After the final version of the strategy is published in 2025, delivering that much environmental change in Oxfordshire by 2030 will be a huge challenge.

Oxfordshire's Local Nature Partnership has identified a funding gap of at least £800million to recover nature in Oxfordshire. Closing that gap will need much more public investment in nature-recovery as well as private investment. The ONLP and the LNRS hope that the Government will see the overwhelming case for investment in those who are delivering Local Nature Recovery Strategy priorities as a great way to rebuild natural infrastructure with the support of local communities. There's also a huge need for more Government support to develop people and groups who can provide green skills and nature-positive planning, so that areas across England can plan ahead intelligently and make space for nature alongside the need for development and wildlife-friendly food production.

Even with the most ambitious Government action, delivering the LNRS priorities will need collaborative action from individuals, communities, and businesses across Oxfordshire. Nature's recovery simply cannot succeed without farmers being supported to lead the charge towards regenerative, nature-friendly land management. Similarly, recovery will never get there without investment from local businesses or without action by local communities and individuals engaging with and doing their bit for nature where they live and work.

Whether you're reading this as a home-owner wondering whether to rewild your garden, as a landowner considering the shift to regenerative management, or as a business owner considering how to create a legacy, we must all work together to deliver the LNRS's biodiversity priorities.

It's called a "Local Nature Recovery Strategy", but that's really just the beginning. If we deliver the priorities in these pages, the results won't just be for nature, they'll strengthen our economy, help mitigate and improve Oxfordshire's resilience to climate change, boost public health, and secure an improved, healthy, and functioning environment to support future generations. If we succeed, the benefits won't just be local, they'll be Oxfordshire's answer to international environmental action. Please join us in taking rapid, decisive action for nature in Oxfordshire. Let's bring our County to life.

Richard Benwell, Chair of Oxfordshire Local Nature Partnership (OLNP)



Matt Whitney, Manager of Oxfordshire Local Nature Partnership (OLNP)



## 1. Executive summary

**Globally, people and nature are balancing on a tipping point. We must ask ourselves what we are going to do about it, and then take action. There are not many chances left to get this right.**

This document, the draft 'Description of the Strategy Area', introduces the Local Nature Recovery Strategy (LNRS), and describes the types of natural habitats and biodiversity (variety of species) found in Oxfordshire. This document then picks out suggestions of priority opportunities for recovering habitats and biodiversity in Oxfordshire as well as discussing the pressures on biodiversity and habitats in the county. Priorities from this description of Oxfordshire's biodiversity were considered alongside the ambitions from local people when the biodiversity priorities were set for the LNRS in the Statement of Biodiversity Priorities and the Species Priorities List.

This document should therefore be read alongside the other three elements which, together, make up the LNRS's shared ambition for the future of Oxfordshire's habitats and biodiversity. Those other three elements are the LNRS 'Statement of Biodiversity Priorities, the 'Species Priorities List, and the 'Local Habitat Map'.

To achieve the set priorities you will find 'potential measures' within the LNRS. These are coordinated actions which could be taken by local people and organisations to recover habitats in Oxfordshire. These actions will not only help the environment and wildlife to flourish but are also fundamental to human wellbeing by improving the quality of the air and water that we rely on, mitigating the impacts of extreme weather events, storing carbon, pollinating our crops, regulating pests, and offering space for people to enjoy nature and exercise. These benefits come from a connected, resilient mosaic of quality habitats. This strategy was designed with local people and organisations to create a shared vision of actions to improve nature which would help to achieve a set of agreed priorities. These suggested actions aim to help users of the strategy to decide which actions they could take, and where, to make the greatest impact towards recovering biodiversity in Oxfordshire. Those who deliver these actions are not just helping nature but simultaneously providing a public good for us all.

Whilst this strategy picks out some key priorities, some actions, and some locations there are still other actions that people can deliver in other locations to support nature across the county. There are a lot of initiatives and strategies that

tackle different elements of nature's recovery and each has its own role in the overall recovery of biodiversity (see our website for guidance).

Oxfordshire is extremely fortunate to be home many people and organisations who care deeply for nature and who understand the wider benefits a healthy environment can bring for us all. There are over 200 nature recovery groups and organisations in this county who are making a difference daily as well as many more landowners and farmers making great changes to support biodiversity. These people and organisations are already leading the way to recover species populations and to improve habitats for wildlife.



Governments expects people to use LNRs to inform bids for project funding and to help incentivise investment in key locations and the mapped areas have endeavoured to complement existing work and efforts being taken across the county. Together, people can deliver collaborative action to create a resilient, connected, and functioning matrix of habitats throughout Oxfordshire which restore biodiversity for the health of nature, people, and future generations. Since all civilisations are built on soils, recovering the landscape and the soil that it relies on is our only opportunity to secure a future for future generations to build their civilisations.

## Acknowledgements,

Below you can see the organisations who have contributed time, expertise, and enthusiasm regularly throughout the development of Oxfordshire’s draft Local Nature Recovery Strategy since 2023. Together, these organisations form the partnership who have developed this project. The LNRS could not have been created without them and their support.

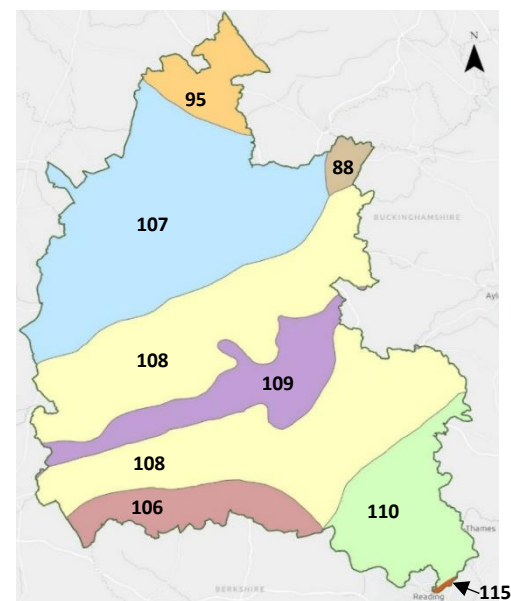


Oxfordshire County Council would also like to thank the many additional people and organisations in addition to the partnership organisations (above) who also contributed significant time and energy towards the LNRS through their engagement, contributions to the project, data-sharing, and more.

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## 5. Biodiversity in the UK and Local Nature Recovery Strategies (LNRS).





# Summary of biodiversity in the UK and Local Nature Recovery Strategies (LNRS).

## Introduction

'Biodiversity' refers to the variety of all life forms, including plants, animals, fungi, and micro-organisms. A landscape that is rich in healthy biodiversity provides the essential necessities for the survival of humans and wildlife, from fresh water, clean air and climate regulation to food, medicines and more. These benefits do not come from individual species but from a rich variety of species working together.

## Global Biodiversity status

On average, countries across the world only have an average of 75% of their biodiversity remaining since recording began. Unfortunately, the UK ranks in the bottom 10% of countries meaning that we are among the world's most nature depleted countries.

## UK biodiversity decline

According to the State of Nature 2023 report, nearly one in six of the UK's local species are at risk of extinction (of those which are recorded) and since 1970, the UK has experienced a 19% decline in the abundance of species. England itself has experienced a 32% decline in species numbers. This decline in biodiversity is primarily due to habitat loss and fragmentation resulting from human land use competing with nature including conventional, intensive agriculture. The report recognizes the need for a different approach, one that enables people and nature to live well together. Source: [State of Nature 2023](#) – report on the UK's current biodiversity

### Terrestrial and freshwater



The abundance of 753 terrestrial and freshwater species has on average fallen by 19% across the UK since 1970.

Within this average figure, 290 species have declined in abundance (38%) and 205 species have increased (27%).



The UK distributions of 4,979 invertebrate species have on average decreased by 13% since 1970.

Stronger declines were seen in some insect groups which provide key ecosystem functions such as pollination (average 18% decrease in species' distributions) and pest

control (34% decrease). By contrast, insect groups providing freshwater nutrient cycling initially declined before recovering to above the 1970 value (average 64% increase in species' distributions).



Since 1970, the distributions of 54% of flowering plant species and 59% of bryophytes (mosses and liverworts) have decreased across Great Britain.

By comparison, only 15% and 26% of flowering plants and bryophytes, respectively, have increased. In Northern Ireland, since 1970, 42% of flowering plant species and 62% of bryophytes have decreased in distribution, compared to 43% and 34%, respectively, that have increased.

Turtle dove, Ben Andrew (rsfb-images.com); Forester moth, Mike Read (rsfb-images.com); Heath Spotted-Orchid, Andy Hay (rsfb-images.com); Ladybird Spider, Ian Hughes (rsfb-images.com); Kittiwake, Ben Andrew (rsfb-images.com); Grey Seal, Ben Hall (rsfb-images.com); Atlantic Yellow Nosed Albatross, Steffen Oppel (rsfb-images.com)



10,008 species were assessed using Red List criteria.

2% (151 species) are extinct in Great Britain and a further 16% (almost 1,500 species) are now threatened with extinction here. In Northern Ireland, 281 (12%) of 2,508 species assessed are threatened with extinction from the island of Ireland.

### Marine



The abundance of 13 species of seabird has fallen by an average of 24% since 1986.

The situation is worse in Scotland, where the abundance of 11 seabird species has fallen by an average of 49% since 1986. These results pre-date the potentially major impact of the ongoing outbreak of Highly Pathogenic Avian Influenza.

4

[State of Nature 2023](#), p4. A description of trends in biodiversity over time.

19%

Across the UK species studied have declined on average by 19% since 1970.

16%

Nearly one in six species are threatened with extinction from Great Britain

### Government initiatives

The government's message is becoming louder, that the UK must act to reverse biodiversity losses. This means that the LNRSs are being created across England at an exciting time, a time where policy and funding are beginning to come together at a national level alongside commitments and targets for positive change. This presents an exciting opportunity for nature and wildlife in the UK. Recent examples of [projects](#) in the country which have been funded to restore biodiversity across 99,000 hectares or landscape include the West Midlands, Cambridgeshire, the Peak District, Norfolk, Somerset funded by Defra and Natural England in 2022. Oxfordshire projects have also had multiple recent successes in their bids for funding grants to deliver Landscape Recovery projects. These local Landscape Recovery projects will be delivered by local people and organisations to provide habitat improvements which are working to create clean and plentiful water, healthy soils, and thriving plants and wildlife.



SoN 2023 p65

### Legislation and Implementation

Local Nature Recovery Strategies (LNRS) were introduced by the UK government through the Environment Act 2021. Authorities in England were asked to start developing these in June 2023 and to publish these online in 2025. The legislation requires authorities all across England to create a list of priorities to achieve in each area which will be developed through engagement and consultation activities with local people and organisations. Alongside the list of priorities to achieve for both habitats and species, LNRSs are asked to create a map of their area to highlight areas of particular importance where habitats should be prioritised for creation or improvement work to benefit local biodiversity

### Nature Recovery

The term 'nature recovery' can have a variety of meanings so it is worth explaining the role that the LNRS has within the overall recovery of nature. For LNRSs, nature recovery means the improvement of habitats or creation of habitats through actions on the ground which would, if delivered, benefit the number and abundance of species (wildlife). The LNRS has a certain level of 'scope' (things that it has the legal power to achieve) and LNRSs are expected to contribute towards nature recovery by creating a list of focused priorities to achieve for their local area and, where possible and suitable, mapping where actions could be taken in the county to achieve those top priorities.

### Funding for the future

Strategies and documents alone are not enough to halt the UK's biodiversity decline. The actions stated within strategies need to be funded and supported so that they can be delivered through coordinated efforts from a range of people and organisations. Government expected that LNRSs would attract funding and support to achieve bigger, better, and more joined up networks for nature across the country which could allow people and nature to thrive and become more resilient to the threats of climate change and the pressures of a growing population. It is the prospect of this funding which makes the LNRS so important to get right. Biodiversity Net Gain is already linked to the LNRS and the LNRS could also be used to guide by public, private, or voluntary bodies to support other green financing initiatives and agri-environment schemes (government have not yet confirmed how the LNRS would interact with agri-environment schemes).

# Oxfordshire's Local Nature Recovery Strategy (LNRS)

## Oxfordshire County Council's Role

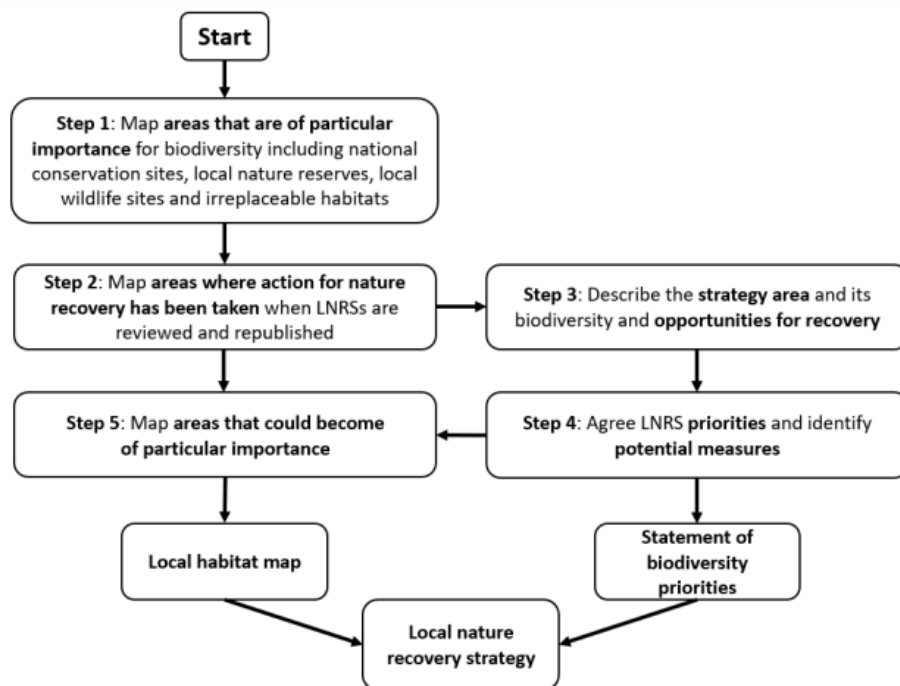
In June 2023, Oxfordshire County Council was appointed by Defra as the Responsible Authority for leading the production of the Oxfordshire LNRS. Oxfordshire County Council created a partnership structure within the project and the partnership will be working collaboratively to oversee the development of the strategy, with the final document expected to be published in 2025.

## What is the Local Nature Recovery Strategy?

The LNRS is expected to help people and organisations across the county to co-ordinate future efforts and funding opportunities towards delivering a shared ambition for nature recovery to support local people to create a bigger, better, and more joined up network for biodiversity to recover. The Local Nature Recovery Strategy (LNRS) is expected to create four key elements which, together, make up the strategy. These are:

1. **A Statement of Biodiversity Priorities** – a written list of the most important outcomes (priorities) to achieve for biodiversity in Oxfordshire. This will include a number of actions that could be taken (potential measures) which would help to achieve the priorities.
2. **A Species Priorities List** – a written list of species which need targeted or specific actions in Oxfordshire to recover. This contains individual and groups of species which need actions over and above those listed on the Statement of Biodiversity Priorities (above).
3. **A Description of the Strategy Area** (this document) – a written document designed to
  - a. Describe biodiversity in each strategy area, in our case, Oxfordshire
  - b. Indicate the opportunities for recovering biodiversity
  - c. Describe the pressures on biodiversity in Oxfordshire (the things that are threatening the survival of species and habitats).
4. **A Local Habitat Map** – an online and interactive map tool which shows
  - a. The existing areas that Defra have agreed are of particular importance for biodiversity
  - b. Priority locations in Oxfordshire where particular LNRS actions could be taken to improve existing habitats, or create new habitats in areas that could become of particular importance for biodiversity.
  - c. Wider information about Oxfordshire if you would like to take actions outside the LNRS priority locations to support biodiversity in the county.

**Figure 2: Order of steps to be followed in preparing contents of a local nature recovery strategy**



The Local Nature Recovery Strategy has partnered with organisations and people across Oxfordshire to create the documents and map above. Together these identify priorities to achieve in Oxfordshire, actions which could achieve the priorities, and suitable specific locations where those actions could be of greatest benefit to biodiversity. Whilst creating the LNRS, partners helped to review the priorities and actions against local, regional, and national targets for biodiversity.

By understanding what people in Oxfordshire want for biodiversity, the government expects that LNRSs will drive funding towards those opportunities that can best create, improve, and restore habitats (natural areas) and wildlife.

The LNRS is expected to help people and organisations across the county to co-ordinate future efforts and funding opportunities towards delivering a shared ambition for nature recovery to support local people to create a bigger, better, and more joined up network for biodiversity to recover.

### **The role of people and organisations across Oxfordshire in the LNRS**

All people and organisations across Oxfordshire are the delivery partners of the Local Nature Recovery Strategy. We all need to contribute towards delivering actions that create, restore, and improve habitats across the county. The LNRS will indicate what types of actions you could take to contribute towards achieving biodiversity priorities in areas across the county. These are not the only actions that people and organisations could take in those locations though.

### **What is the difference between the draft LNRS and the final LNRS?**

During 2024, the draft LNRS will be published online which is a first version of each and all of the LNRS documents (listed above). The goal of publishing this online is to invite local people and organisations to be able to view and comment on the drafted LNRS. By hearing any changes that

local people and organisations recommend we can review a great amount of feedback on these documents and then collate these responses to understand what the LNRS needs to change to create a final version which makes the LNRS easier and more supportive for people to use. The final version is the version that will be published in 2025 and which authorities are not then allowed to change in the following 3 – 10 years (until the Secretary of State asks authorities to review and republish their LNRSs).

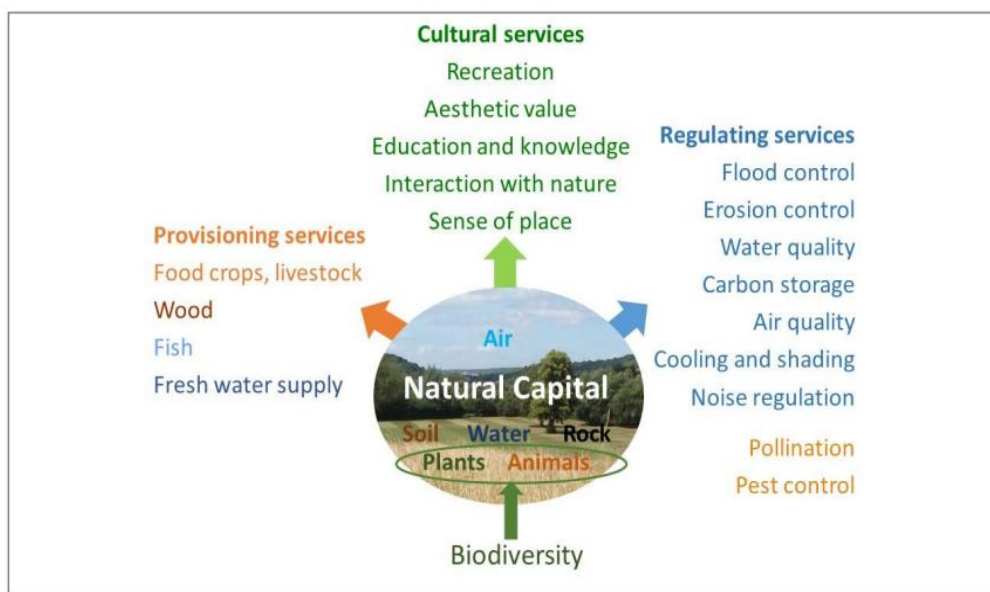
Visit the website ‘Let’s Talk Oxfordshire’ during mid October – late November to comment on the draft version and give us your thoughts before the LNRS creates the final version.

**Figure 1: Local nature recovery strategy review and republication cycle**



**Wider Benefits of Nature Recovery Actions**

Nature recovery actions not only help our wildlife and species to thrive, but if well-coordinated across the UK, could significantly improve human health and wellbeing in the future. The image below illustrates the range of ‘services’ that a healthy landscape can provide and emphasises the importance of nature to us all.



*Figure 1: Natural capital stocks deliver flows of ecosystem services that underpin human health and wellbeing*

Source: Natural Capital in Oxfordshire Short [report](#), p3, Alison Smith, Environmental Change Institute, University of Oxford



## **6. A summary of Oxfordshire's biodiversity**

## 2. Oxfordshire's biodiversity: a summary.

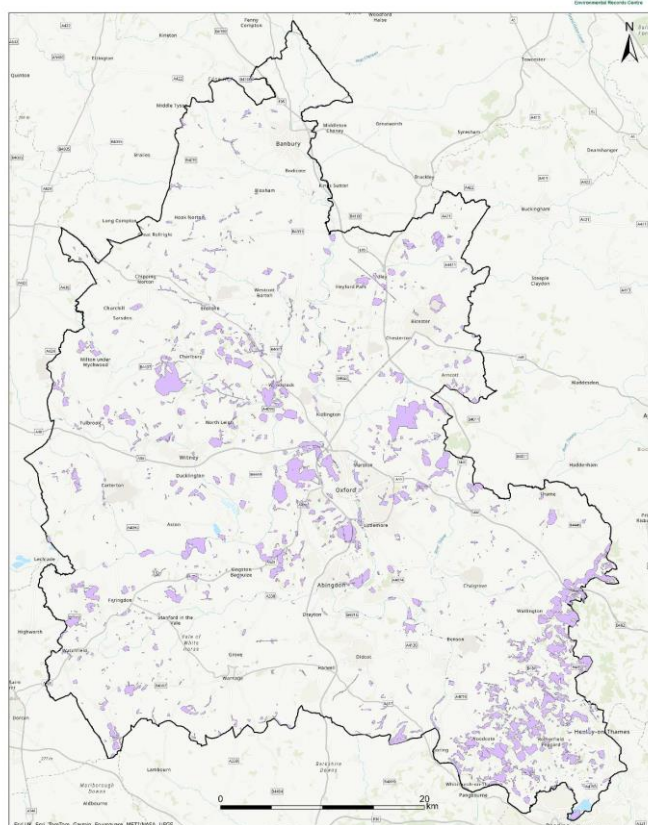
Oxfordshire covers 260,595 hectares of southern England and is the most rural county in the South East (Oxfordshire Joint Strategic Needs Assessment 2023). The State of Nature Oxfordshire ([2017](#)) describes the county as having “a diverse and interesting geology, criss-crossed by eight river systems, that create a gentle yet complex landscape. As such, it supports a variety of habitats, from fragrant chalk grasslands scented with wild thyme, to fungi-strewn beech woods; from pockets of damp, reedy fen and acid grassland to marshy meadows full of birds.” Throughout the document this variety of habitats and species and the landscape in which they are found is often referred to as ‘nature’ and the collective variety of our animals, plants, fungi, and microorganisms is often referred to as ‘biodiversity’.

The LNRS was asked, by Defra, to follow certain criteria to map out existing areas in the county which are ‘of particular importance for biodiversity’ (see map right). In total, 6.5% of Oxfordshire (16,866 hectares) currently qualifies as areas of particular importance to biodiversity. You can see the full report on our [webpage](#) which was carried out by Thames Valley Environmental Records Centre (TVERC).

The areas which were mapped as existing ‘areas of particular importance for biodiversity’ included the national conservation sites, local conservation areas like National Nature Reserves ([NNRs](#)), Sites of Special Scientific Interest ([SSSI](#)), Special Areas of Conservation ([SAC](#)), Local Nature Reserves ([LNRs](#)), Local Wildlife Sites ([LWS](#)). Also included are areas of irreplaceable habitat which are defined in the [National Planning Policy Framework](#) and include lowland fen, ancient woodland, ancient and veteran trees, and more. Some of these types of sites overlap with each other (i.e. there may be ancient woodland, trees, or fen sites within Local Wildlife Sites or SSSIs).

Before considering overlaps, 4.3% (11,197.4 hectares) of the county consists of local and national conservation sites (NNRs, SACs, SSSIs, LNRs, and LWSs). 3.7% (9,624.3 hectares) of Oxfordshire consists of irreplaceable Ancient Woodland & Lowland Fen habitat, much of which is within the bounds of local or national conservation sites. In addition, 0.34% (894.5 hectares) of the county is covered by patches of Wood Pasture and Parkland which contains ancient or veteran trees. There are also over 1,700 known additional ancient and veteran trees outside of wood pasture and parkland which cover at least 0.06% (148.4 hectares) of the county based on

Oxfordshire LNRS Baseline Map



DATE: 24/05/2024 CHECKED: SW  
SCALE: 1:250,000 APPROVED: SW  
DRAWN: NB VERSION: 1.0

**Legend**  
All Baseline Sites & Habitats

Map produced by Thames Valley Environmental Records Centre © TVERC 2024  
All rights reserved Oxfordshire County Council Licence No 100023343 (2024)  
Contains TVERC data © TVERC  
Contains Ordnance Survey data © Crown Copyright and database right 2024  
Contains data from the Ancient Tree Inventory, Woodland Trust, Accessed 05/2024

their root protection areas (however ancient and veteran tree [records](#) are not comprehensive and are regularly being updated across England). You can see this breakdown in the table [below](#).

SITE TYPE	AREA (ha)	% OXFORDSHIRE
Local & National Conservation Sites	11,197.4	4.3%
Irreplaceable Habitat: Ancient Woodland & Lowland Fen	9,624.3	3.7%
Irreplaceable Habitat: Ancient & Veteran Trees	148.4	0.06%
Irreplaceable Habitat: Wood Pasture & Parkland with Ancient & Veteran Trees	894.5	0.34%
<b>Total Area (without overlaps)</b>	<b>16,866.1</b>	<b>6.5%</b>

Table 1. The values in this table represent the total area of each site or habitat type, and the total area is presented without overlapping site or habitat types.

Of the 16,866 hectares (6.5%) of Oxfordshire which meets the Defra criteria to be an ‘area of particular importance for biodiversity’, 5,693 hectares exist outside of nationally protected or locally protected conservation sites.

This Baseline Map presents a preliminary view of important areas for biodiversity in Oxfordshire and was specifically created for the LNRS to serve as a basis for Oxfordshire’s LNRS Local Habitat Map to plan for a bigger, better, and more joined up network of nature in Oxfordshire. This map information has helped the LNRS to target locations which could in future, become of importance for biodiversity. This map serves a particular purpose and there are many further areas across Oxfordshire which experts also consider to be important or irreplaceable habitats which do not yet meet the current government criteria to be mapped as an ‘area of particular importance for biodiversity’.

## Oxfordshire’s Land use and Natural Resources

The map on the previous page describes a very small percentage of the county and there are many habitats and types of land cover (farms, buildings, golf courses etc) which cover the rest of the county. This section describes the types of habitats and land use (land cover) which can be found across Oxfordshire’s 260,595 hectares. (Source: Agile Nature Recovery Map of Oxfordshire, University of Oxford)

[Design team to insert pie chart to surpass the table [Table/chart x](#) ]

Summary categories	Hectares	Percentage	
Arable (42%)	110,683	42%	
Improved grassland (27%)	71,491	27%	
Plantation woodland (3%)	9,063	3%	
Semi-natural woodland* (6%)	15,412	6%	Semi-natural*
Traditional orchards* (<1%)	256	0.1%	Semi-natural*
Wood pasture and parkland* (1%)	2,246	1%	Semi-natural*
Semi-natural grassland* (5%)	12,871	5%	Semi-natural*
Scrub, heath, wetland* (1%)	1,747	1%	Semi-natural*
Water* (1%)	3,136	1%	Semi-natural*
Green space & gardens (7%)	17,318	7%	
Manmade (6%)	16,371	6%	
<b>Oxfordshire total area</b>	<b>260,595</b>	<b>100%</b>	<b>All landcover types</b>



**Sub-total of area that is semi-natural\***

35,668.29

14% \*semi-natural habitat types

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## **Agricultural Land**

The majority of Oxfordshire is land used for agriculture and much has been conventionally farmed (sometimes referred to as intensively farmed). 73% (over 190,000 hectares) of Oxfordshire’s land is currently used for agriculture (growing, grazing, and producing food and produce). Of the 73%, 43% is arable, 27% as improved grassland, and 3% under other classifications. There are habitats being created on farmlands which can also be used to benefit food production and there have been changes in farming practices with large numbers of farmers moving towards schemes to benefit nature alongside food production as part of their business.

Managed sensitively, productive farmland can support a wide range of wildlife. Indeed, managing farmland sensitively helps to combat habitat fragmentation, through creating a more resilient landscape that is permeable to wildlife and provides vital links between protected sites. Agricultural practices to improve soil organic matter can both increase the biodiversity of the soil and store additional carbon.

## **Urban and settlements**

The area used for manmade ‘built development’, gardens, and green spaces makes up 13% of land in Oxfordshire. About 6% of Oxfordshire’s land is covered by built developments (including buildings, sealed surfaces, roads, rail, and developments) and about 7% is domestic gardens and urban greenspace such as playing fields or allotments. Between 2014 and 2020, 2,710 hectares of sealed surfaces were created. In comparison, between 2017 and 2023, just 0.4 hectares of lowland heathland were restored, 2.3 additional hectares of reedbed were created, 7.4 hectares of traditional orchards were created, and woodland cover increased by 0.2% (about 520 hectares).

## **Semi-natural habitats**

‘Semi-natural habitats’ are those which have most of their ecological processes and biodiversity intact, although many of these have still been altered by human activity. 14% (about 36,500 hectares) of Oxfordshire is classified as semi-natural habitat. Of that 14%, 6% (about 15,500 hectares) is semi-natural woodland, and 8% (about 20,800 hectares) is other semi-natural habitats including flood plain meadows, chalk grassland, parkland with scattered trees, wetland, scrub, heath, and a tiny area of traditional orchards (see a more detailed chart on the next pages). There are also around 17,000km of hedgerows and lines of trees along field boundaries.

## **Woodland**

As of 2020, woodland covered 9.2% (about 24,000 hectares) of Oxfordshire, just under the average 9.9% woodland cover for England (data from TVERC). Approximately one third of Oxfordshire’s woodland is plantation (woods which have been planted to grow timber and so are not ‘semi-natural habitat’). Many of Oxfordshire’s woodlands are small – 38% are less than 10 hectares in size, indicating a scattered and fragmented habitat type. 3.4% of all woodland in Oxfordshire is ancient, with just over 2,500 hectares being plantation on ancient woodland (PAWS).

## **Carbon Storage**

It is estimated that 23 million tonnes of carbon is stored in Oxfordshire's soils and vegetation, and that in addition 115,000 tonnes of carbon is sequestered each year by healthy soils and vegetation. A further 3.5 million tonnes of carbon would be sequestered between 2020 and 2050 if there was no further change in land-use or ecosystem condition (Pathways to Zero Carbon Oxfordshire).

## **Minerals**

The geology of the County has enabled a thriving minerals industry to develop, providing sand and gravel from the river valleys, soft sand in the south west of the County, and limestone and ironstone in the north and west. A survey in 2009 found that 78% of sand and gravel and 51% of crushed rock produced in the county is used in Oxfordshire. Many large areas of habitat creation have or will be delivered through the restoration of minerals sites in the County, including through the Lower Windrush Valley Project.

### **Definitions relevant to table and the above section:**

- Arable: land used for growing and producing crops, also includes intensive orchards.
- Improved grassland: grasslands for pasture that have been highly modified through reseeded and frequent fertiliser application. Typically over 50% perennial ryegrass, white clover and other high-productivity agricultural species. Also includes unidentified natural surface.
- Plantation woodland: coniferous, mixed and broadleaved plantations, unknown woodland and felled woodland
- Semi-natural grassland: acid, calcareous and neutral grassland, purple moor grass and rush pastures, unidentified semi-improved grassland (including 'rough grassland' from OS Mastermap), 'marshy grassland' (some of which is just improved grassland on the floodplain), poor semi-improved grassland, tall herb and fern, bracken, and ephemeral vegetation
- Scrub, heath and wetland also includes a few hedgerows which are on the TVERC habitat map (typically because this has been provided by a restoration project; most hedgerows are not included)
- Water: rivers, streams, canals, drainage ditches, lakes, ponds and reservoirs
- Greenspace and gardens: domestic gardens, parks, cemeteries, churchyards, playing fields, allotments, amenity grass, grassed roundabouts and verges
- Man-made: buildings, sealed surfaces, roads, rail, tracks, bare ground, landfill, quarry, Open Mosaic Habitat on previously developed land (this can be biodiverse), sand and new development

## Important Habitats, Species and Designated Sites in Oxfordshire

The value of selected areas of the county's habitat are recognised with a range of statutory and non-statutory designations which aim to protect the best examples of places for nature.

### National Landscapes

Oxfordshire has parts of three National Landscapes. In total, these three landscapes cover some 25% of the county. National landscapes are designated to conserve and enhance their areas of outstanding natural beauty. Oxfordshire's three National Landscapes are:

1. **The Chilterns** National Landscape, of which 233 km<sup>2</sup> (8.9% of the county and 28% of the National Landscape) lies within Oxfordshire. Of note in this part of the Chilterns are the ancient woodlands, chalk downland, chalk streams and scrub communities (including important juniper scrub).
2. **The Cotswolds** National Landscape, of which an area of 248km<sup>2</sup> (9.5% of the county and 12% of the National Landscape) lies within Oxfordshire. Of note in the Oxfordshire Cotswolds are areas of open High Wold, the Evenlode and Windrush river valleys, the Wychwood Forest, areas of unimproved limestone grassland and floodplain meadows. A good population of farmland birds still exists on arable land in this area.
3. **The North Wessex Downs** National Landscape, of which 186.5km<sup>2</sup> (7.2% of the county area) lies within Oxfordshire. Habitats of note in this landscape in Oxfordshire include chalk grassland, chalk streams, populations of farmland birds and veteran trees.

### World Heritage Sites

Blenheim Palace and Park was awarded World Heritage Site status in 1987 and is one of only 17 registered sites in England (one of 30 in the UK). Blenheim Park also contains an important SSSI, containing one of the finest areas of ancient oak-dominated pasture woodland in the country with lakes of regional importance for breeding and wintering birds.

### Special Areas of Conservation (SAC)

Oxfordshire has seven internationally designated Special Areas of Conservation (SAC) which fall partly or entirely within the county. SACs are designated where they support internationally important habitats and/or species, and receive strict legal protection.

- **Aston Rowant:** One of the best remaining examples in the UK of lowland juniper scrub on chalk.
- **Chilterns Beechwoods:** Beech forests on neutral to rich soils, stag beetle *Lucanus cervus*, dry grassland and scrublands on chalk
- **Cothill Fen:** Largest surviving example of alkaline fen in central England, alder woodland on floodplains
- **Hackpen Hill:** Dry grasslands and scrubland on chalk with a significant population of early gentian *Gentianella anglica*.
- **Hartslock Wood:** Yew woodland and chalk grassland supporting one of only three UK populations of monkey orchid *Orchis simia*.
- **Little Wittenham:** One of the best studied great crested newt *Triturus cristatus* sites in the UK.

- **Oxford Meadows:** Lowland hay meadows including the larger of only two known sites in the UK for creeping marshwort *Helosciadium repens*.

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

There are 113 Sites of Special Scientific Interest (SSSI) wholly or mainly within Oxfordshire. The added area of all those 113 sites is a total of 4475.7 hectares (which is 1.17% of Oxfordshire). These SSSI sites are designated as important nationally for their wildlife or geology. 50.48% of Oxfordshire's SSSIs are in favourable condition (by area), with 47.45% in favourable recovering condition. 0.99% SSSIs by area are considered to show no change, with 0.76% declining and 0.19% destroyed (Natural England 2024). A list of the 113 SSSIs can be viewed in the TVERC reports on the County Council LNRS webpage.

### **Local Wildlife Sites (LWS)**

Local Wildlife Sites (LWS) are sites identified at a County-wide level for their wildlife-rich habitats, or particularly important species. All Local Wildlife Sites which meet the necessary criteria are designated; this differs significantly from the process of identifying SSSIs, as the latter are a representative sample of sites. Local Wildlife Sites don't receive legal protection but are identified and protected through the planning process. Like SSSIs, LWS are surveyed on a rolling programme, with most sites being reassessed approximately every 10 years. Since 2005, 36 sites have been removed and 94 sites added to the total number of Local Wildlife Sites. Oxfordshire currently has 399 Local Wildlife Sites (6670.4 hectares which is 2.5% of Oxfordshire ) with a further 71 proposed new or proposed extensions to LWS (1195.8 hectares in total) under assessment (TVERC, 2023). Currently the percentage of the county covered by LWS is 2.5%, much lower than in some neighbouring counties such as Berkshire (8%), and much lower than England (5%) (The Wildlife Trusts, 2016).

In Oxfordshire, 52% of Local Wildlife Sites were considered to be in positive conservation management in 2022 - 20223. For context, the equivalent figure across England in 2021 - 2022 was 43%. There has been a gradual improvement in the proportion of Local Wildlife Sites in positive management in the County from 34% in 2016- 2017.

### **Road Verge Nature Reserves**

Road Verge Nature Reserves (RVNRs) are verges rich in biodiversity, including a number of scarce and threatened plants and habitats. RVNRs provide connectivity between wildlife areas, helping maintain and restore a green network through which wildlife can move and survive. Green verges provide a vital link between what can otherwise be inhospitable landscapes, providing benefits for both wildlife and people. There are currently 51 RVNRs located across the county, including examples of limestone and chalk grassland, acid grassland and neutral grassland.

### **Habitats of Principal Importance**

56 Habitats of principal importance for the conservation of biodiversity in England have been identified under the Natural Environment and Rural Communities Act 2006. The list is

intended to help public bodies be aware of biodiversity conservation in their policy or decision making, to inform landowners planning nature recovery and to help funding bodies support suitable nature recovery.

Oxfordshire supports 20 of the 56 habitats identified as ‘habitats of principal importance’ in England, which are described in the table below:

**Lowland Meadows:** a key habitat in Oxfordshire, dependent on low fertility soils and traditional management methods. Flower rich, important for invertebrates and ground nesting birds such as skylark.

**Lowland calcareous grassland:** a key habitat in Oxfordshire, associated with areas of chalk and limestone geology, found particularly in the North Wessex Downs, Chilterns and Cotswolds. Flower rich, important for invertebrates (particularly butterflies).

**Acid grassland:** of restricted distribution in Oxfordshire, associated with sandy soils such as those on the Mid-vale Ridge. Generally not flower rich, but important for rare plants and invertebrates.

**Floodplain Grazing Marsh:** a key habitat in Oxfordshire, associated with river floodplains. Sometimes flower rich, important for wading birds.

**Lowland Fens:** a key habitat in Oxfordshire, particularly in the Cothill area. Important for rare invertebrates and plants. May support water vole and otter.

**Eutrophic Standing Waters:** likely to be found in old gravel pits and reservoirs, often important for waterfowl.

**Mesotrophic Lakes:** these have lower levels of nutrients than Eutrophic Standing Waters, and can be particularly rich in plant and invertebrate species. There are only a few examples in Oxfordshire, to be found mainly amongst the old gravel pits of the Lower Windrush Valley.

**Ponds:** found throughout Oxfordshire, may be rich in plants and invertebrates. Likely to be breeding sites for amphibians, including great crested newt.

**Reedbeds:** of restricted distribution in Oxfordshire, important for birds, may support water voles or rare plants.

**Rivers:** found throughout Oxfordshire, provide important wildlife corridors. Likely to support water vole, otter, and a variety of invertebrates. All of Oxfordshire’s rivers are now managed by catchment partnerships. Chalk streams in the Chilterns are a local and special habitat type which is rare globally with the majority of all the world’s chalk streams found within England.

**Purple Moor Grass and Rush Pastures:** these wet pastures are of restricted distribution in Oxfordshire, found mainly around Otmoor and the Shill Brook in West Oxfordshire.

**Lowland Wood Pasture and Parkland:** important for veteran trees, invertebrates and bats. Found mainly on Oxfordshire’s old estates

**Lowland Beech and Yew Woodland:** a key habitat in Oxfordshire, found mainly in the Chilterns.

**Lowland Mixed Deciduous Woodland:** found across Oxfordshire, those with rich ground flora are of particular biodiversity interest. Also important for bats, woodland birds and butterflies, occasionally support dormice.

**Wet woodland:** of restricted distribution in Oxfordshire, likely to be adjacent to waterbodies or part of a mosaic of wetland habitats. May support otters, or rare invertebrates.

**Traditional orchards:** of restricted distribution in Oxfordshire, dependent on traditional management methods. Important for bats, rare invertebrates, mosses, lichens.

**Arable Field Margins:** strips around field edges managed to provide benefits for wildlife – can provide important food sources for birds and invertebrates.

**Hedgerows:** an important linking habitat found throughout Oxfordshire, of particular biodiversity value when they consist of a large proportion of native woody species. Used by foraging birds and bats, dormice and a range of invertebrates.

**Lowland Heathland:** of restricted distribution, important for reptiles and invertebrates

**Open Mosaic Habitats on Previously Developed Land (OMHPDL):** examples in Oxfordshire include former quarries and ash lagoons – can be particularly important for birds, invertebrates and specialist plants.

## **Working across Oxfordshire's Border - Regional Projects**

In order to secure the recovery of nature in the face of climate change organisations and authorities need to plan and act for how nature moves as it adapts to a changing climate. We need to think about Oxfordshire's future wildlife and to think about what local species will need to be able to live here in 10, 50, or 100 years' time and how they will move to they get here or leave here as the suitability of habitats changes. Species are already moving at a scale greater than an individual county.

LNRSs can contribute towards regional projects that cover multiple counties across England. This includes 'Big Chalk' and river catchment partnerships (which are described later in this document).

## **Big Chalk Introduction**

Big Chalk is a partnership and a programme of activity working across the calcareous (chalk and limestone) landscapes of southern England. It seeks to amplify the efforts of partners to create a robust ecological network of all habitats found on calcareous landscapes on a scale hitherto unimagined.

The partnership is headed by an influential Board and topic groups and conferences bring partners together across an array of subject areas. A wider membership list keeps people in touch. Individual projects can apply for Big Chalk accreditation through a project registration scheme.

More information can be found [here](#).

### **Ecological importance**

Calcareous (chalk and limestone) landscapes in the south of England contain the most species-rich habitats within the UK. When combined across the whole landscape, these habitats make the Protected National Landscapes one of the best places to allow wildlife to recover and adapt to climate change.

With a north south reach of 108 miles, Big Chalk represents the one of the best opportunities offered by the English landscape to support the northward movement of species to a new climate space. Being located towards the north of the area, Oxfordshire plays an important role as a destination for these species.

### **Challenges and opportunities,**

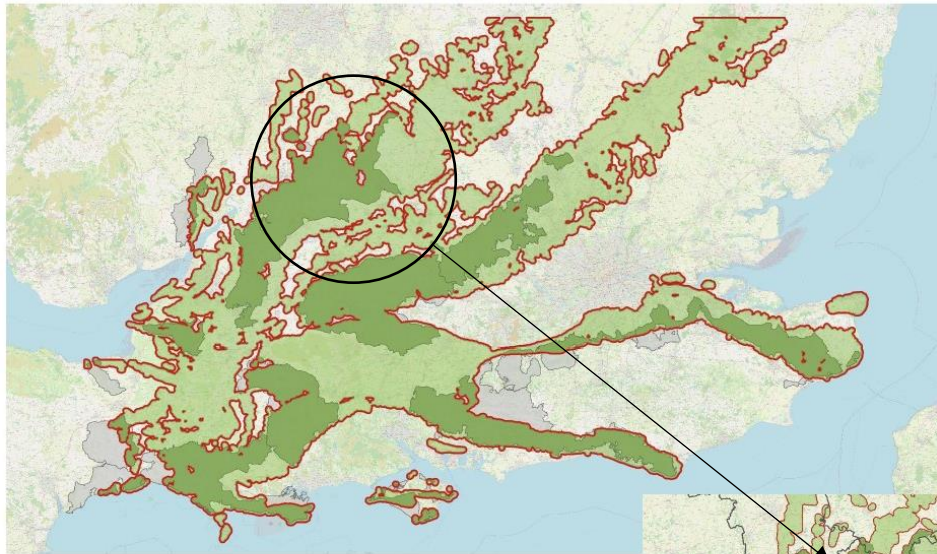
The Big Chalk area is huge, covering some 24,867 sq. km, or 19% of England and there are many people, organisations and partnerships striving to deliver the Big Chalk vision in a variety of ways. It is important that the Big Chalk partnership champions and supports these efforts rather than competes with them. Big Chalk seeks to do this in two main ways:

- Championing and connecting the contributions of partners across political and institutional boundaries.
- Defining priorities, influencing funders and policy makers to support and secure resources for new activities.

The Big Chalk Partnership is already proving to be influential with funders and policy makers. As nature recovery effort continues to grow Big Chalk can combine our voices and efforts to better create and realise opportunities for the recovery of nature.

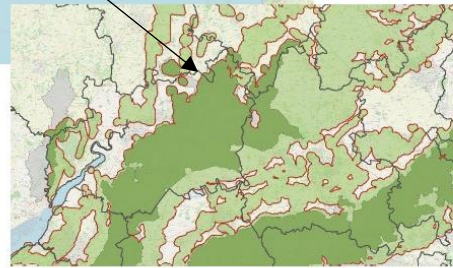


Chalk grassland with high biodiversity in



**Map of BIG CHALK, including the Protected Landscapes (in dark green)**

**Inset: BIG CHALK around Gloucestershire & Oxfordshire**



Written by the BIG CHALK Partnership team, January 2024



## Species trends in Oxfordshire

Species trends in Oxfordshire generally reflect patterns seen across England. For some species we have local data sets and can understand local trends in more detail. The following trends mostly come from the State of Nature in Oxfordshire Report (2017).

### Species 'on the brink' (at risk of being lost) in Oxfordshire

Whilst there will have been significant historical losses of a wide range of species, the examples below include species where records indicate fairly recent declines (many since 1998) to the point that species are now considered extinct or near extinct in Oxfordshire. This is not an exhaustive or definitive list, there may be other species which meet this categorisation which we do not yet have sufficient information about.



Wall butterflies, grassland specialists which had been widespread are now considered extinct in the County having not been recorded since 2009



The marsh fritillary which was rapidly declining in 1998 is now considered near extinct in Oxfordshire

*Dormouse: there are very few records for Dormice in the County, with the last recorded sighting in 2017. It is unclear whether this is partially due to under-recording of this species.*



Nightingale *Luscinia megarhynchos* had disappeared from Oxfordshire with the last confirmed breeding records in the County from 1998 and only 2 sightings in 2020 and in 2021. However, a landowner has recently recorded the first breeding pairs in the county in the past 4 years after dedicated habitat management work and their range could expand with the creation of suitable habitat



Following recent significant declines Native white clawed crayfish is now extremely rare in Oxfordshire



The adder *Viperus berus* is typically found in heathland but is now very rare (all but extinct) in the county, whilst it was considered to have a stable population in 1998, the last confirmed record of an adder in Oxfordshire was from the Chilterns in 2015



We have recently lost the wood white butterfly which was last recorded in 2008.



In 2017 Otmoor was the only reliable site in Oxfordshire where turtle doves still bred, they have not been recorded

breeding there since 2020. Through the work of Operation Turtle Dove there is potential for this species to recover

## Declining Species



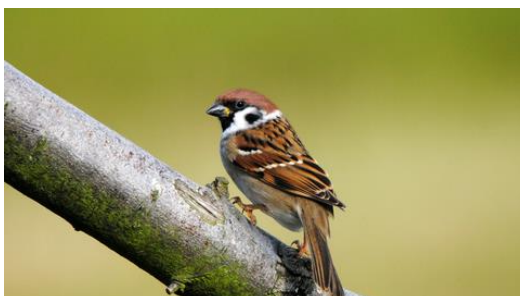
Apart from at the RSPB's Otmoor reserve, curlew numbers decreased by 51%, lapwing by 21%, snipe by 88% and redshank by 50% in Oxfordshire between 2005 and 2015. These declines are attributed to loss of wet grassland habitat and predation impacts. More recently, the Curlew Recovery Project estimates that there is currently a total population of 60 pairs of Curlew in the Upper Thames (including a few

in Buckinghamshire), with strong recovery continuing at Otmoor, but there is also evidence of declines in many of the smaller populations.

Data collected for the Upper Thames Butterfly Atlas 2016 (Asher et al., 2016) shows declining trends of the wider countryside butterfly species, which are now experiencing the same sort of drop in abundance that the habitat specialists suffered 30 years ago. The black hairstreak butterfly, found only in hedgerows and thickets of blackthorn in woodlands on the heavy clay soils between Oxford and Peterborough, has suffered a dramatic decline nationally (losing 43% of its population since the 1970's) but the Buckinghamshire and Oxfordshire colonies seem stable due to targeted conservation efforts to maintain habitats for these species in certain locations.



**Willow tits**, which like scrub and wet woodland, are the most rapidly declining woodland bird species locally. Several other woodland bird species in Oxfordshire have been in long term decline and on the Red List for Birds for some time (BoCC4, 2015) include lesser spotted **woodpecker**, **marsh tit** and **hawfinch**.



Banbury Ornithological Society (BOS) "Winter Random Square Survey" has shown that several resident farmland birds, including yellowhammer and linnet, declined greatly in the 70s and 80s, before stabilising somewhat in the late 90s and 2000s. For a few, the declines are continuing, notably corn bunting and tree sparrow (ed. Easterbrook, 2013).

## Increasing Species

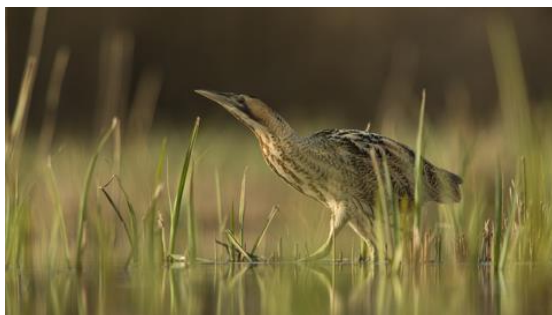
The Adonis Blue, silver washed fritillary, purple emperor and brown argus are all butterfly species which have expanded in range, if not abundance (Upper Thames Butterfly Conservation, 2016).



Between 1900 and 1998, water voles (*Arvicola amphibius*) suffered a 95% reduction in their range in the UK. During the period 2009 to 2024, against the backdrop of a national decline, the total spatial coverage of water vole 'Local Key Areas' in Oxfordshire increased by 85% as a result of co-ordinated water vole conservation and mink control activities; this can be interpreted as an overall

improvement in the fortunes of this species in the county.

In the first three national otter surveys of England, undertaken from the late 1970s to the early 1990s, otters were almost entirely absent from the Thames catchment and Oxfordshire, following extensive national declines, with a just the first few positive sites in Oxfordshire in the 1991-94 survey. Otters are now widespread across the county and can be seen in urban as well as rural areas, reflecting their gradual but continuing national recovery. The banning of toxic chemicals, improvements in water quality and legal protection have all helped to bring otters back to the Thames catchment.



After an absence from the county of about 200 years, bittern, marsh harrier and common crane have returned to breed in the new reedbed at RSPB's Otmoor reserve.

## Re-introductions

This section focuses on some key species which have either been introduced to Oxfordshire, or could, in future be reintroduced to Oxfordshire.



**Natterjack toad.** With its specialist habitat requirements, the natterjack toad has always been rare in the county. This species went extinct from the county in the twentieth century but was more recently re-introduced to a sandy-heathland site on a farm in Oxfordshire where a breeding population has become established.

**Red kites** became extinct in England as a result of persecution. In 1990 they were successfully re-introduced at a site on the Oxfordshire/Buckinghamshire border in the Chilterns, establishing a self-sustaining and expanding population.



**Eurasian Beavers** have begun to be reintroduced in England under licenses. Local Nature Recovery Strategies are asked to consider species which could be suitable for reintroduction to their relevant counties and people and organisations across Oxfordshire have repeatedly mentioned the possibility to reintroduce beavers. It would be crucial to plan this reintroduction carefully with the support from relevant landowners and considerations of managing growing populations.

## Nationally important populations of species and their habitats which can be found within Oxfordshire

Oxfordshire is home to a number of species and habitats which are important at a national level. This is often because they are found in few (or no) other locations in the country.

### Plants

- Oxfordshire's calcareous grasslands support nationally important rare plants, including the bulk of the UK populations of downy woundwort, meadow clary, early gentian and Chiltern gentian. All these species are in decline, Downy woundwort is found nowhere else in the UK and the Oxfordshire populations have been struggling.
- Oxfordshire has one of the largest UK populations of the nationally rare downy-fruited sedge *Carex filiformis*. Our wet grasslands support the vast majority of the UK's population of creeping marshwort *Helosciadium repens* and fen violet *Viola persicifolia*.
- The River Ray floodplain is a stronghold for the rare true foxsedge *Carex vulpina* (Feber, 2013).
- One of only three UK populations of monkey orchid is found at Hartslock nature reserve.
- Bluebells *Hyacinthoides nonscripta* are widespread in Oxfordshire woodlands but under threat globally.

- One of Britain's rarest trees, the native black poplar is a tree of wet woodland and forested floodplain. Thought to be declining over the long-term in Oxfordshire, more information is needed about this species which requires DNA-testing to confirm its identity.
- Box woodland is extremely limited in the UK, localised to only about 10 sites in the country. There is a location in Chinnor where an example of mature box woodland can still be found.

### **Breeding curlew**

- The Eurasian Curlew is identified as Near Threatened at a global scale by the IUCN. With 58,000 pairs reported in the UK in 2020, the UK holds 40% of the European curlew population and 25% of the global population. With an estimated 60 breeding pairs, the Upper Thames is one of the important lowland breeding sites.

### **Lowland Meadows**

- Oxford Meadows Special Area of Conservation (SAC) is considered to be one of the best lowland hay meadow areas in the UK, with vegetation communities that are perhaps entirely unique which reflects the influence of long-term grazing and hay-cutting on lowland hay meadows. Other good examples of this habitat are found in the floodplains of the Thames, Cherwell and Ray.

### **Calcareous fens**

- Oxfordshire hosts a complex of calcareous species-rich fens that forms the largest remaining group of such habitats outside East Anglia and North Wales. Cothill Fen SAC (JNCC, 2016) is the largest surviving example of alkaline fen in central England, which supports keeled skimmer, small red damselfly and southern damselfly, as well as endangered soldier flies, rare horseflies, water penny beetles, the mollusc *Perforatella rubiginosa*, fen violet and greater water parsnip.

### **Chalk Streams**

- Streams arising (starting) from chalk aquifers such as the Letcombe Brook, Chalgrove Brook and Ewelme Stream support characteristic species such as brown trout, bullhead and other species dependant on clear, fast flowing water and gravel substrates. Chalk streams are a globally rare habitat, with only 224 in England (TVERC data).

### **Veteran Trees and Wood Pasture**

- Blenheim Palace in Woodstock hosts one of the greatest collections of ancient oak trees in Europe, including one that is 1,000 years old. There are a range of other sites of importance for veteran trees and wood pasture; an English Nature report of 2005 concluded that the many parklands and long history of wood pasture management in the Thames & Chilterns region highlights its national and international importance for habitats and species associated with veteran trees.

### **Research Sites**

- Wytham Wood, owned by the University of Oxford, is one of the most well-studied woodlands in the world.

- Oxford has a long-standing cultural and scientific association with swifts – the colony at the Oxford University Museum of Natural History has been the subject of the Oxford Swift Research Project, started by David and Elizabeth Lack in 1947. This is one of the longest running studies of any species of bird, and has contributed greatly to our knowledge of the species.
- Little Wittenham Special Area of Conservation is one of the best-studied great crested newt sites in the UK.

## **Water Environment**

- Later within this document, there is a full description of each of the main river catchments in Oxfordshire, their ecological characteristics and importance, and the challenges and opportunities for recovering biodiversity along these rivers. We know from the consultation workshops and surveys that improving water quality and the health of our rivers and freshwater habitats is a core priority for the people of Oxfordshire. This is echoed by the Environment Agency who are leading this recovery work and who support a number of Oxfordshire’s ‘catchment partnerships’ (groups of landowners, organisations, and people who are taking action to improve the condition of their local rivers and waterways). Together, they have helped to create our descriptions of the Rivers and Waterways below.

**The next section of this document describes the opportunities for recovering nature across Oxfordshire and separates this by different areas of the county.**

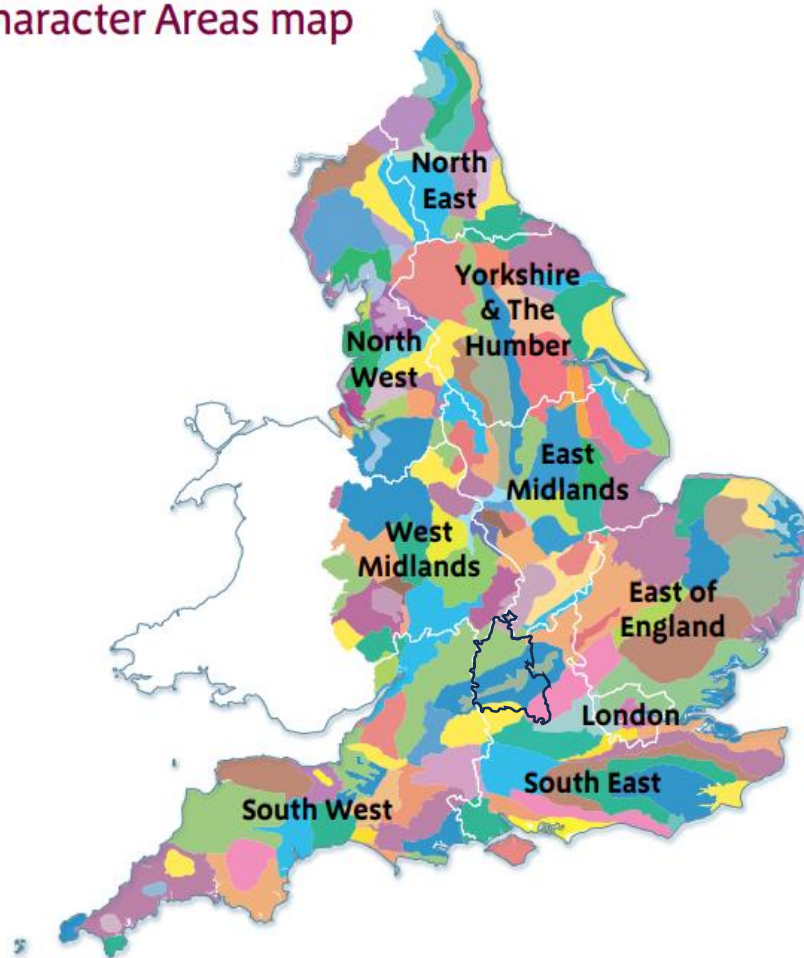


## **7. Oxfordshire's opportunities for nature recovery by National Character Area.**

## SECTION 7: Oxfordshire’s National Character Areas and opportunities for nature recovery.

[Natural England](#), the government’s advisory body for nature, describes England using 159 different and distinctive National Character Areas (NCAs). Each NCA gives a description of the geology, landscape, cultural history of the area and describes what kinds of habitats and biodiversity are typical in those places. Starting by thinking about geological features and soil suitability tells us about England’s natural borders and features which is a helpful way to start thinking about how to recover nature in a way that is suitable for those types of landscapes.

### National Character Areas map



**Source:** National Character Area Profiles, Natural England (2014) with Oxfordshire outlined in a black border

Each National Character Area (NCA) profile describes the geology, biodiversity, and character of the land within it. This includes an understanding of how people are using the land and how land-use has changed over time. By looking to understand Oxfordshire’s nature from a cultural, social, environmental, and historic perspective, this LNRS intends to offer recommendations about the types of nature recovery actions which could be suitable priorities in those places which represent both people and biodiversity.



## A county with a responsibility for improving habitat connectivity across central England.

As you can see on the map below, Oxfordshire is located at the top of the South East region of England and our borders join us to the South West, West Midlands and East Midlands. Our placement in the centre of southern England means that we play an important role in ensuring that habitats join up and connect across administrative borders and that habitats allow wildlife to move and migrate between counties. This responsibility is expected to become increasingly important as the climate changes because species will need more opportunities to move across landscapes to find to suitable places where they can survive as our weather patterns change.

Re-connecting habitats is an urgent priority to achieve because many current habitats are highly fragmented (not connected to each other well). This means that if weather patterns changes whilst our habitats are highly fragmented, species would be unable to move away from unsuitable areas and we are more likely to lose populations of species who would die out.

**'Connectivity'** of habitats has been voiced as a top priority to achieve in Oxfordshire. The LNRS heard this from people and organisations across our surveys, workshops, and when the LNRS reviewed local nature recovery plans. Joining up existing habitats allows species to move, find each other, reproduce, escape unsuitable conditions, and increase their range across England. It is therefore important that locations which the LNRS prioritises to focus nature recovery efforts are connected as a network of habitats.

Oxfordshire's draft LNRS will be shared with our six neighbouring county areas (Warwickshire, Northamptonshire, Buckinghamshire, Berkshire, Wiltshire, and Gloucestershire) and we have worked closely with neighbouring counties whilst we developed this draft LNRS, having regular meetings and sharing documents like these to help keep conversations open about cross-border opportunities for nature recovery.

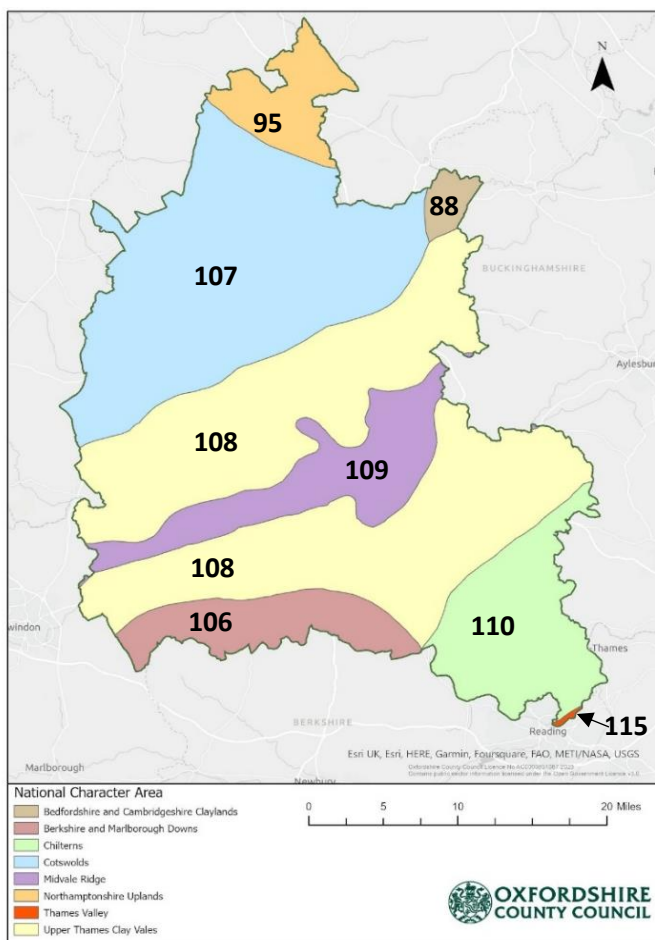


# Oxfordshire's Natural Character Areas (NCAs)

## Overview

The map below illustrates the 'National Character Areas' which run across Oxfordshire's landscape. Each coloured area represents a unique type of landscape distinguished by its geology, soil types, biodiversity, history, or land-use. The features that shape our sense of place within Oxfordshire, such as the historic towns, open farm fields, and woodlands, are all integral parts of these areas. It's important that our local nature recovery strategy considers these features when thinking about which nature recovery actions are most appropriate, and where.

National Character Areas in Oxfordshire



**Figure X:** Oxfordshire's National Character Area (NCA) map.

## Exploring the NCAs

This section guides you through each of the coloured NCAs in Oxfordshire (pictured left), moving from North to South. Each section describes the nature found in each area and how this nature benefits us by providing services called 'ecosystem services'.

**Ecosystem services** 'are the benefits that nature delivers to people' (Millenium Ecosystem Assessment, p.9). The long term provision of these benefits relies on us maintaining enough healthy 'natural capital' such as healthy soils, clean rivers, woodlands, wetlands, grasslands, and the diverse range of plants and animals that live within these (Alison Smith, University of Oxford).

## Benefits of Healthy Ecosystems

Healthy soils are not only essential to food production, but also filter rainwater into the ground, replenishing our underground water supplies, support invertebrates and micro-organisms essential to nutrient cycling and store carbon. Trees absorb carbon, purify the air and water, control floodwater, and help cool their surroundings. Well-managed floodplains and wetlands store water, mitigating flooding impacts and enhancing water quality. These nature-rich green and blue spaces offer opportunities for recreation and exercise, improving our mental and physical wellbeing. A variety of habitats, including grassland, wetlands, woodland, heathland, and scrub, provide homes for local species too. These species benefit people in many ways, for example, flies, wasps, bees, moths, and other insects pollinate the flowers on

our crops which allows those crops to produce food.

## Sources

Many of the details in the following sections have been collated from Natural England's National Character Area [profiles](#), the [Oxfordshire Wildlife and Landscape Study](#) and [Wild Oxfordshire](#)'s website.

## Landscape Types in NCAs

Each of the National Character Areas above (NCA) covers a large portion of Oxfordshire. The next pages show you a breakdown of each of the above National Character Areas and the types of landscape and biodiversity present in each. The landscape types were identified in the Oxfordshire Wildlife and Landscape Study (OWLS) and have been shown according to each NCA.

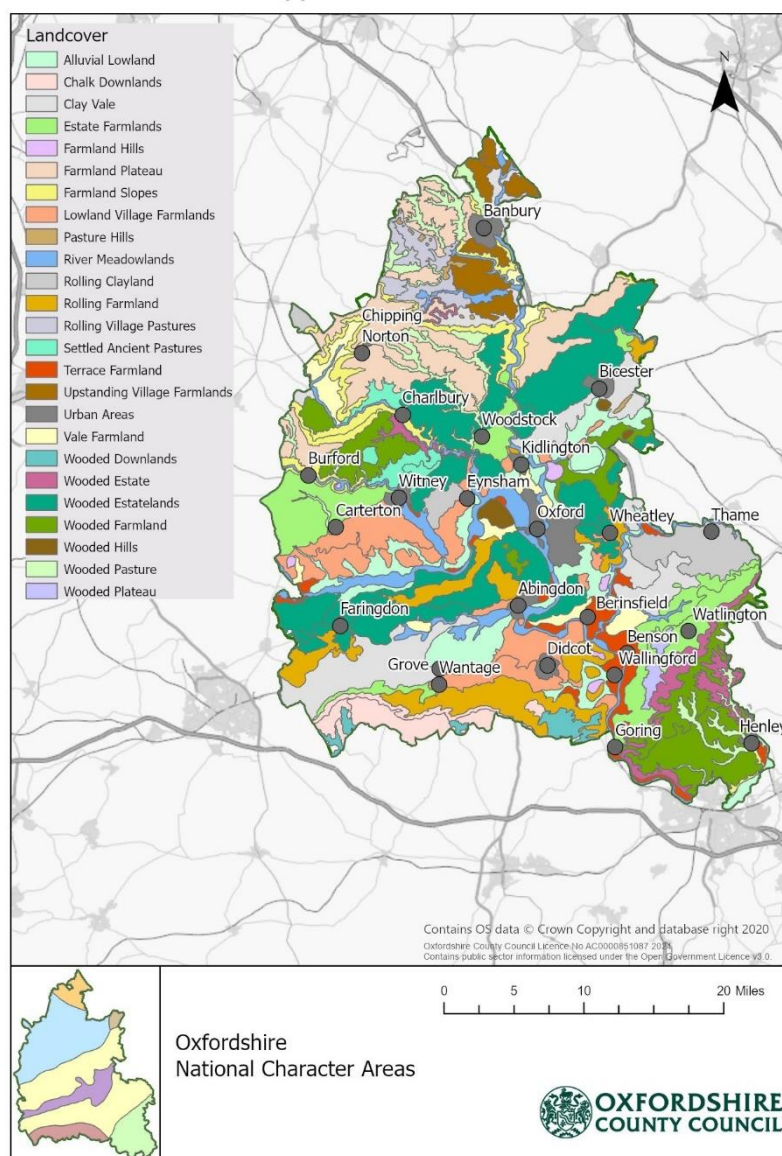
## Action Planning

By detailing the types of landscape, habitat types, and biodiversity which are typical to each NCA (based on their underlying bedrock and how water moves through them), this section gives the reader more information to understand what types of nature recovery actions may be most appropriate for their area of interest within Oxfordshire.

## Oxfordshire Wildlife and Landscape Study

Fortunately, in addition to the NCA areas, the [Oxfordshire Wildlife and Landscape Study \(2004\)](#) also created a breakdown of 25 different types of 'landcover' which cover the whole county and tell us more about the habitats and biodiversity typical to different areas of the county. This understanding of Oxfordshire is made possible by the work of those who created the. To use a more interactive version of this map, please view the [website](#).

### OWLS landcover types in Oxfordshire



The next pages describe each of Oxfordshire's NCA areas alongside information from the OWLS landcover types above.

## **NCA 95 – the Northamptonshire Uplands (11,233 ha), 4.31% of county)**

**Source:** NCA95 Northamptonshire Uplands

**Geology:** In the Northern tip of Oxfordshire where the Oxford Canal and the River Cherwell run, the underlying geology is made up from middle Jurassic limestone, sandstones, muds, and clays that are rich in iron including Marlstone, Northampton Sands, and clays of the Lias. Areas of thick ‘boulder clay’ are found in the North and East of the map (right) which gives these areas heavy loam and clay soils which often become waterlogged with high rainfall.

**Landscape Character:** Rounded hills roll gently with long, low ridgelines between valleys. From the low ridgetops, long distance views can be seen with scattered pockets of broadleaved woodland, mature ash and oak trees, and parkland areas dotted with veteran trees. There are extensive open fields for farming across this area with areas of historic ridge and furrow. Tall, A-shaped hedgerows containing mature oak and ash trees are a feature of the area. Around Banbury the main habitat type is floodplain grazing marsh with pockets of high quality arable land. Straight, narrow roads with grassy verges follow ridges between settlements, and ironstone buildings and churches are commonplace. This area has recently experienced a significant amount of development to increase housing, roads, and rail options. Banbury sits along a key national transport corridor which has influenced the character of some areas.

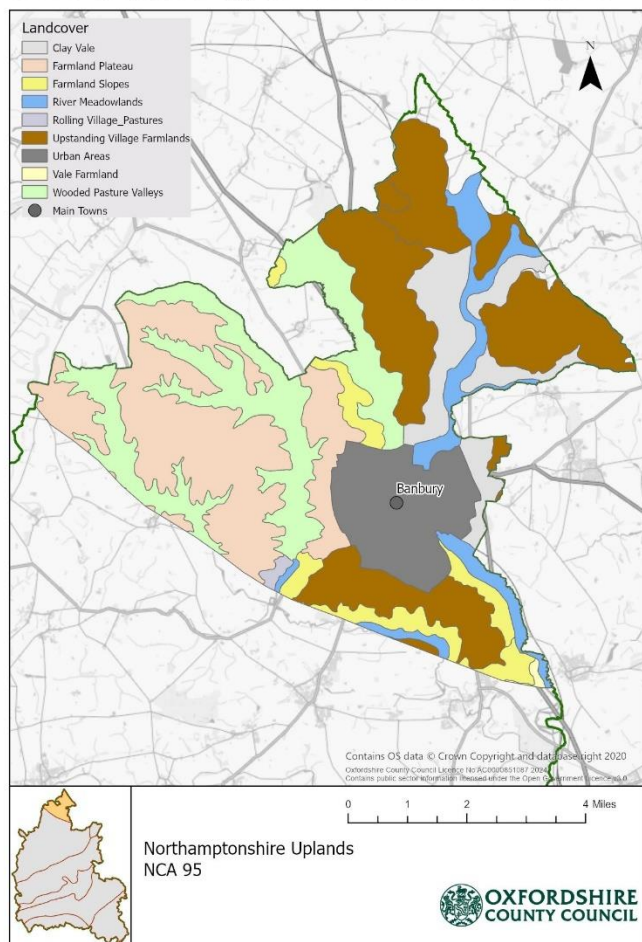
### **Ecosystem services:**

The Oxford canal and waterways here offer people in Oxfordshire outdoor recreation opportunities. The country homes, parkland, and archaeological features (some features dating back to the 7<sup>th</sup> century) offer a cultural sense of place, history, and access to the outdoors. This area is also home to Banbury, one of Oxfordshire’s major urban areas, and includes important road and railway infrastructure like the M40 which connects Oxfordshire to our neighbouring counties. Besides Banbury itself, this is a mostly rural area with agriculture at its heart, the production of food is a key service provided from this area although there is a recent increase of biomass crops like miscanthus being planted across the landscape which can be used to generate renewable energy.

### **Biodiversity of note:**

With good arable land around Banbury, this area is important to farmland birds and arable plants and the Upper Cherwell Valley has been supporting breeding curlews consistently (see [report](#)).

OWLS landcover types for NCA 95 in Oxfordshire



However the presence of curlew in this area has declined where developments and infrastructure have been built and where wet meadows have been drained of water for arable use. The tall A-shaped style hedgerows are distinctive to this area with regular mature oak and ash trees and there are areas of ancient bluebell woods such as Badby which offer opportunities to spot rare woodland species.

### **Recovery already being taken:**

In this area there are a number of groups who are supporting biodiversity including (but not limited to) the Upper Thames [Curlew Recovery Project](#) who support breeding curlews in the county by fencing nests to protect them from disturbance and predation and monitoring and reporting on chicks as they hatch and fledge. [Banbury Community Group](#) undertake a variety of actions with opportunities to get involved, or you can search [CAG Oxfordshire](#) to find more community action groups in your area. If you are a parish council, farmer, or landowner organisations like [BBOWT](#) and [Wild Oxfordshire](#) can also offer advice and support. Actions are being taken along the river and canal through this area too and you can search for opportunities to join volunteer tasks with the [Canal Trust](#) or click [here](#) to join in with the Cherwell and Ray Catchment Partnership to contribute towards their [action plan](#) to help improve the river, the catchment, and your local freshwater habitats. Farmers can contact the [NFU](#) or [CLA](#) to hear about events and support in the area. The Forestry Commission have officers who can support you with [woodland creation](#) and you can view some of their priority areas for creating trees and woodland on their map [here](#).

### **Opportunities for recovery:**

#### **(1) Farmland opportunities**

As a farmed landscape, this area offers great opportunity for farmers to create field margins, hedgerows, and wildlife corridors that connect through neighbouring farms. A large number of hedgerows have been lost across the area and re-planting hedgerows with hedgerow trees or gapping up hedgerows is an opportunity to increase biodiversity and improve wildlife corridors. Practicing rotational ditch management and being supported to restore wet areas of semi-natural habitat in a way that benefits farm businesses is a great opportunity here. Landowners could maintain a mix of pastures and meadows with veteran and ancient trees. Farmers and tenant farmers should also be supported to use nature-friendly agricultural practices that contribute towards healthier, biodiverse soils to improve the long-term ability of this area to continue to produce good quality food into the future.

#### **(2) Create wide buffer strips**

Along watercourses, it is important to create wide buffer strips of suitable semi natural habitats for the location. Creating an area that has a mix of habitat types and structure is ideal. This could mean a wet grazed grassland with ponds that has a buffer strip of longer vegetation and some trees and scrub growing along the bank. These buffer strips of habitat can help improve the structure and quality of the riverbank as well as to help the soils hold, capture, and filter water as it runs off the land and into the river, reducing pressures pollution and maintaining the integrity of riverbanks. This can also offer more areas of habitat for wildlife which use the riverbanks.

#### **(3) Improve water quality and river habitat**

The part of this NCA in Oxfordshire drains water into the Cherwell catchment and there is a significant opportunity to improve water quality by reducing agricultural and urban run-off, improve soil health, and consider other actions that can alleviate flood flows, improve water

quality, enhance the quality of river and floodplain habitats to benefit biodiversity and recreation. Pollution from sewage must be addressed by the relevant bodies.

(4) Carefully planned developments

Growth and development is a pressure in this area meaning that the need for development sites, mineral extraction sites, and landfill sites may grow. To help nature recover, growth should be carefully planned considering how local building styles, plant species, and materials can be used to complement the areas landscape. Future developments have an opportunity to safeguard and complement remaining areas of tranquillity whilst still providing genuine access to areas of nature in a way that supports local species which should be a key consideration of new developments

(5) Bring woodlands into management

Woodlands are slowly coming into management regimes but the majority remain out of 'active management'. This means that many woodlands have grown to have an excessive number of tall, mature trees with a dense canopy cover blocking out a lot of light to the woodland floor and meaning an unsustainable age-structure exists with few-to-no younger trees growing through. Woodlands which are managed could have selective trees removed in a way that increases the diversity of the woodland and allows new plants and trees to grow up. Introducing coppicing can be a particularly good technique if it is suitable to your woodland and local species. Woodland cover remains low in this area offering opportunities for expanding woodlands through planting or natural colonisation of mixed and broadleaf woodland in suitable places.

(6) Improve the 'permeability' of the landscape

This means joining up habitats in a way that allows wildlife to move through the area with fewer obstacles (like impassable roads, fences, and buildings). In this area there is a large amount of archaeology which presents an opportunity to maintain grasslands that support an open landscape and help our wildlife to travel through our county using a mix of habitats.

(7) Create new areas of trees and hedgerows, or improve existing ones

Improve the condition of existing trees, orchards, hedgerows, and hedgerow trees or plant new trees and hedgerows in suitable places, particularly where they can help to connect up existing areas of importance to biodiversity. This can help butterflies, bees, bats, birds, and many other species to better move through our towns, cities, and rural areas. Trees could be planted or facilitated to grow up naturally as orchards, hedges, individual trees, copses etc. and should complement the location, soil type, and land use.

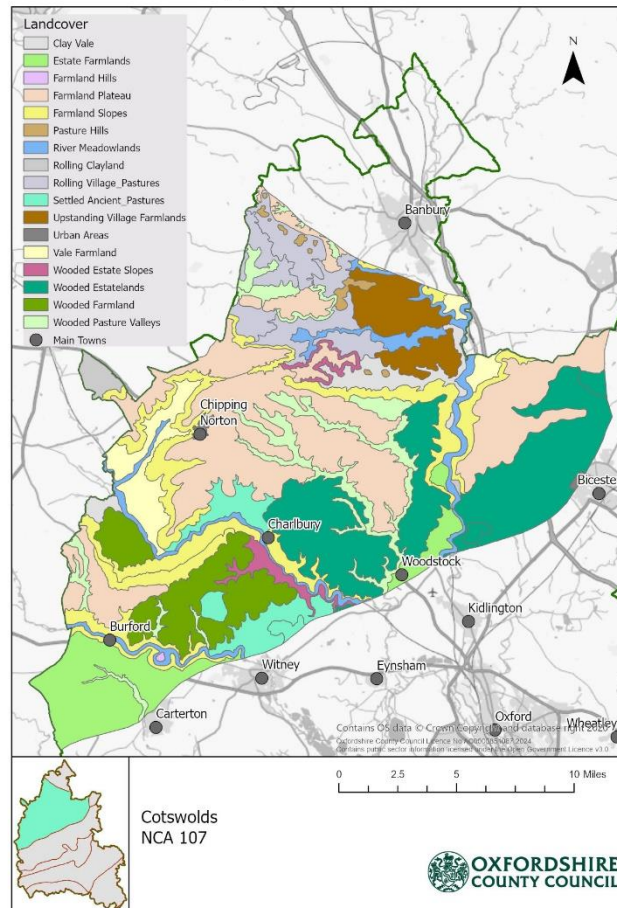
[space to insert images of the NCA throughout the description]

## **NCA 107 –the Cotswolds (73,996 hectares, 28.4% of county)**

**Source:** NCA107 Cotswolds, Natural England

**Geology:** The Cotswolds contains Middle and Lower Jurassic rocks which is mostly overlain by 'Great Oolite' in Oxfordshire giving this area a smoothly rolling plateau. The Cotswolds is a distinctive landscape of national significance, 65% of which is designated as a [National Landscape](#). The region is dominated by limestones which form an area of rolling high wolds that descend gradually eastward into the adjoining clay vales in Oxfordshire and Wiltshire. This creates a very distinctive landscape, unified by the underlying geology and the widespread use of the distinctive oolitic limestone as a building material. The geology also influences local freshwater habitats because rainwater permeates through the soils and rock into aquifers which store and move water underground through landscapes before entering rivers and streams.

OWLS landcover types for NCA 107 in Oxfordshire



**Landscape Character:** The Cotswolds stretches as a belt across counties, connecting habitats, people, buildings, and landscapes. This is a well-known landscape for its outstanding natural beauty and boasts a variety of open landscapes, particularly chalk grasslands. This area is often what people imagine when thinking of a quintessentially English landscape. In this part of Oxfordshire, the main landscapes found include high wold dip-slope, broad floodplain valleys, pastoral lowland vale, and pockets hills and valleys. Typically the land feels steep and open with small woodland pockets found in valleys and ancient beech trees and forests throughout the area. In Oxfordshire, sections of Cotswold limestone dip below wet clays in the open river valleys of the upper Thames tributaries with deeper, alluvial soils that are more fertile. In these areas the landscape has more arable farmland as well as grassland meadows running along flood plains. Thanks to the efforts of landowners and organisations, nature and farming work together in this landscape and you may see crops being grown and grazing sheep being managed to regenerate grasslands, keeping the landscape open and moving nutrients and seeds across the landscape.

**Source:** Cotswolds National Landscape, Landscape Character Assessment

**Ecosystem services:**

As a result of the limestone aquifer underlying this area, the rivers are supplied with high quality water in the local area and this feeds into the upper reaches of the Thames supporting people as far away as London. Quarries from this area are renowned internationally for the Cotswolds limestone that is extracted and used to build homes throughout the villages across Oxfordshire. The habitats and villages of the Cotswold's and their accessible green and blue spaces (including the Thames Path National Trail) bring international tourism to Oxfordshire every year. Alongside tourism, the many trails, green spaces, and historic parklands offer varying levels of access to nature and walking is a popular way to spend a day here. Ancient examples of human activity, like the Rollright Stones, Neolithic long barrows contribute to a sense of place and connection to our past and offer stories for both adults and children to enjoy. This area has an active and extensive network of farmers who produce food and produce.

#### **Biodiversity of note:**

This area is particularly known for species that thrive in the limestone grasslands here. This includes iconic butterflies like the large blue, Adonis blue, and Duke of Burgundy. Birds and bats of note are found here too, including birds like the yellowhammer and corn bunting. The continued careful management of the grasslands and arable fields has supported the survival of many wild plant species you may spot shepherd's needle, cranesbill species, and scabious species. This area is home to plant species which are particularly rare such as Downy Woundwort and Cotswold pennycress. For the past 50 or so years, the national distribution of Downy Woundwort has been limited to Oxfordshire and some sites remain managed to support this species in particular. In agricultural fields you may see the Cotswold Lion sheep, bred in this NCA, is a symbolic species of the Cotswolds and is well adapted to grazing the limestone grassland.

Within this area, large estates like Cornbury Park and the grounds of Blenheim Palace contain some of the oldest trees in England which are nationally important due to the rarity of trees of this age left in the country. Some oaks in Blenheim are over 800 years old and support a variety of unique and rare species that require such old trees to survive. Certain fungi, lichens, and invertebrates can only be supported by such ancient trees. Blenheim Park was also where the Blenheim Orange, a variety of apple, was found growing in Woodstock in 1740 which may often be found in the gardens of residents around Woodstock. As well as parkland, you can find impressive woodlands including the historical Royal Hunting Forest of Wychwood, which once covered 120 square miles of Oxfordshire, from Sarsden to Northmoor. It was one of the most wooded forests in England, but also included a rich patchwork of meadows, cultivated open fields, heaths and downs. Today, it survives in fragments where its cultural and ecological legacy lives on in sensitive ancient woodland flora and fauna (extracts from [Wychwood Forest Trust](#)).

#### **Recovery already taking place:**

A huge variety of groups and opportunities are working across this area and there would not be space to name them all. [Wychwood Forest Trust](#) are actively improving and conserving habitats and offer events, volunteer opportunities, and information on how you can support woodlands and wider habitat creation. For rivers and the freshwater environment you can join groups who are taking action to reduce the impacts of flooding whilst increasing biodiversity and improving river quality. The Evenlode Catchment partnership have been undertaking habitat work in this area which won the Climate Resilient Places category for the Flood & Coast Excellence Awards in 2021 and gives high quality examples of what others could do. Across towns, cities, and rural spaces there are community action groups you could join like [Biodiversity Bloxham CIC](#) or you can search [CAG Oxfordshire](#) to find groups in your area. If you are a parish council, farmer, or landowner, then



organisations like [BBOWT](#) and [Wild Oxfordshire](#) can also offer advice and support. Farmers can contact the [NFU](#) or [CLA](#) to hear about events and support in the area and the Forestry Commission have officers who can support landowners with [woodland creation](#). You can view some of the Forestry Commission priority areas for creating trees and woodland on their map [here](#).

Farm businesses within this protected landscape are essential for the conservation of the Cotswolds and the Cotswolds National Landscape has already supported local farms with more than £3 million from grant funding to restore nature through the Farming in Protected Landscapes scheme benefitting wildlife, farmland birds, and arable plants. In this area there is a proactive group of over 137 farm owners who are working together to regenerate the landscape and farmed environment across borders on their 42,000 hectares of land as the [North East Cotswolds Farm Cluster](#).

### **Opportunities for recovery:**

The Cotswolds NCA is distinguished by a network of semi-natural and arable habitats and these should be increasingly connected through suitable habitat creation work which complements farm businesses to support our rare calcareous species to spread and flourish within a predominantly agricultural landscape.

1. **Opportunity to prioritise the restoration of calcareous habitats.**

There are rare habitats, some of which can only be restored on calcareous landscapes (where the soil has a significant amount of carbonate content which comes from limestone). Since this geology is restricted to certain areas in the UK including Oxfordshire, Oxfordshire must prioritise habitat creation and restoration which is suitable to the calcareous landscape in appropriate areas. Whilst additional new trees and woodlands will generally benefit Oxfordshire, the Western edge of this NCA is a higher sensitivity area where woodland creation may not be suitable and where grassland creation and restoration would be a greater priority. This is because woodland can be created across many soil types but calcareous grassland restoration can only happen in calcareous landscapes. Additional woodland and trees should therefore be carefully considered before planting to ensure they complement the chance to restore high quality calcareous habitats.

2. **Creating corridors for nature to move through.**

[Natural England](#) (p39) recognise that this area is a key strategic corridor to allow species to move through England's landscapes in response to climate change and great care should be taken during planning to not fragment current or future habitat connectivity which could significantly obstruct species' ability to move across this landscape. Connecting the mosaics of habitats across this calcareous landscape is a rare opportunity which has recently picked up significant momentum with ambitious programmes like [Big Chalk](#) which has been developing a shared vision to connect up our landscape across borders to help wildlife and people thrive.

3. **Farmland opportunities**

With an existing and active [farm cluster](#) as well as available grants and funding to support farmers, there are opportunities in this landscape for farmers to enhance their landholdings in a way that benefits both biodiversity and food production. The farm cluster works with the Evenlode Catchment Partnership, FarmED, Heritage Wheat Group and other like-minded organisations with the aim to enhance natural capital on farms to tackle the climate emergency and build more resilient food and farming businesses. Funding can be found for actions like creating or improving semi-natural habitats, restore species-rich grasslands, create field margins, and more, from the [Cotswolds National Landscape](#) with support from 'Farming in Protected Landscapes'.

4. **Create and improve semi-natural habitats**  
Actions must be assessed at the local level to establish which are most suitable and could include hedge creation, growing new trees, orchards, or woodlands, creating ponds, or restoring grasslands with regenerating scrub. The steeper valley sides in particular offer the opportunity to manage and create limestone grassland and scrub in a species rich mosaic. Across this area there are remnant pockets of lowland fen amongst wood pasture, lowland meadows, and woodlands near water. Connecting up these habitats would improve the connectivity across the NCA for key species.
5. **Improve the condition of rivers and their catchments**  
Restoring natural features and processes of rivers and their corridors can mitigate the effects of flooding, improve water quality, increase biodiversity and improve the resilience of our landscape to climate change. Several large tributaries to the Thames flow through this NCA and are subject to a variety of pressures, as well as supporting a range of aquatic and riparian wildlife. De-intensifying agriculture on valley sides and floodplains, creating bunds, ponds that retain nutrients and other measures to 'slow the flow', planting trees, and establishing buffer zones along watercourses are all interventions that can store significant amounts of water and carbon, reduce the effects of flooding in homes and infrastructure by using Natural Flood Management methods, and improve the value of river valleys for wildlife. These measures can greatly enhance the quality of the water environment for people and nature. Pollution from sewage must be addressed by the relevant bodies.
6. ***Manage and protect ancient trees, woodlands, and orchards***  
Undertake targeted planning to plant, or allow new trees and woodlands to grow, in locations where they would particularly contribute towards connecting up, or expanding existing woodlands (especially ancient woodlands). For example, effort could be directed towards restoring the Wychwood forest area through woodland planting and natural colonisation. Woodland creation and management efforts need to be complemented by efforts to manage unsustainably high population of species which cause excessive damage to woodlands and the establishment of trees.

[space to insert images of the NCA throughout the description]

## **NCA 88 – Bedfordshire and Cambridgeshire Claylands (2,970 hectares, 1.14% of county)**

**Source:** NCA Profile: 88 Beds and Cambs Claylands.

**Geology:** The extent of clay running through this area, including Jurassic Oxford Clay, led to significant clay extraction here to produce bricks for building since the early 19<sup>th</sup> century. ([88 Beds and Cambs Claylands.pdf](#))

**Landscape Character:** This area makes up a small area of the north-east corner of Oxfordshire. The views are mostly wooded estate lands and large arable farms with sparse buildings. There is a mix of woodlands, and seminatural habitat spread through the area. The Padbury Brook, a tributary of the Great Ouse, is the only substantive length of watercourse in the county which isn't part of the Thames catchment, and rises in this NCA to flow eastwards into Buckinghamshire.

### **Ecosystem services:**

this area contributes significantly to food provision, particularly arable agriculture including local varieties of fruit.

### **Biodiversity of note:**

River valleys in this area support overwintering birds, water vole, otter, and great crested newts whilst the farmland provides areas for brown hare, skylarks, and grey partridge. Areas of ancient woodland remain in the southern part of the area on the map and a number of woodland areas remain throughout the area with some running along the River Great Ouse at the Northern border of this area where Oxfordshire meets Buckinghamshire.

### **Recovery already being taken:**

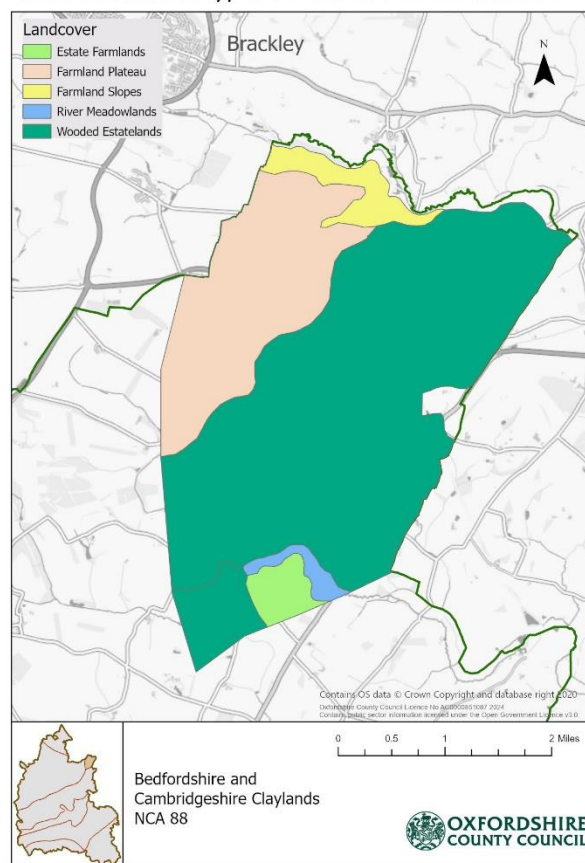
Between 1999 and 2003 woodland cover rose as grants and payments supported the planting of black poplar and the pollarding of willows. You can search [CAG Oxfordshire](#) to find more community action groups near this area. If you are a parish council, farmer, or landowner organisations like [BBOWT](#) and [Wild Oxfordshire](#) can also offer advice and support. Click [here](#) to join in with the Upper Ouse Catchment to contribute towards their [catchment plan](#) to help improve the river, the catchment, and your local freshwater habitats. Farmers can contact the [NFU](#) or [CLA](#) to hear about events and support in the area. The Forestry Commission have officers who can support you with [woodland creation](#) and you can view some of their priority areas for creating trees and woodland on their map [here](#).

### **Opportunities for recovery:**

#### (1) Farming with biodiversity

As a productive arable area, farms should be supported to take-up nature-friendly farming practices that improve the health of their soils to benefit their yields as well as biodiversity. Biodiversity incentives need to enable farmers to create habitats and increase biodiversity

OWLS landcover types for NCA 88 in Oxfordshire



(e.g. within soils) whilst supporting farms to continue to successfully produce food into the future. In this area, farms increased in size over time as pressure to produce more food increased and this led to a loss of hedgerows and the fragmentation of semi-natural habitats. For any semi natural habitats on farms, existing woodlands could be connected and expanded and areas of existing grasslands and other semi-natural habitats could be expanded, connected, and restored.

(2) **Creating new trees and hedgerows**

On and off of farms, hedgerows and trees could be planted, allowed to grow larger, and hedges could be gapped-up to establish taller, wider hedges with regular hedgerow trees that support biodiversity including pollinators, shelter livestock, shelter crops, and which restore connections across the farmed landscape. Individual trees can be planted or facilitated to grow across this area and, where suitable, orchards can be created.

(3) **Managing freshwater habitats to achieve good condition**

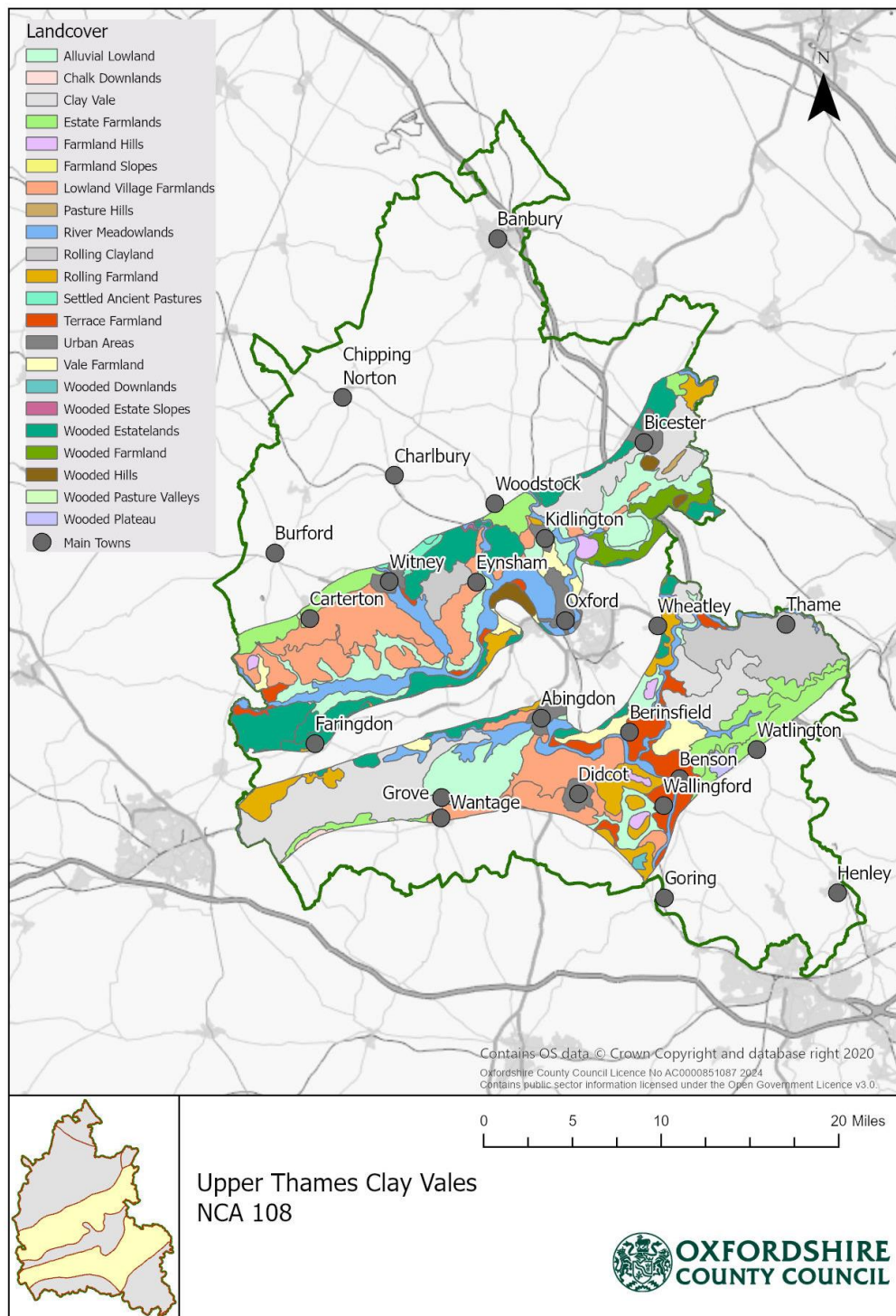
The River Great Ouse runs along the northmost boundary of this mapped area where Oxfordshire joins Buckinghamshire with lakes, ponds, and wetland areas running along the Oxfordshire side of the border. Activities along this river, its watercourses, and the local freshwater habitats provide a prime opportunity to manage the area to support local species and wildlife.

[space to insert images of the NCA throughout the description]

**NCA 108 the Upper Thames Clay Vales – (107,332 hectares), 41% of county**

Source: NCA Profile: 108 Upper Thames Clay Vales (NE570)

**OWLS landcover types for NCA 108 in Oxfordshire**



**Geology:** As seen in the ‘mini-map’ on the bottom left of the image above, this NCA covers two bands of Oxfordshire, separated by a different type of landscape called the ‘Midvale Ridge’. The geology of the Upper Thames Clay Vales is characterised by Cretaceous and Jurassic clays, which form much of the centre of our county, other than the Midvale Ridge (NCA 109) which sits nested between this NCA area. Much of the NCA is underlain by heavy blue-grey Gault Clays covered by wide expanses of river

terrace deposits of sand and gravel, especially within the Thames Valley. Broad alluvial flats are often defined by wetland vegetation and willow pollards alongside the rivers. To the West of Oxford the sandy terrace soils are predominantly calcareous with good drainage. There are also patches of land where the Oxford clay more widespread in the basin of the River Ray, particularly at the eastern end of the vale where it passes into Buckinghamshire.

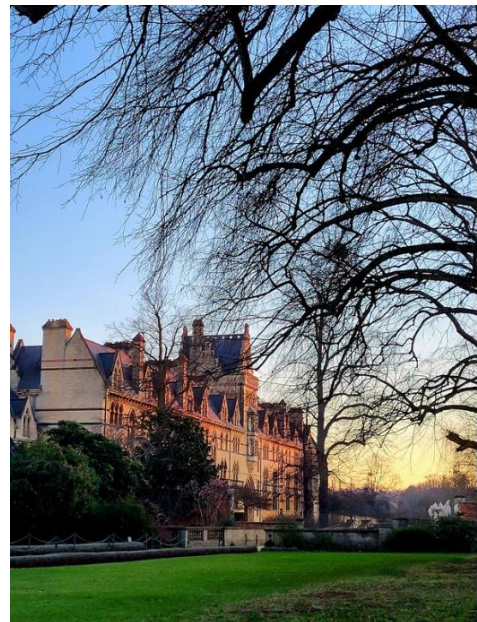
**Landscape Character:** The variety of underlying soils and geological deposits means that this area features a diverse set of habitat types (as seen on the map above) with numerous watercourses and lakes lined with willows and poplar trees. The landscape is open and undulating extending into our neighbouring counties. The landscape varies between mixed farmland, hedges with oak and ash hedge trees, and field trees and parkland among wet valleys and enclosed pastures. The Chalk scarp of the Chilterns is prominent in views throughout this area.

#### **Ecosystem services:**

This area has, for a long time, served a key role for people to live. The area contains a lot of homes and settlements as well as key strategic transport links like the M40. The water bodies here offer significant recreational benefits for local people. The watercourses and lakes allow people to live on, and enjoy, the water. In the Lower Windrush Valley, a large complex of gravel pits have been restored which offer places for biodiversity to thrive and for people to enjoy. From the Thames river that enters Oxfordshire in the West, you'll pass through Chimney Meadows into fishery lakes and restored gravel pits around Stanton Harcourt and Standlake, and towards Farmoor reservoir before heading into Oxford near Worton lakes down into Port Meadow and other Oxford Meadows. Some of the floodplain meadows along that stretch have remained unchanged for centuries and play a key role in storing and regulating water during seasonal and heavy rainfall providing Oxford city with some natural flood mitigation. Alongside the river, the Thames Path National Trail runs for hundreds of kilometres through Oxfordshire offering people a chance to enjoy the outdoors. Moving East from Oxford and away from the Thames, the public are able to access to some of the 485 hectares of [Otmoor Reserve](#). This floodplain grazing marsh and reedbed reserve is one of England's largest inland wetland complexes and is managed by the RSPB as a sanctuary for a wide range of rare wildlife, particularly known for wading birds, wildfowl, and songbirds which has built up a sense of place for many who enjoy the public access to Otmoor. In the southern half of this NCA, pockets of Oxfordshire's highest quality farmland can be found meaning that this area is of significant importance for food provision.

#### **Biodiversity of note:**

- This NCA is home to internationally important **lowland meadows** as well as significant **wetland** areas. In the East of Oxfordshire, this NCA boasts wintering Golden Plovers, Grass snakes, common lizards, Black and brown hairstreak butterflies, Lapwings, Redwings, and Fieldfares, Short-eared Owls, Snipe, and Redshank ([Otmoor | The RSPB](#))



- Within this NCA, the MOD have undertaken habitat creation work which supports a variety of rare species including great crested newts, a number of hairstreak butterflies, and for the first time since the 1980s, **nightingales** have been recorded breeding in Oxfordshire once again in the past 3 – 4 years after dedicated habitat work by the MOD. This is the only confirmed location where this bird species is known to be breeding.
- **Black poplar**, one of Britain's rarest native trees can be found throughout the catchment of the River Thames which flows from Thames towards Dorchester.
- The River Thames and a number of its tributaries are a significant feature of the NCA, which includes parts of the River Windrush, Evenlode, Cherwell and Ray, Thames, and high proportion of the River Ock. These watercourses and their smaller tributaries form the stronghold of the county's **otter and water vole** populations.
- Over 80% of the world's chalk streams are found in England ([WWF](#), 2023; NWD AONB Nature Recovery Plan) with the majority of these in Southern England. Near Wantage, the **Letcombe Brook chalk stream** flows into this NCA from the Berkshire Downs and is an internationally rare habitat of particularly good quality thanks to local community efforts and organisations who protect and improve the chalk stream which is a similar priority for this rare habitat in Benson. **Water vole** populations have been recovering in this area in the last 10 years and there has, until recently, been recordings of a native white clawed crayfish population. However, it's unclear whether these have been lost due to the presence of invasive, non-native American Signal crayfish who outcompete the native British species and spread a fungal disease which the native species has no immunity to.
- In Lower Windrush Valley area, a large complex of lakes are present which are nationally important for wintering wildfowl, specifically for shoveler and gadwall, and the area is also designated as a nationally Important Stonewort Area (see [LWVP biodiversity review](#) for more information).
- There are two Special Areas of Conservation (SACs) within this NCA, Oxford Meadows, designated for its lowland meadows and Little Wittenham, designated for its great crested newt (GCN) population which are some of the most studied GCNs in the UK.

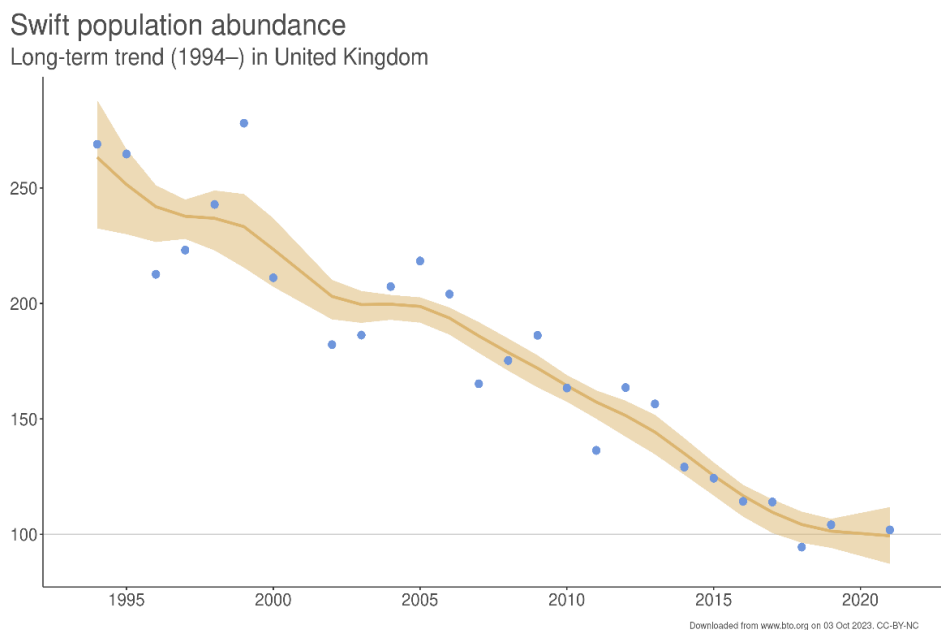
#### Recovery already being taken:

This area includes many groups and organisations who are all working to improve habitats and biodiversity in a range of ways. The [Lower Windrush Valley Project](#) is an area with a legacy of restored minerals development with lakes which support biodiversity across this landscape and access for people. In [Otmoor](#) the RSPB manage this extensive reserve which has a thriving population of species that bring people from across the South East to view the rich, biodiverse hotspot here. Now the wildlife trust BBOWT are working on an exciting new cross border [project](#) to reconnect habitats across the Bernwood Otmoor Ray area in East Oxfordshire crossing over the border into Buckinghamshire. Further West near Eynsham, the [Nature Recovery Network](#) was initiated by [Long Mead Wildlife Site](#) in 2019 and is now a strong, growing network of individuals, groups, businesses, and councillors who have dedicated their efforts to understanding and restoring their local nature and biodiversity. They host bird walks, plant up wildflower meadows, manage meadows, conduct water vole surveys, and more events and activities which they support local people to join. Thanks to local efforts, this area contains a productive 10 hectares of extremely rare wildflower hay meadow (of which only 4 square miles remain in the UK) with freshwater habitat, woodland and a traditional orchard. Efforts to spread and increase the amount of species rich hay meadows led to the [Thames Valley Wildflower Meadow Project](#) which has been working towards the creation of a nature recovery network of habitats for Oxfordshire. Alongside this work, the [Thame](#)

[Catchment Partnership](#) have been working as a group of landowners and organisations and have created a [catchment plan](#) to tackle problems that face the freshwater environment across the catchment. Groups have been undertaking river restoration work and fish passage improvements. A prime example of habitat recovery is [Pinkhill Meadow](#) ponds which was created by Freshwater Habitats Trust on Thames Water land in 1990 on a degraded floodplain. It has now recovered so well that it acts as a demonstration site for how to repair damaged floodplains. Alongside these habitat recovery project, other local groups like the [Farmland Bird Aid Network](#) have been monitoring and increasing farmland bird populations working with farmers. Local groups like [Wild Kidlington](#) have formed to take steps to support swifts, hedgehogs, wildlife friendly gardening and connecting people to nature which is similar to a growing group in Benson, the [Benson Area Nature Group](#) who are dedicated to making their village permeable to wildlife and bringing high quality nature into the everyday lives of the community.

Even more groups like Chesterton Community Woodland, Earth Trust’s River of Life, and Mend the Gap are all organisations and projects who are dedicated to recovering nature. Unfortunately it is not possible to name every group working to improve biodiversity but you can search [CAG Oxfordshire](#) to find community action groups in your area. If you are a parish council, farmer, or landowner organisations like [BBOWT](#) and [Wild Oxfordshire](#) can also offer advice and support. Actions are being taken along the rivers through this area too and you can click [here](#) to join in with the [Ock Catchment Partnership](#) to contribute towards their [action plan](#) to help improve the river, the catchment, and your local freshwater habitats. Farmers too can join the [Ock Catchment Farmer Cluster](#) to work together to show how farmers can create a healthy freshwater environment, this group have recently been very successful in a recent funding bid to carry out [landscape scale recovery of floodplains](#) in Oxfordshire. Farmers can also contact the [NFU](#) or [CLA](#) to hear about events and support in the area. The Forestry Commission have officers who can support landowners with [woodland creation](#) and you can view some of their priority areas for creating trees and woodland on their map [here](#).

In this NCA, Kidlington, [Oxford](#) City, and [Harwell](#) and other towns are urban strongholds for one of the UK’s most at-risk birds, the Swift. This is also true for House Martins which are also an at-risk bird. Not only do these birds nest in buildings across the city but a new Swift Tower was installed in [University Parks](#) to offer more nesting spaces to these birds as part of the University of [Oxford’s Biodiversity](#)





[Strategy](#). Every year swifts and house martins migrate to the UK from West Africa, however since 1995 - 2020 there has been a 60% decrease in the number of swifts in the UK (see [graph above](#)).

### Opportunities for recovery:

#### 1. Rivers, Floodplains and lowland meadows

Rivers on claylands have been subject to considerable historic modifications through engineering and in this NCA there is a substantial need to restore river habitat and river diversity and remove or mitigate barriers to fish passage to improve habitat quality for aquatic species, building on work that has already been done. This can and should be done alongside measures that de-intensify and diversify floodplain land-use and habitats. Slowing the flow of water as it travels into this area is a high priority alongside actions that can improve water quality in the rivers. This includes taking action on the land and habitat areas around the river to contain, slow, and store water through habitat creation and improvements. For example, by improving meadows, grazing fields, and woodlands near our rivers we are able to help the land store more water during periods of rainfall (mitigating flooding), keep the land in better condition and more able to store water during dry spells (mitigating drought), and filter more water through it before entering the river, improving the quality of water entering the river and reducing levels of pollutants.

#### 2. Species rich hay meadow restoration and creation

This NCA also contains a great proportion of England's [remaining sites](#) of species rich hay meadows or (MG4 grassland). The Thames and its tributaries are a stronghold of species rich hay meadows and Oxfordshire is home to over 25% of the remaining area of this type of habitat. Areas around the River Thames therefore present particularly important opportunities to maintain and restore communities of species which are perhaps unique in the world due to the land being under traditional management for several centuries without other disturbance.

#### 3. Chalk stream restoration

Where chalk rivers and streams cross this area, their restoration and management should be a priority due to their nature as an internationally rare habitat.

#### 4. Opportunities on farmland

This NCA is home to some of the best quality farmland in Oxfordshire and offers Oxfordshire a chance to show how farming can support biodiversity alongside food production. Techniques for improving soil health and biodiversity can be encouraged alongside rotational ditch and hedge management to support local species. Trees or hedgerows can be planted or grown on farmland in suitable ways and places to benefit livestock, shelter crops, produce fruits, and support integrated pest control plans as well as store carbon and, in the right places, build resilience across landholdings. Farmers who are supported to carry out nature-friendly practices can benefit biodiversity, provide public goods by increasing the resilience of the landscape, and improve the quality of the soils and health of productive land enabling it to continue to produce food into the future.

#### 5. Remnants of rare habitats

Ancient woodlands and hedges are scattered throughout this area and warrant protection, management to diversify them, and expansion to help ancient woodlands spread and increase the size and connectivity of habitats in the landscape. Creating new hedgerows

between exciting semi-natural habitats is also a great opportunity to increase connectivity across the county. Anywhere where woodland or trees are being established or where woodland is being managed it is likely to be necessary to manage any species which are present in unsustainably high populations and cause excessive damage to the trees.

6. **Support urban wildlife including swifts, bats, urban birds, hedgehogs, and frogs**  
Living in urban areas can make it harder for animals to travel through the area (due to fences, roads, buildings, walls, and a lack of suitable habitat options). In urban areas there are a range of actions that anyone could take on both new or older homes. See further LNRS documents like the draft Species Priorities List, the draft Local Habitat Map, and the webpage for wider biodiversity information to help wildlife. For example, you can join efforts to protect swifts and house martins by putting up suitable nest boxes, joining local Facebook groups, and recording sightings, nesting birds, and more.

## **NCA 109 – the Midvale Ridge ( 23,249 hectares), 8.92% of county**

**Source:** NCA Profile:109 Midvale ridge (NE417)

**Geology:** This NCA contains a band of low limestone hills, bounded to the north and south by lower lying clay vales that together form a broad lowland zone running through the centre of Oxfordshire. The rocks in this area were laid down mainly during the Upper Jurassic period, when sands and limestones were deposited in what was then an area of coral reefs in a shallow tropical sea. In contrast to typical chalk and limestone areas, the Corallian limestone is very sandy and free draining, producing soils, which are often prone to leaching and acidification. This has formed a low, irregular escarpment rising from the surrounding low-lying clay vales, with Lower Greensand caps on many of the higher parts. Particularly prominent are the series of hills on the Oxfordshire/Buckinghamshire border at Brill and Quainton.

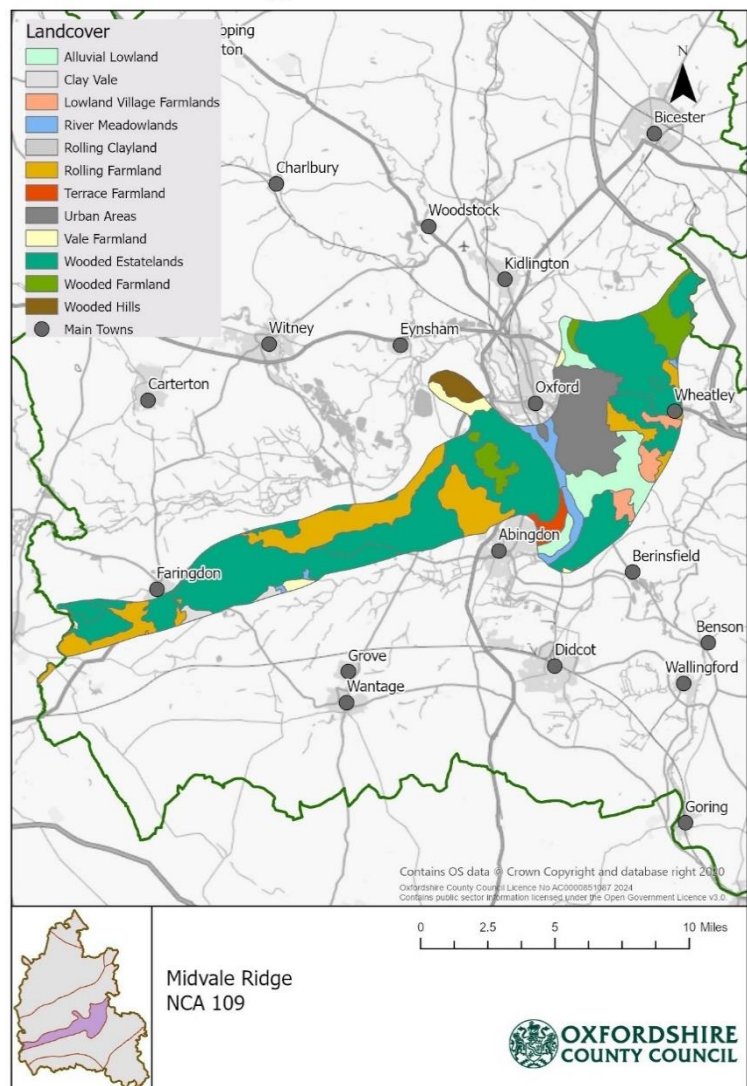
Internationally renowned fossils from prehistoric sea creatures have been discovered throughout this area. The geology here has been closely studied since the 19<sup>th</sup> century and its mixed geology has also led to the development of rare habitats including calcareous flushes, grassland, and fens which support rare species.

### **Landscape Character:**

From the low hills along the ridge you can get excellent views of the landscape. The land rolling away from the ridge is mostly flat and open farmland with cereals growing and livestock grazing. The fields are large and separated with hedges and areas of woodland. This area is notably more wooded than the surrounding clay vales with tree species changing depending on the soils. In the wetter soils near Oxford, ash oak hazel and field maple are common whilst drier soils have more oak, birch, and conifer (many are plantations). To the East of the county, ridge and furrow ripples through the fields showing evidence of agriculture area since the Middle Ages. Villages are found along on the hill tops here and along the ridge where natural spring water rises up.

On the lower slopes of the ridge, where the permeable limestone meets the impermeable clay of the surrounding clay vales, water percolating through the limestone emerges in a series of springs and

### **OWLS landcover types for NCA 109 in Oxfordshire**



flushes. These support several large fens which are home to a number of rare plant and invertebrate species. The largest fen, Cothill Fen, has been designated a Special Area of Conservation (SAC) for its surviving fen vegetation. To the south-west of Oxford, around Frilford and Cothill, are areas of calcareous grassy heaths comprising one of the most characteristic and important semi-natural habitats of this area.

### Ecosystem services:

This area has a variety of good soils meaning that some locations are particularly good for growing food and sheep are grazed throughout other areas of this NCA producing food. The natural spaces which have access provide a key service to people in this location by offering a sense of place and an opportunity for recreation, leisure, and exercise. The Thames Path National Trail runs for hundreds of km through Oxfordshire and connects to other walking routes through this NCA. Near Oxford there are also accessible woodlands like Shabbington and Shotover country park near the city. The varied geology also plays a significant role in this NCA. Limestone extracted from quarries in this area is used to construct buildings and homes for local people and businesses and this contributes to the internationally recognized character of Oxfordshire buildings and local villages, attracting tourism. In this area of Oxfordshire the ridge of land through the county is made up from a permeable rock below the soils. This ridge allows water to move through Oxfordshire's landscape underground and the ridge stores water that feeds mostly into the rivers Thames, Thame, and Ock.

### Biodiversity of note:

- Despite being a small NCA among 159 NCAs across England, Natural England describe this area as “possibly the most important region in southern England for calcareous fens ... rare plants and insects” .(109 Midvale Ridge [NCA profile](#) 109 p 33) It's unusual geology supports key habitats which support rare UK species. The largest alkaline fen in the area, Cothill Fen, is designated as a Special Area of Conservation (SAC) for the flora found here like the marsh orchid and invertebrates like the southern damselfly. Both these species are considered rare across England so this makes sites like this nationally important. Oxfordshire has several more fens which are associated with the geology of this area including Sydlings Copse, Lye Valley, and Chilswell Valley, each of which are considered to be irreplaceable biodiversity hotspots and support a range of rare plant and invertebrate species.
- The Lye Valley SSSI, in Headington, Oxford, is a 14,000-year-old internationally rare habitat, a tufa-forming valley-head alkaline spring fen. It represents 1.5 ha of only 19 ha of this habitat left in all England and supports over 20 species of plant rare in Oxfordshire of which 14 are on the England Red List. It also hosts ten nationally rare species and 27 nationally scarce species of invertebrate, notably soldier flies and glow worms, as well as thriving populations of reptiles and amphibians.
- Breeding waders are found in strong numbers in the river floodplains here.
- The snakeshead fritillary (pictured **right**) enjoys a UK stronghold in this part of Oxfordshire as does the black hairstreak butterfly.
- A third of the area's woodland is designated as ancient and supports important populations of uncommon and rare butterflies



Snakeshead fritillary taken by [Hornbeam Arts](#).

- The Jurassic and Cretaceous acidic sands of Brasenose Wood and Shotover Hill SSSI are important for a diverse bee and wasp community including the rare yellow-shouldered Nomad bee *Nomada ferruginata*, the Bee Wolf wasp *Philanthus triangulum* and the Large Gorse Mining bee *Andrena bimaculata*.
- This areas is notably more wooded than the Upper Thames Clay Vales NCA containing a significant proportion of ancient woodland. In East Oxfordshire which is home to Shabbington Wood as well as the biggest remnants of what used to be the Royal Forest of Bernwood which can be accessed and has particularly special populations of butterflies, orchids, and fungi. Common tree species in the area are oak, ash, hazel, field maple, and birch.

### Recovery already being taken:

Since 2000, [Shotover Wildlife](#) group have had the consent and assistance of Oxford City Council to gradually convert suitable areas of secondary woodland back into areas of acidic grassland and heath. A variety of locally scarce acidophile mosses and liverworts have colonised the area since the soil was exposed. The group has also engaged local mountain bikers to modify a biking area to integrate a bespoke habitat for soil-nesting invertebrates. After just two years, 51 species of solitary bee and wasp have been recorded in the area. These are species which would not likely have been present if the area had remained as closed canopy secondary woodland.

In the Lye Valley, the [Friends of Lye Valley](#) group have managed of the fen areas has and the fen condition has improved habitat vastly over the last 14 years. Specific improvements have been achieved through recovery work like scrub management and extensive annual cutting and raking of fen vegetation by volunteers as well as a range of other activities meaning that the site now boasts impressive numbers of rare orchids, invertebrates, flowering plants, and more. This is all the more impressive considering it is located within an urban and busy environment.

The [Cothill Fen](#) Project started in April 2010 and covers four BBOWT nature reserves within the Cothill Fen SAC, these are Dry Sandford Pit, Lashford Lane Fen, Parsonage Moor and Gozzards Ford Fen. The projects aim is to make sure the fen areas of the reserves stay in favourable condition. This has meant creating new ponds which hold open water at Parsonage Moor and diverting ditches and removing encroaching trees at Lashford Lane. At Dry Sandford Pit, the fen is grazed and the grazing pattern has been adjusted and improved to benefit biodiversity. and improved grazing regimes at Dry Sandford Pit to allow the fen to be grazed for and expanding the fen grazing area at Lashford Lane.

The [CAG Oxfordshire](#) website will show some of the other community action groups in this area and if you are a parish council, farmer, or landowner then organisations like [BBOWT](#) and [Wild Oxfordshire](#) can also offer advice and support. Farmers can find information about nature-friendly farming in protected landscapes [here](#) and can also contact the [NFU](#) or [CLA](#) to hear about events and support in the area. The Forestry Commission have officers who can support landowners with [woodland creation](#) and you can view some of their priority areas for creating trees and woodland on their map [here](#).

### Opportunities for recovery:

1. **Achieve high quality fen habitats through management and restoration**  
Keeping existing fens in good condition is key to supporting their existing biodiversity. Fens which have not been in management or which may have been lost to tree and scrub growth could be restored through habitat work at those locations to offer a greater amount of fen

areas in Oxfordshire and boost the biodiversity which rely on this rare habitat type. The continued provision and supply of good and clean water to these fens is also a priority to ensure that they continue to exist.

2. Improve or manage fragments of rare habitats

In this area, a range of calcareous grasslands, dry acid grasslands, and calcareous heathland can be found in isolated locations. These habitats can't be recreated and can only be restored on certain types of rare geology including within this NCA. Particular care should be taken to continue to restore rare semi-natural habitats in suitable locations and to take action to support the recovery of species which are living here, or which could live here.

3. Manage and increase broadleaved woodland and wet woodland cover

As a notably wooded and wet part of central Oxfordshire, it would be in line with the character of this area to actively manage existing woodlands, conserve ancient woodlands, and create new native broadleaved woodland and wet woodlands through [appropriate](#) woodland creation. There could be opportunity to create rich and biodiverse floodplain woodlands in suitable locations. Woodland creation or tree planting is likely to require the management of any species which reach unsustainably high numbers and which cause excessive damage to trees.

4. Connect people to nature

As a densely populated area, there is great opportunity to support projects here that create opportunities for recreation and education can benefit biodiversity by building a sense of place and connecting people to nature and heritage across this area. Oxford represents a key area in Oxfordshire to connect people to biodiversity. The [Health and Wellbeing Strategy ambition](#) for people in Oxfordshire is to Live Well by working "with local nature partnership to improve access to physical activity in natural environments" especially for cycling and walking routes (p.30).

5. Deer and grey squirrel management

Imbalances of animal numbers can cause problems for biodiversity. An unsustainable population of deer can lead to the loss of new trees, hedges, flowers and plants that would otherwise survive and support other species. Having too many of any particular species can lead to declines in others. To maintain biodiversity, the health of habitats, and the health of other species it is important that deer and squirrel are managed.

## **NCA 116 – the Berkshire and Marlborough Downs, (15,588 hectares) 5.98of county**

**Source:** NCA Profile:116 Berkshire and Marlborough Downs (NE482)

### **Geology:**

The Berkshire and Marlborough Downs are underlain by Cretaceous Chalk. The geology of the Wessex Downs includes the Lower, Middle and Upper Chalk, the latter giving rise to the characteristic smooth rolling downland topography. In Oxfordshire the Wessex Downs form an elevated plateau rising to a high point of just over 250 metres. It has a rolling topography incised by a network of often steep-sided dry valleys, or 'combes', some of which contain naturally intermittent watercourses and springs. These dry valleys are a characteristic chalkland feature, formed by surface streams during the Ice Age, when permafrost impeded sub-surface drainage. Today, these chalk landscapes function as a massive aquifer which stores and moves water underground which supports local habitats and species.

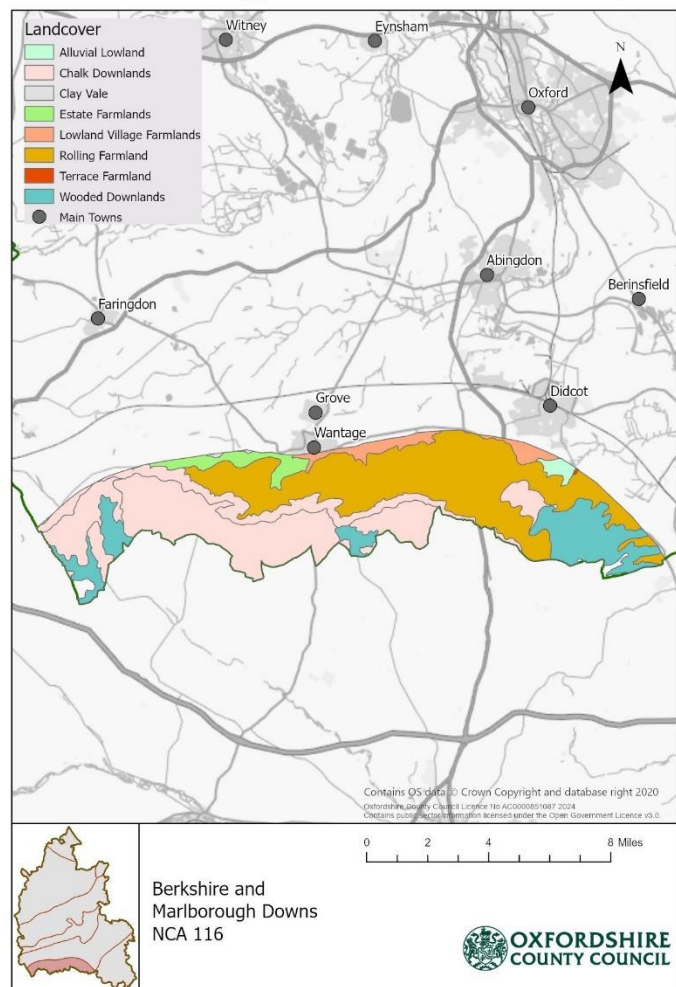
**Landscape Character:** Nearly all of the land here is designated within the North Wessex Downs National

Landscape for its outstanding natural beauty. Across this area, large arable fields stretch across the rolling chalk hills of the Wessex Downs giving views across the escarpment including landmarks of chalk-cut horses, beech clumps, and ancient monuments. Historic routeways, including the Ridgeway National Trail, provide public access through this landscape. Avebury stone circle is a popular visitor destination and part of a World Heritage Site and there are numerous other Scheduled Monuments and heritage features across this wider landscape. Almost the entire NCA (97 percent), including the Oxfordshire part, falls within the North Wessex Downs National Landscape in recognition of the scenic qualities and national significance of the features within this area. Chalk streams are a particularly important and beautiful feature of this NCA's landscape.

### **Ecosystem services:**

Underlain by the Chalk and Upper Greensand, this area comprises a major aquifer which supplies high quality water into our rivers, streams, and ultimately into people's taps. Public water supply is largely abstracted directly from the aquifer, rather than from surface waters. The grasslands here,

OWLS landcover types for NCA 116 in Oxfordshire



especially those with trees, woods, and hedgerows which buffer the wind protect the soils and prevent soil erosion which the arable fields are particularly vulnerable to soil erosion where large fields lie on slopes and where thin soils are cultivated. The prevention of soil erosion is critical to maintaining the good water quality in the major aquifer which then feeds the chalk streams and other habitats. This area is known for its outstanding natural beauty and offers people space to enjoy nature and be outdoors. The landscape has inspired famous artists through history such as Eric Ravilious, Paul Nash and David Inshaw and writers such as Thomas Hardy and Richard Jefferies. The famous landmarks like the Uffington white horse attract groups of visitors as does the Ridgeway National Trail.

### **Biodiversity of note:**

In Oxfordshire this area has records of

- Chalk grassland species and groups of butterflies, invertebrates, and species who rely on chalk grasslands, streams, and woodlands.
- The early gentian is a [protected](#) plant in the UK because of its rarity, internationally it is only found in the UK and this NCA has had confirmed records.
- Lemon tart lichen's only site in Oxfordshire can be found at Ashdown in this NCA amongst the parkland and ancient woodland.

### **Recovery already being taken:**

The majority of this National Character Area is part of the North Wessex Downs National Landscape. This is the area of Oxfordshire which contains the greatest number of chalk streams which are an internationally rare habitat and about 85% of the world's chalk streams are found in England (North Wessex Downs AONB Nature Recovery plan, 2023), and Oxfordshire is home to some of these.

### **Opportunities for recovery:**

1. **Chalk streams**  
Chalk stream projects are a priority where they exist in this area. These are internationally rare river habitats and improving their condition can only be done in places where there are already chalk streams. These cannot be recreated so their recovery is of top importance for this area.
2. **Recover nature within the North Wessex Downs National Landscape**  
Priorities for this area include the priorities of the wider North Wessex Downs National Landscape who, by 2030, have pledged to (1) improve the condition of SSSIs within their area, (2) to plant or allow new woodland to grow in suitable places, and (3) to have targeted actions for specific species from the threatened list so that by 2030 action has meant that a species is no longer threatened.
3. **Restore, connect, and maintain chalk grasslands**  
Connect and restore these rare habitats which can only be restored and created on calcareous landscapes. Find opportunities to create a grassland focused set of connected habitats which create a corridor along the steep slopes of the scarp and along the ridgeway which runs along its crest.
4. **Plant trees or allow new trees to grow**  
New planting in the Downs should reflect historic distribution. Planting where there used to be woodland or planting near existing ancient woodlands would help maintain the character of the landscape and allowing select trees or scrub can support the grasslands here. Careful planting for sustainable timber and wood fuel can strengthen local supplies and planting or



natural colonisation by new young trees can ensure there will be a new generation of open-grown trees, so that veterans can continue to be an aspect of the landscape.

## NCA 110 – Chilterns (26,060 hectares), 10% of county

[Source: NCA Profile:110 Chilterns \(NE406\)](#)

### Geology:

The region is underlain by a Chalk outcrop that formed during the Upper Cretaceous period and which was subsequently tilted and folded by earth movements. In the Quaternary period ice sheets overrode the outcrop, lowered the escarpment and blocking the original passage of the Thames leaving a dramatic north-west facing escarpment of the Chilterns offering distant panoramic views over the adjacent Midland vales. The Thames carved a gorge through the escarpment at Goring and laid down sand & gravel deposits beyond to form as a series of broad river terraces. Today the dip slope is drained by small streams which flow out of the chalk, passing through numerous rural and urban settlements located in the valleys. The upper parts of some of these valleys are dry, while many of the watercourses dry up near their source when groundwater levels are low. These watercourses create internationally rare habitats also known as chalk streams.

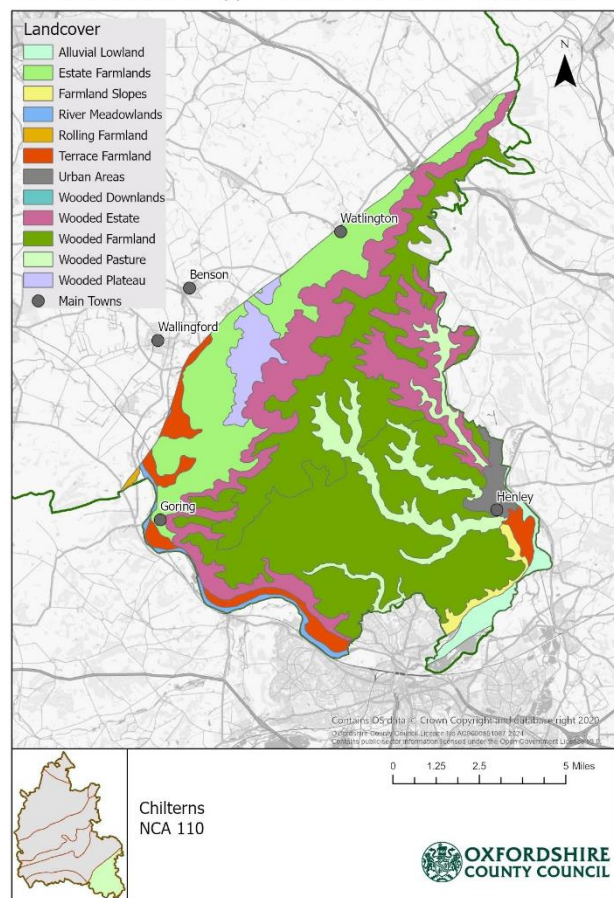
### Landscape Character:

Large parts of the Chilterns are designated as a National Landscape in recognition of the natural beauty and scenic qualities of the features within this area. The region is extensively wooded. Throughout the Chilterns the countryside that we see today is a patchwork of mixed agriculture with woodland, set within hedged boundaries, many of which are ancient. Steeper ground is often characterised by small fields. The rolling hills, wooded valleys, and steep chalk escarpments which have been shaped by the geology, weather, and the use of the land over many centuries. The landscape types of the Chilterns National Landscape include scarp foothills and vale fringes, chalk scarp, plateau and dip slope, and river valleys. These landscapes are criss-crossed by ancient routes and hedgerows, trees, orchards, and parkland, weaving across historic farmland.

### Ecosystem services:

This area offers a range of 'services' that benefit people. This is one of the most wooded areas of Oxfordshire and is also a farmed landscape. The woodland trees provide services by cooling and shading the land, cleaning the air, storing carbon, and offering space for people to enjoy the outdoors and gives people a sense of place. Food is produced in a concentration of arable land beneath the hills in the north and along the scarp foot. Cereals dominate arable production, with wheat being a predominant crop. There are limited but well-established sheep farms and localised

OWLS landcover types for NCA 110 in Oxfordshire



areas of dairy and beef production. The porous chalk rock of the Chiltern Hills allows water to be stored in an underground aquifer and this forms part of the most significant aquifer in the southeast of England offering an important water supply for local people. The considerable areas of undisturbed soils beneath the ancient woodlands and downland represent a large, longstanding store of carbon and the extensive tree cover sequesters carbon into the future. A variety of green spaces and an extensive rights of way network offer a range of recreation opportunities for people to enjoy nature. Improvements have also been made to increase accessibility for more users. Long-distance, prehistoric routeways of the Ridgeway and the Icknield Way and associated prehistoric monuments create a particularly strong sense of prehistory along the escarpment. Commons and woodlands rich with archaeology are widespread.

#### **Biodiversity of note:**

- This NCA is important for its chalk grassland, chalk streams, ancient woodlands (especially beech) and habitats on arable land. Fine-grained variations in soils, topography and past management have given rise over millennia to rich habitat mosaics. These include box woodland and juniper scrub, scarp slope and dipslope chalk streams, wayside verges and disused quarries. Wood pasture and veteran trees, heathland and acid grassland (habitats often associated with common land) add to the richness.
- This NCA contains three of the seven Special Areas of Conservation (SACs) in Oxfordshire. This is particularly impressive considering that only 0.29% of Oxfordshire is classified as a Special Area of Conservation. The three SACs located in this corner of Oxfordshire are the Chilterns Beechwoods and Aston Rowant, both situated on the northeastern border with Buckinghamshire, and Hartslock Wood, located on the southwestern border with Berkshire. These areas contribute significantly to the county's natural capital and biodiversity.
- The rarer plants associated with the Chilterns Beechwoods SAC in Oxfordshire are the uncommon and declining hard-fern *Blechnum spicant*, white helleborine *Cephalanthera damasonium*, bird's-nest orchid *Neottia nidus-avis* and the Critically Endangered and infamously illusive ghost orchid *Epipogium aphyllum*.
- The standing and fallen dead and decaying wood within the Chilterns' woodlands is important to many species, especially invertebrates, including rare flies and beetles, such as the stag beetle *Lucanus cervus*. Over 700 species of flies have been recorded, with at least a third of these being dependent on dead wood or fungi (saproxylic) making it a nationally significant site for saproxylic communities.
- The Woodcote area is home to an important population of *Malacolimax tenellus*, also known as the lemon or slender slug, an ancient woodland indicator species.
- There have been recent sightings of the rare and elusive hazel dormouse *Muscardinus avellanarius*.
- Aston Rowant is one of the finest remaining examples in the UK of lowland juniper scrub on chalk and supports incredible diversity of invertebrates across of beech woodland and old chalk scrub.
- Particularly important species found in the Oxfordshire Chilterns include chalk grassland specialists Chiltern gentian *Gentianella germanica*, wild candytuft *Iberis amara*, pasque flower *Pulsatilla vulgaris*, silver-spotted skipper *Hesperia comma* and glow-worm *Lampyrus noctiluca* and the yew woodland and chalk grassland of Hartslock Wood supports one of only three UK populations of monkey orchid *Orchis simia*.
- The NCA's chalk streams support Brown trout, bullhead, otter, water vole and reed bunting.

### Recovery already being taken:

This area has a number of existing countryside sites and nature reserves (you can see how to visit some [here](#)). The Chilterns also have a series of 'Flagship Projects' which all aim to manage the landscape, influence planning and development, promote sustainability, engage communities, and combat climate change. The Chilterns National Landscape have received recent funding from Defra to make the area more accessible to more people and have been creating routes that can enable more people to get out into nature which is a key part of ensuring that we all understand and value of our habitats and species well enough to protect and safeguard them.

### Opportunities for recovery:

1. Chalk streams

Chalk stream projects are priorities in this area. There are a number of existing chalk stream projects. These streams are internationally rare and improving their condition can only be done in places where there are already chalk streams. These cannot be recreated so their recovery is of top importance for this area.

2. Farming in Protected Landscapes ([FiPL](#))

As a largely farmed area, it is key to support landowners, land managers and people who live and work in these agricultural areas to help protect nature and heritage. Since 2021, over 100 projects in the Chilterns National Landscape have been allocated £1.35 million to improve biodiversity and natural resources.

3. Manage deer, pests, and diseases in the Chilterns

Imbalances of animal numbers can cause problems for biodiversity. This area of Oxfordshire has an unsustainable population of deer and this can cause the loss of new trees, hedges, and flowers and plants that would otherwise survive and support other species. This can lead to declines in other species like dormouse, marsh tit, bullfinch, willow warbler and others. To maintain the health of ancient woodlands, hedgerows, and other species it is important that deer, squirrels and *Glis glis* are managed.

4. Chilterns New Shoots project

Get involved with the year-long programme for 14 to 18-year-olds and develop your interest in wildlife.

## **NCA 115 – Thames Valley (165 hectares), 0.06% of county**

**Source:** NCA Profile: 115 Thames Valley (NE379), Natural England

**Geology:** London Clay is the main underlying geology with some sand and gravel.

**Landscape Character:** This NCA is characteristically urban and connects Oxfordshire to Reading in Berkshire. The tiny part of this NCA which is found in Oxfordshire is a type of landscape called ‘alluvial lowlands’. This land runs alongside the River Thames and contains a series of lakes which used to be quarries. Now restored, these extraction sites now offer homes for species and recreation areas for people. This small corner of Oxfordshire is popular for bird spotting and water sports.

**Ecosystem services:** Oxfordshire is a leading supplier of UK minerals, especially for gravel and sand which we use when build new homes and infrastructure. The geology here offers opportunities for mineral extraction to supply these demands which in turn offer opportunities for nature recovery actions that bring benefits to people and nature. In this area, you can find former gravel pits. Once these were no longer extracting gravel they were restored through nature recovery actions into a complex of lakes which are now popular for water sports and recreation as well as creating important habitat for a variety of species. As an open, urban, and water-rich area, farming is very limited in this southern tip of Oxfordshire, with only very small areas of grazing pastures and hay meadows.

### **Biodiversity of note:**

Around the lakes here, look out for bats and birds including Grey Herons, migrating geese, birds of prey and the rare blue flash of a Kingfisher.

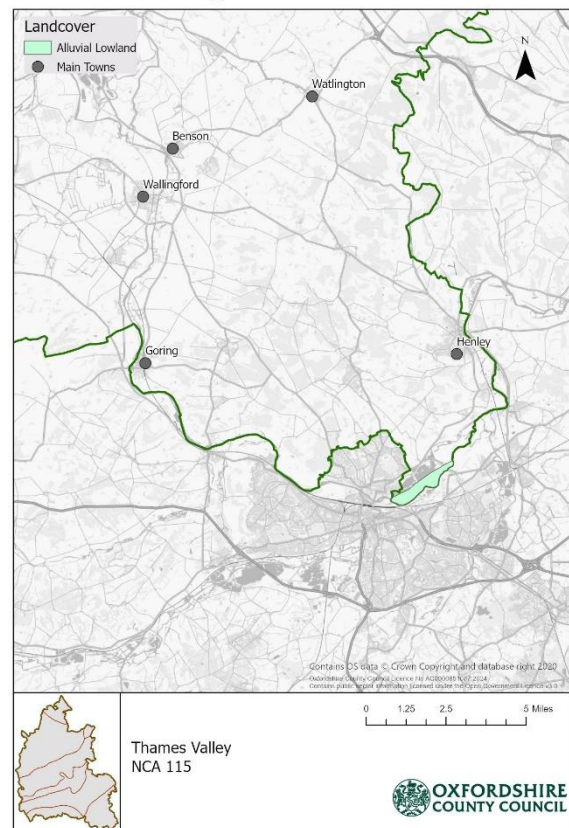
### **Opportunities for recovery:**

This area is a small pocket of Oxfordshire and opportunities can focus on the water and woodlands, there are opportunity areas to plant the right trees in the right places for people and the environment to help keep rivers cool, improve water quality, and offer benefits to people and biodiversity.

#### **1. Improving the water’s edge (riparian habitats)**

Here people can continue to improve and maintain the existing areas of green and blue space which benefit people and wildlife. Existing trees and woodland should have a management plan in place, and additional suitable trees should be planted along the water’s edge. Allowing grasses and flowers along the river edge to grow long can develop their root structures and improve the overall structure of the river bank, reducing erosion of the banks.

OWLS landcover types for NCA 115 in Oxfordshire



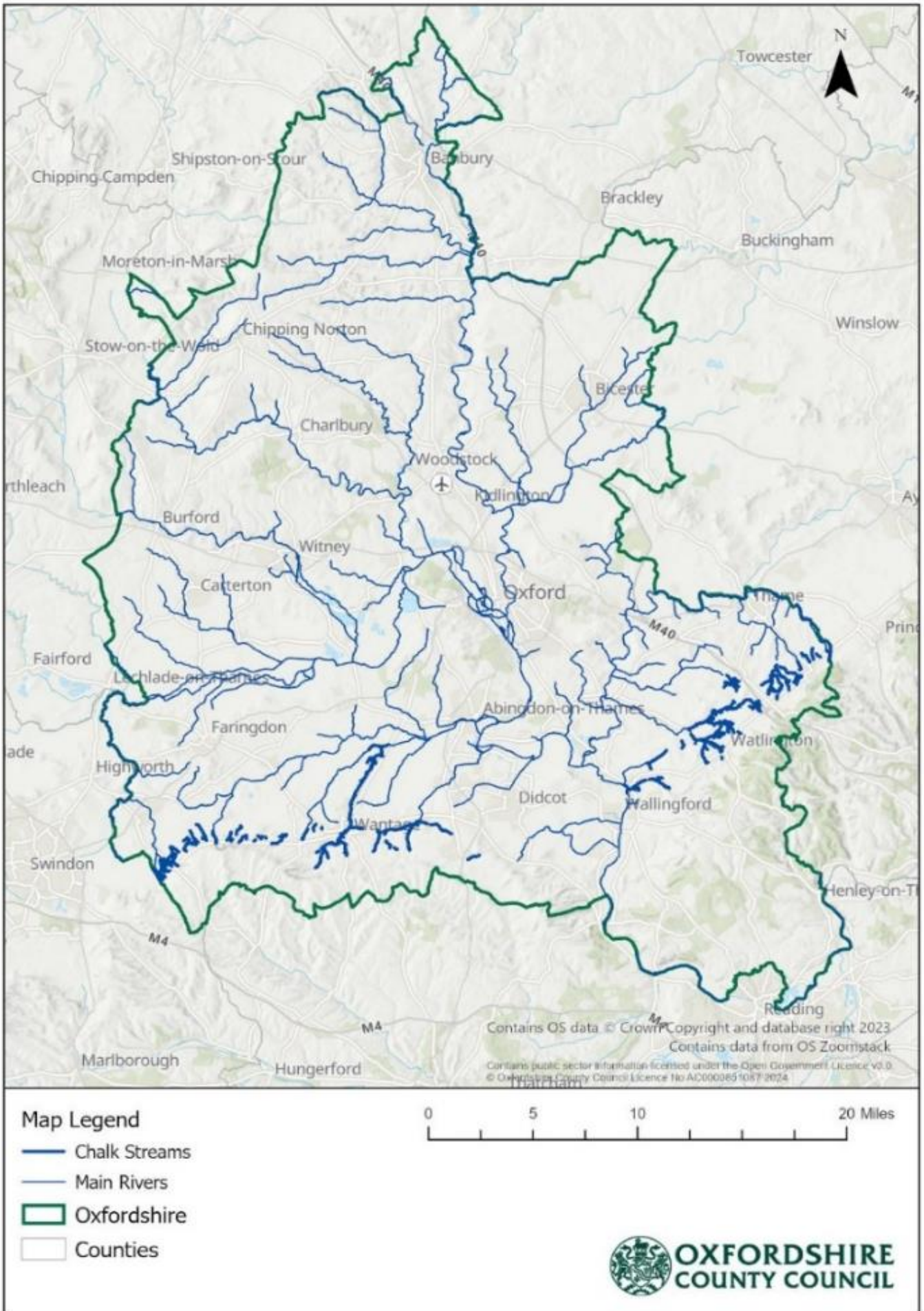
2. *Improving river health*

The southern and eastern border of the Oxfordshire section of this NCA run along a section of the River Thames which at the time of writing, is recorded as 'Moderate' ecological condition according to the [Environment Agency](#) and is a High risk area for flooding from the River. Aim to improve the condition and diversity of this section of river and increase opportunities for local species to spread from the area.

3. *Urban corridors for nature*

This area represents a key opportunity for a nature corridor along the river into Reading. Nature corridors are areas where we can [join up land](#) and remove obstacles for wildlife so that they can freely move through across the land with minimal interference from development. This could be done through wildlife corridors, bridges, or careful local planning to protect and connect existing green spaces. Making our landscapes more joined-up is a key [principle](#) underlying nature recovery.

[space to insert images of the NCA throughout the description]



## 8. Oxfordshire's Rivers and Catchments

# Oxfordshire's rivers and catchments

## Introduction

This section provides an overview of the rivers and river catchments across Oxfordshire. A river catchment is an area of land where rainwater collects and drains into a single river system, usually defined by the topographic landform and the surface water catchment. The groundwater catchment for a river (where the geology is permeable) may differ slightly from the surface water catchment due to groundwater not being constrained by surface landform. Catchments include much more than just the main river and include all the watercourses which drain into it, the associated floodplains (which should be seen as part of the river in a flood event), and all the land with its associated habitats and land-uses which form the drainage basin. Catchments form a natural mechanism for describing the landscape and are a complementary way to consider actions and priorities for nature's recovery alongside those grouped by the National Character Areas (NCAs) described previously within this document.

## An overview

Oxfordshire is largely situated in the Thames River basin, with just small parts of the county draining to the Warwickshire Avon and the Great Ouse.

There are over 3670 km of watercourse in Oxfordshire, including the main rivers and their smaller tributary streams and headwaters. The River

Total watercourse length	Km
Rivers	1015.01
Headwater streams	2660.42

Thames, originates (rising to the west) in Gloucestershire and forms a central spine meandering through Oxfordshire, where it is joined by six major rivers: the Windrush, Evenlode, Cherwell (with its tributary the Ray), Thame, and Ock. A number of smaller watercourses also flow directly into the Thames in the county, including the Cholsey Brook and Ewelme Stream. These rivers, along with their naturally functioning floodplains and any remaining associated wetlands, are valuable biodiversity resources. Within LNRS surveys and conversations with people and organisations across Oxfordshire it has been clear that improving the quality of our rivers, streams, and catchments is a top priority. Watercourses act as opportunities to connect people and nature in a continuous pathway even amidst densely populated urban areas and intensively farmed landscapes. However, barriers such as weirs and locks do block natural fish migration. Rivers and their connected environments have key roles as crucial habitats for wildlife and provide an array of eco-system services, and therefore, warrant high levels of protection and restoration.



## Geological Influences and Historical Processes

Oxfordshire hosts a diverse range of river types, each with unique characteristics shaped by catchment geology and historical human modifications to rivers and their floodplains. These river landscapes range from the limestone-fed streams of the Windrush Valley to the internationally important chalk streams originating in the Chiltern and North Wessex Downs escarpments, and the more flashy (responsive to rainfall) clay rivers sustaining vitally important wet grasslands and the wetland habitats on Otmoor, to the iconic River Thames, a wide, navigable river meandering gracefully through the county. These rivers reflect the geological heritage of Oxfordshire, the millennia of post-glacial evolution, and more recent human interventions in land and river management. Our rivers have been and still are subject to many human pressures, including historic widening and deepening (which has been done to facilitate land drainage for agriculture and reduce the impacts of flooding), impounding for milling and recreation, abstraction (removal of water from the environment) for supplying water to people, and agriculture, and rivers are also subjected to numerous pollution influences (both point and diffuse) including wastewater, and agricultural and urban run-off. These are each discussed in more detail later within this document.

## The Thames basin

Oxfordshire is situated almost wholly within the River Thames basin, which covers a much larger area spreading from Gloucestershire across to London and beyond (see image [below](#)). Within this basin area, the River Thames runs from its source to the

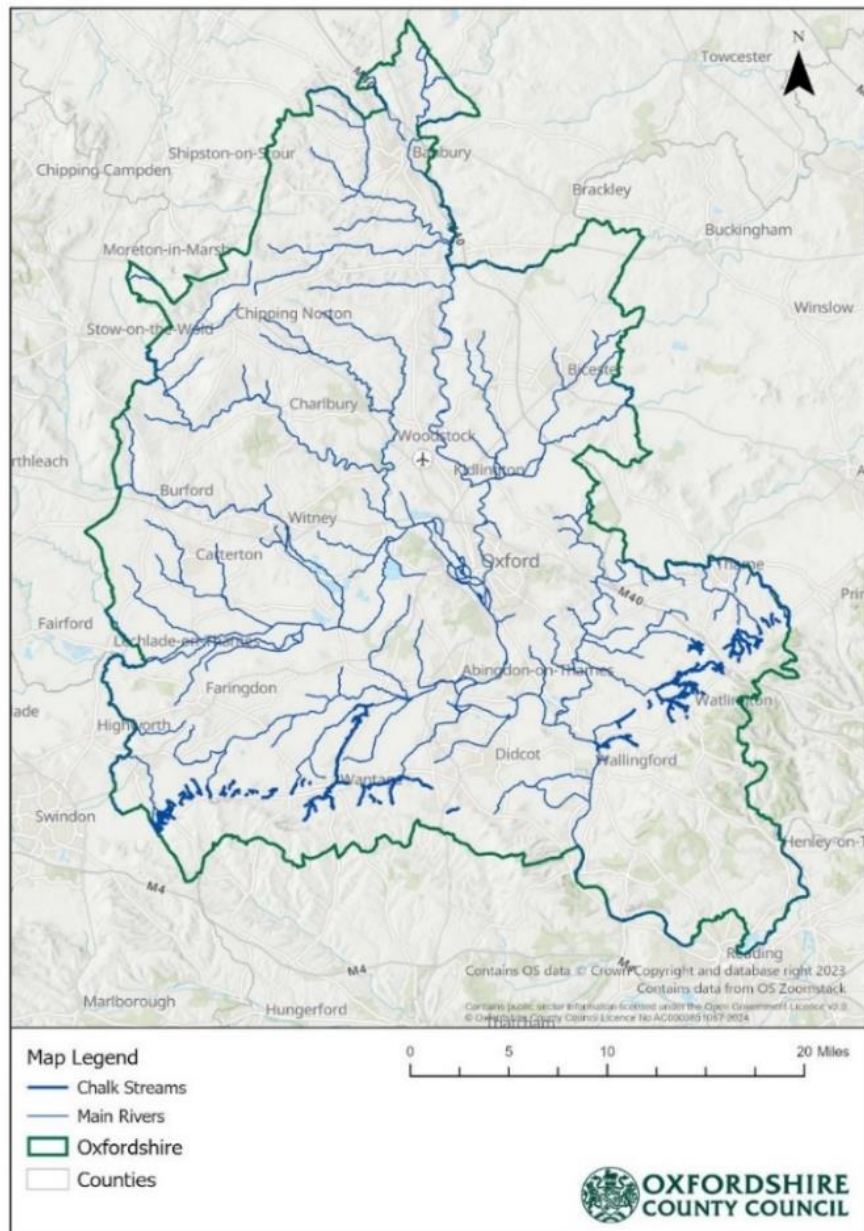


sea and is nourished by a network of large tributaries that drain into it, each contributing to the catchment's rich ecological tapestry.

## Rivers in Oxfordshire

The image, [below](#), shows an image of the rivers in Oxfordshire, and in bold, the internationally rare chalk streams that are in the county.

Rivers in Oxfordshire



The next section discusses the condition of these rivers and streams, and the pressures on the biodiversity within and around them.

## The status of waterbodies in Oxfordshire and objectives through the Water Framework Directive (WFD)

The Water Framework Directive (WFD) is a European Commission piece of legislation which states objectives to protect and restore water bodies to reach good status condition (both ecological and chemical) and to prevent their deterioration.

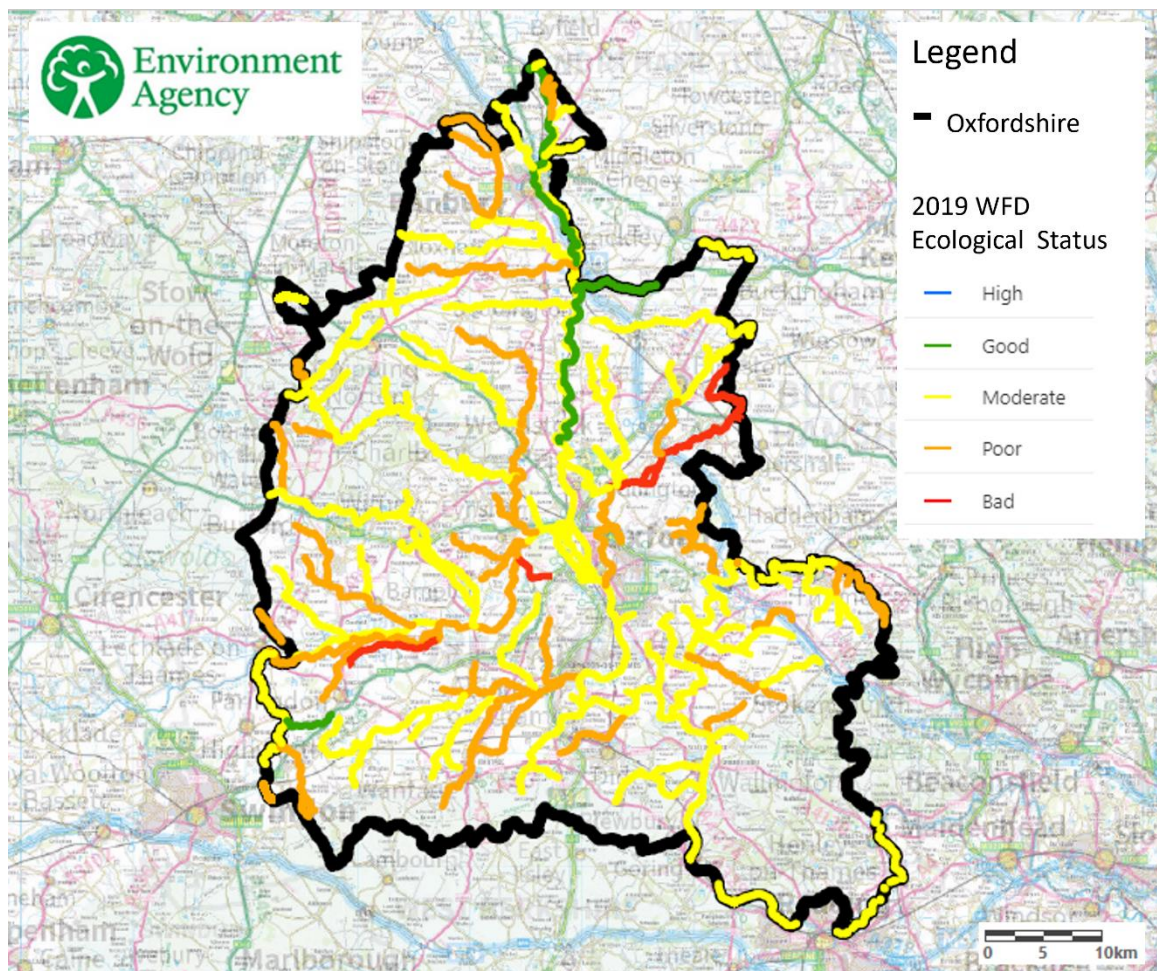
The WFD was first transposed into UK Regulations in 2003, and the updated Regulations of 2017 have been retained as UK law following departure from the European Union; the Regulations still provide the main mechanism for identifying and driving long-term ecology-based objectives for the water environment. The Regulations sets out objectives for designated rivers, lakes, groundwater estuaries and coastal waters, as set out in River Basin Management Plans (RBMPs) (of which the Thames is one). The RBMPs are updated on 6-year cycles, with the next update due in 2027. The designated 'water bodies' are given a 'status' depending on the condition of a range of parameters (including ecological communities and chemistry) ranging from bad, through poor, moderate and good to high status. The overall aim of the Regulations is to achieve good condition for all waterbodies. Not all surface waters are part of designated waterbodies, and many still waters (such as ponds) are not designated, but there are more general provisions under the Regulations that relate to the overall condition of the water environment. In Oxfordshire, just over 1,109km of watercourse is part of a designated WFD waterbody.

Below you will find a table and map which show the current status of the waterbodies in Oxfordshire. This data comes from the latest full assessment in 2019 with some which were updated in 2022. The classifications for each waterbody are made by collecting data about different factors (physical condition, chemical condition etc.) and following a methodology to assigning them to an overall condition rating (high, good, moderate, bad, poor). This data is held by the Environment Agency and the age of the data does vary.

The statuses **below** were combined as a summary in 2022 and are based on field data collected and analysed between 2 – 15 years ago at the time of writing (2024). As a result, some classifications may not be an accurate reflection of the current condition of each waterbody. A fuller reclassification is planned for 2025 and significant resources (funding and people) are required to support regular reclassifications. At present, the summary table above shows that most of Oxfordshire's river waterbodies are currently classified in an overall 'moderate' or 'poor' status, with a smaller proportion in good and bad status and none at high status. However, it is important to understand how the classification system works because this overall rating does not show that within some of those rivers there are elements which are in

'high' or 'good' condition, but they may be classified as 'moderate' overall if another element (e.g. their chemical condition) has brought them down.

Number of water bodies (river sections, brooks, streams) classified in each of the following condition classifications based on the last full classification (2019)		Percentage of total river sections
Ratings per km of river were not available at the time of writing.		
Bad condition	4	4%
Poor condition	33	36%
Moderate condition	53	58%
Good condition	2	2%
High condition	0	0%
<b>Total number of waterbodies reported in Oxfordshire</b>	<b>92</b>	<b>100%</b>



### A note on awarding ecological 'status' to waterbodies (bad, poor, moderate, good, or high).

When considering the current ecological status of our waterbodies, it is important to understand how the waterbodies are classified. The waterbodies are scored against a variety of different elements to do with the presence of animals, plants, algae, water chemistry (all of which determine ecological status) and also certain chemicals (which

determine chemical status, not discussed further in this document). The waterbody will be given the classification of the lowest scoring element. For example, if it is good for three elements, but moderate for another, the entire waterbody will be classified as moderate. In this sense it is a 'one-out, all-out' system.

The ecological elements include algae (small single-celled plants), macrophytes (larger plants), invertebrates, and fish. The 'physico-chemical' elements include the basic chemical drivers of ecological condition; ammonia, phosphate, and levels of dissolved oxygen. As mentioned, the lowest scoring of these drives the overall classification. To put the results in the table above in context, although only 2% of the waterbodies in the county are at good status and 0% at high status, a total of 67% of all the classified ecological elements for waterbodies in the county in the 2019 full classification were at good or high status; it is the smaller number of poorer scoring elements which bring the classifications down. This underlines the importance of addressing those pressures which are causing one or more elements to fail to reach good condition in the majority of waterbodies. (See [Appendix X: Technical detail on scoring statuses for the Water Framework Directive](#))

## **Pressures on Oxfordshire's rivers, catchments, and the biodiversity who rely on it:**

Rivers face many pressures that prevent them from achieving 'good' status (as classified by the Water Framework Directive), and there has been considerable work and investment to address the various pressures on our rivers for over three decades. The Water Environment (WFD) Regulations (updated 2017) now provide a strong legal framework for setting long-term objectives for the water environment. In Oxfordshire actions which contribute towards WFD objectives have been taken, and are being taken, by a range of both statutory and non-statutory organisations and groups. Oxfordshire now has a number of catchment partnerships which are active in the county and which bring together people and organisations to focus on the needs of local waterbodies in order to improve them and move them towards achieving 'good ecological status'. The LNRS hopes to amplify the case for taking these actions and to identify river recovery priorities in our county, and emphasise how addressing pressures on rivers can be as a result of increasing the ecological quality and richness of river corridors, flood plains, and headwater catchments, and in promoting sustainable and nature-friendly farming.

This section will now describe the different types of pressures on the water environment in Oxfordshire.

## **Historic changes and modifications to the physical habitats through river engineering**

A considerable proportion of Oxfordshire's watercourses have been modified to a greater or lesser extent, certain watercourses having been more adversely affected than others. Modifications have typically included historic dredging to widen and/or deepen watercourses, followed by further desilting as watercourses naturally try to recover their former channel size. This results in the loss of diversity of the features within the channel of the watercourse. For example some may have previously had variations in depth and substrate (bed material), varying bank heights and angles of slope, and many water courses would have originally split into two or more channels in places particularly where the gradient were low, creating wide areas of poorly drained and complex habitat. These more natural conditions would have been suitable to support a wide range of different species. Historic dredging and land drainage has instead removed much of this physical habitat diversity and key features for aquatic species, making watercourses more uniform in their structure and less diverse, and with a marked loss of the coarser gravels from over-deepened river beds which can be so important for spawning fish and aquatic invertebrates.. Dredging also disconnects rivers from floodplains around them by making it harder for low level floods to spill out into the floodplains, reducing the natural function of floodplains to mitigate the impacts of flood events and improve water quality.

The historic modification work has rarely prevented larger flood events from occurring and instead, perversely allows rivers to move flood waters more effectively downstream, which increases the flood risk to others. This impact is exacerbated by land-use changes which have come with land-based modifications e.g. drainage systems and non-permeable surfaces, and damaged agricultural soils, all of which move water off the land more quickly and effectively (increasing rates of run off). By making these changes to how water is drained quickly to watercourses from the land, we have put more pressure on river systems and have reduced the natural capacity of the land to absorb water.

In addition to dredging and the loss of river gravels and natural river features numerous barriers have been built on Oxfordshire's watercourses in the past for water mills, water-meadow management, amenity, and navigation. Each of these barriers also add pressure on river biodiversity by preventing fish and other species from moving freely through watercourses, and addressing barriers to fish passage to allow them to access spawning and other habitat is now considered a key objective for achieving healthy fish populations. The consequence of this legacy of modifications is that many Oxfordshire watercourses now have a fairly uniform structure and have lost their natural variation and characteristics. This has removed a huge variety of habitat types which used to exist meaning that the rivers now offer much poorer habitat conditions. To address these pressures for biodiversity, Oxfordshire could do further work to restore damaged sections of rivers, reconnect sections with their floodplains, and remove barriers to fish passage. In fact, physical river habitat restoration could be a key ingredient of achieving objectives for a broader range of floodplain habitats.

## **Water quality and Pollution**

The quality of the water is one of the main drivers of the ecological condition of our rivers, and is very much impacted by how we use the land and how people and organisations dispose of waste and wastewater created from human activities. There are a number of ways to measure water quality.

Pollution generally refers to the addition/entry of materials or particles into an environment (in this case, our rivers) in an amount which is beyond their normal and natural levels. This can include chemical, biological (organic), and plastic pollution. These pollutants affect water quality in different ways depending, for example, on whether they are specific toxic chemicals or substances which increase the supply of nutrients. Imbalances in nutrient levels may increase the levels of algae or may cause a decrease in oxygen levels (typical result of untreated sewage or silage liquor). Changes like these can affect the balance of the river ecosystem to the point where the overall quality of our rivers reduces and aquatic life (in extreme cases) struggles to survive.

Many activities that could adversely affect water quality are regulated by the Environment Agency – broadly covering activities that involve a discharge of processed materials to the environment. The Environment Agency have monitored rivers and have seen improvements in general water quality across many river catchments compared to water quality several decades ago. They report that this has been due to enormous investment in improving the quality of treated sewage effluent and industrial discharges and addressing the more acute agricultural pressures from, for example, livestock farms. However, water quality remains one of the main pressures on the biodiversity and ecological health of watercourses in Oxfordshire and there are expected to be some particular challenges ahead, some of which fall to organisations (regulators and the regulated) to deliver, and some of which can be influenced by wider people, organisations, and landowners.

### **Sewage (waste water treatment works and misconnections)**

The past improvements in treated sewage effluent (albeit with further to go) have been overshadowed of late by the growing evidence describing the amount of untreated sewage entering our rivers through storm tanks at sewage treatment works. Although at the time of the production of the LNRS (2024) this is subject to a large-scale investigation, the lack of investment in sewerage infrastructure is clearly wreaking a penalty on our rivers although the ecological consequences on biodiversity are currently uncertain (hampered currently by a reduced resource available for the WFD ecological monitoring network). One further source of sewage pollution that adds pressure on biodiversity by reducing water quality is from 'misconnections'. Misconnections are where properties have wastewater pipes incorrectly plumbed into freshwater drains. This tends to occur when work has been carried out to create new bathroom, utilities or moving washing machines into garages or outbuildings. Many people are not aware that this may be a source of pollution they are responsible for.

The solution to the pressure of sewage on water quality will require considerable investment and regulatory oversight and has become a highly politicised issue.

Dealing with the challenge of illegal storming of raw sewage due to failing or inadequate infrastructure, and also setting out what is required and when with regard to further improvements to treated sewage effluent, falls largely to Government bodies and regulated water companies and is beyond the scope of what the LNRS can map out. The environmental improvement requirements placed on water companies in their next five-year business plans (currently in development) will be critical to making good and speedy progress on this matter.

When the LNRS began engaging with people in Oxfordshire through workshops and surveys, we had hundreds (400+) of mentions for actions related to improving rivers, waterways and freshwater habitats. Across our surveys and workshops, nearly all groups had improving the freshwater environment in Oxfordshire as the most important priority to achieve. The importance of addressing pollution pressure is therefore recognised as a key component of the nature recovery in the Oxfordshire. There were also many requests for housing developers and planners to consider how new developments could worsen this pollution issue unless treatment works are invested in. While the LNRS can identify habitats to create, restore, or improve to mitigate the impact of pollution, LNRSs do not have powers to stop developments, and it is therefore critical that those advising on and making planning decisions do so with full understanding of the capacity of waste water treatment facilities to adequately cope with the increased demand.

### **Agriculture and water quality**

Agricultural land management operations, slurry management (e.g. diluted manure), silage storage (animal fodder), and applications of fertilisers and chemicals (such as herbicides and pesticides) can all impact on water quality. This can result from poor practice which may lead to acute pollution events, or may be the more chronic impacts from the repeated and long term use of agrichemicals which are washed into watercourses from the land after rainfall. On some headwaters in the county, agricultural diffuse pollution is the main source of elevated nutrient (primarily phosphate) in a waterbody. More direct impacts on water quality and riverbank structure arise when livestock are allowed to enter rivers unrestricted, or when large quantities of soil run off from tilled fields after heavy rain. All of these are pressures on the quality of the water environment and can all impact negatively on biodiversity. In some cases, ecosystems (like rivers) can take years or decades to fully recover from more acute impacts. Agricultural land is identified by the Environment Agency as the main source of added sediment into rivers which leads to an excessive build-up of silt in many of our rivers affecting the water environment and quality or river gravels, and making it more challenging for plants and animals.

There are many measures and good practice solutions to mitigate and prevent diffuse pollution, many supported by agri-environment scheme funding which is reaching a new phase with the developing Countryside Stewardship provisions. De-intensifying land-use in more sensitive locations provides the opportunity for more



sustainable, wildlife friendly farming in floodplains and on steep valley sides, both of which can reduce agricultural pressures on the water environment and at the same time support nature's recovery.

### **Road/urban runoff**

The effects and scale of road and urban runoff on Oxfordshire's biodiversity is not fully understood but from recent research within the Thames Basin this pathway of pollution is a cocktail of particles from vehicles such as engine emissions, brake wear, road surface wear, and oil leakage. The biggest impact on the river ecosystem occurs in wet weather directly after dry periods where a first flush of concentrated pollutants on the road network is flushed into the water courses. In severe circumstances this can lead to short-term deoxygenation of water and fish mortality. To reduce the impact on the water environment, urban draining schemes could allow water to more slowly percolate into the ground, and silt traps and oil interceptors could have improved maintenance.

### **Water Resources and Abstraction**

The flow regime of any river is an essential component of its ecology, and aquatic life can be severely compromised by high levels of abstraction. Abstraction is the removal of water from rivers, lakes, springs, or groundwater and is usually used for drinking water, agriculture, and other purposes. Where abstraction impacts rivers this can reduce water levels and flow velocities, promoting the deposition of silt or preventing the maintenance of clean river gravels and reducing the dilution of pollutants. Some of the rivers in Oxfordshire are supported by high 'baseflows' which is a consistent water supply into a watercourse from large aquifers which are underground areas of permeable rock which water can move through. An example of this in Oxfordshire is the water-bearing rock of the limestone of the Cotswolds, or the chalk of the Chilterns and Berkshire Downs; these are important in supporting the flow of a number of rivers but these same groundwaters are also important sources of water for human use. Balancing the needs of people and the environment is a fundamental objective of the abstraction licensing regime, managed by the Environment Agency, which now regulates all but the smallest abstractions.

There are locations in or adjoining Oxfordshire where the abstraction of water has been suspected to be negatively impacting the flow of rivers in the county, and these potential impacts have been investigated over the last two decades. The result has been several licence restrictions or closures to protect the biodiversity and ecological systems on those watercourses.

Examples include recent restrictions on some of the Cotswold groundwater licences in Gloucestershire which reduces pressure on the main Thames as it flows into Oxfordshire, closure of the abstraction from the Windrush at Worsham, and closure of the groundwater source near Wantage which impacted the Letcombe Brook. The surface water abstraction on the Cherwell at Banbury has also not been in use for many years for operational reasons

related to water quality impacts from agriculture. The net result of these investigations and licence changes has been a reduction in abstraction pressure for many of the county's waterways, although some investigations (e.g. into the Chilterns abstractions) are still just concluding. It is important to note that on some rivers, the effluent from sewage treatment works augments river flows above those which would be naturally occurring under dry weather conditions.

However, all these licence restrictions still require water to be found from other existing, ostensibly more sustainable sources. This has resulted in more pressure being put on the abstraction from Farmoor Reservoir, west of Oxford, which abstracts direct from the Thames, and although this abstraction takes place on an impounded section of river, it compromises flows through the various 'Oxford Watercourses' though Oxford downstream, causing significant management challenges. The Environment Agency indicate that only a new major water resource would allow some of the pressure from the Farmoor abstraction to be managed better.

In summary, abstraction is currently considered to be quite a localised pressure on our rivers in the county, partly as a result of how this pressure has been addressed by concerted action, but there are some challenges remaining, not least how a new sustainable resource can be developed to meet future demand without adversely impacting the ecology of our rivers and wetlands.

Abstraction is an important pressure to address in the county because the removal of water puts significant pressure on biodiversity and the ecology of rivers and wetlands. The removal of water at unsustainable rates negatively impacts rivers and creating a sustainable water resource, managed well, could relieve pressure on the biodiversity which rely on rivers and watercourses.

## **Flooding**

Flooding is a natural part of a river's function and a river's floodplain should be seen as an essential part of the whole system. Many human interventions and activities have increased and worsened the risks from flooding and it is this increase in flood events, and the need to manage them, which can put pressure on biodiversity.

For example,

- People have increased the speed with which water runs-off from urban areas (through artificial drainage systems and the amount of impermeable surfaces such as roads and pavements) so that water flows more quickly off the land into watercourses. This increases the amount of water which that river is expected to hold within a short time and has increased the chances of rivers flooding further downstream as tributaries join together. Increased flood risk puts significant pressure on built infrastructure and can also increase flood risk for sensitive habitats for animals and plants, such as unseasonal flooding

impacting breeding waders and lowland meadows in the floodplain. Increased run-off from the land can also affect the biodiversity within rivers, especially if they have been modified to increase their capacity, as they can become more flashy and experience frequent high flows which can displace fish fry and invertebrates.

- There are many locations where housing and built infrastructure has encroached onto floodplains or built them up, resulting in a loss of floodplain biodiversity and increased flood risk from rivers, a risk which can be transferred to other sensitive locations if land has been raised out of the floodplain. Measures to address flood risk to people and property can often involve schemes which in themselves have to be carefully designed to minimise impacts on the environment, underlining the importance of avoiding building in floodplains in the first place.

Addressing flood risk from rivers, groundwater, and surface water is an ongoing challenge particularly in the light of climate change where precipitation and heat patterns are changing. The most substantive area of flood risk in the county is in Oxford itself, where one of the largest fluvial (river flooding) flood schemes in the country is in development, but there are many other smaller communities which experience periodic flooding. For some of these communities, actions could be taken to create, improve or restore habitats or land upstream from flood risk areas. These actions could include improving soil quality on agricultural landholdings so that the soil is in better condition to store water during rainfall events and to slow water down so that it does not rush (as run-off) into watercourses. Oxfordshire could also harness the water storage capacity of floodplains where water can do less harm, by e.g. better reconnecting rivers with these floodplains where they have been over-deepened; these natural flood management measures form part of a strategic approach to flood risk management benefitting both biodiversity and people.

One of the most important actions could be to restore the wildlife-rich habitats in floodplains and valley sides which can serve to 'slow the flow' of water through Oxfordshire as well as provide opportunities for nature's recovery. Flooding is a natural function of a healthy catchment, and with climate change now a reality we must work with natural processes and allow floodplains wherever possible to do their job of keeping people and biodiversity safe during periods of extreme weather.

## **Invasive and non-native species.**

A number of species (plants, animals, fungi, microorganisms) have been introduced to our rivers and wetlands which are not native species. In Oxfordshire, this includes the American Signal Crayfish, zebra mussels, demon shrimps, Australian swamp stonecrop and Himalayan balsam. These species can negatively affect our river and wetland ecosystems and biodiversity they support by outcompeting some of our native species. For example, Himalayan Balsam out-grows and shadows other vegetation during the summer reducing natural root systems from other species that more effectively stabilise riverbanks; when they die off during the winter they leave the riverbanks exposed and susceptible to erosion. In Oxfordshire, the American signal crayfish has led to the almost complete eradication of native white-clawed crayfish, and the non-native crayfish also has adverse impacts on aquatic invertebrate communities as well as being considerable predators of fish eggs.

## **River Catchment Summaries**

The next section describes the characteristics and biodiversity opportunities of each of the main rivers in the county and the area of land around it (its 'catchment'). Each of the following river description sections will describe the recovery priorities relevant to each river and catchment as well as highlighting the 'Catchment Partnerships' who are working, through the 'Catchment-Based Approach' ([CaBA](#)), to improve the water environment across various rivers in Oxfordshire by addressing some of the pressures mentioned above.

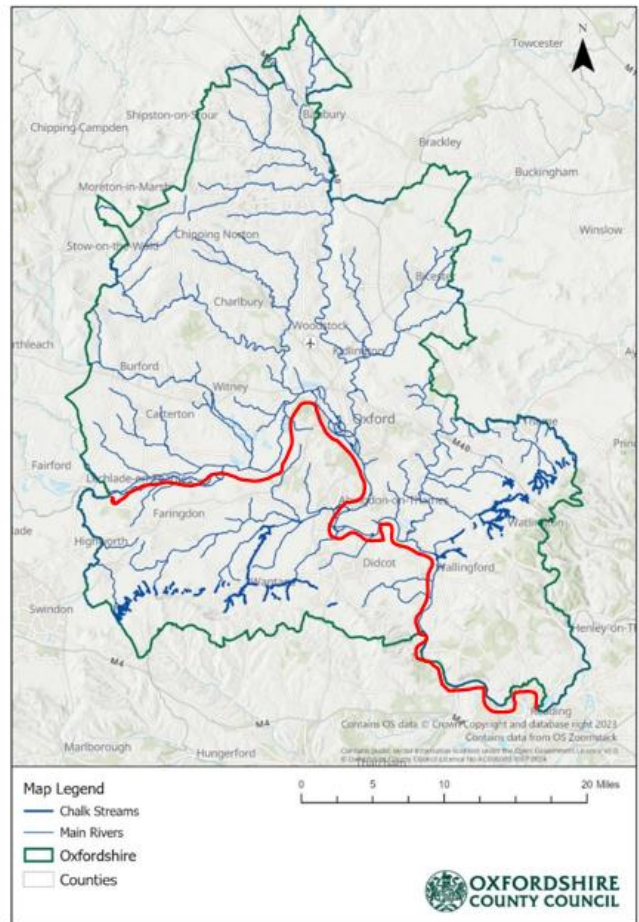
**Many thanks to the Environment Agency and representatives from the catchment partnerships who helped Oxfordshire County Council to shape this section.**

# River Thames

## Introduction:

The River Thames stands as Oxfordshire's most iconic waterway, originating from the limestone-rich Cotswolds in Gloucestershire to the East. As seen by the red line added to the image below, the River Thames enters Oxfordshire just downstream of Lechlade and meanders across central and southern Oxfordshire, flowing eastwards mostly through a clay landscape until it encounters greensand and chalk near Wallingford, where it heads south towards Reading and runs along our border with Berkshire. Notably, the Thames is extensively engineered and managed for navigation, with a system of locks and weirs regulating its level. This artificial management dominates the River which is characterised by artificially-created, deep stretches of uniform river habitat interspersed with energetic weir pools and side streams. Despite being modified for navigation, the Thames sustains or runs alongside a diverse range of habitats including floodplain pastures and hay meadows. The stable water levels foster a rich ecosystem for those species which have been able to adapt to these modified river structure conditions, including species like otters, kingfishers, and water voles.

Rivers in Oxfordshire



## Description:

The Thames flows predominately through rural areas until it approaches Oxford. The river is characterised by natural banks with plenty of marginal vegetation and tree cover, including some very old willow pollards. The adjoining land is dominated by improved floodplain pasture, with some arable. The floodplain is wide, and where agricultural improvements have been limited, some excellent species rich floodplain hay meadows survive. Notable examples include Chimney Meadows SSSI, Oxford Meadows SSSI/SAC, Port Meadow SSSI/SAC, and Iffley Meadows SSSI.

As the Thames enters Oxford it splits and forms a number of channels called 'The Oxford Watercourses'. The Oxford Watercourses are a complex series of streams in and around the Oxford area which are distributaries of the Thames. Some of these support very valuable flow-dependant habitat, including important fish spawning and nursery sites. A number of weirs and sluices are also located on these watercourses and are used to maintain water

levels to ensure that the Thames is navigable for boats. In times of low flow, arrangements are put in place to ensure these structures are carefully managed to ensure the flows to the watercourses that support critical habitat are protected as much as possible. The Seacourt Stream has the highest overall ecological importance of all the flow dependent Oxford Watercourses and its flow is governed and maintained by the management of King's Weir.

South of Oxford City, the nature of the Thames returns to a more natural system, with natural banks and wide floodplains dominated by pasture. It flows through the towns of Abingdon and Wallingford, before leaving the Oxfordshire border on the edges of Reading (as seen in the image below).

### **Ecological Importance:**

The Thames provides an excellent corridor for the movement of species through the landscape and supports an excellent fish population, along with good numbers of Otters and other protected species such as Kingfisher.

### **Challenges and Opportunities:**

Because of its regulated nature, the opportunities for enhancement are limited to protecting and supporting the natural nature of the banks – retaining trees and marginal vegetation and limiting the loss of natural bank to sheet piling and more urbanised and artificial edge treatment. There is plenty of opportunity to create or restore more nature-rich floodplain habitats such as encouraging the development of species rich hay meadows, or the creation of permanent or seasonal wetted areas of value to wading birds. In some areas there can be wildlife benefits of allowing increased inundation of the floodplain via breaking through of flood embankments, such as has been done at Chimney Meadows BBOWT reserve. Other opportunities include the provision of backwaters connected to the Thames which can provide refuges for fish under flood flows, and help provide the diversity of habitat features which have been lost by the regulation and engineering of the main river channel – examples include the backwaters at the River of Life schemes on Earth Trust land near Little Wittenham. As the lock and weir structures which maintain the Thames navigation are barriers to fish passage which can't be removed, then the provision of fish passage to improve connectivity for migrating and spawning fish at each of the main barriers is also important; some good examples of nature-like bypasses have been constructed at weir complexes such as Radcot, Rushey and Shifford Lock, with more planned, and there are more technical fish passes at sites like Sutton Pools upstream of Culham Lock. A number of lock and weir complexes on the Thames in the county are still awaiting fish passage solutions.

**Hear more about groups taking action for the Thames such as [Thames 21](#).**

# River Windrush, River Leach and adjacent watercourses

## Introduction:

Rising in Gloucestershire, the River Windrush traverses picturesque Cotswold scenery before joining the Thames. Its limestone-fed waters sustain rich biodiversity, though threats like pollution and habitat loss persist. By prioritizing habitat restoration and sustainable water management, the Windrush can thrive as a haven for wildlife.

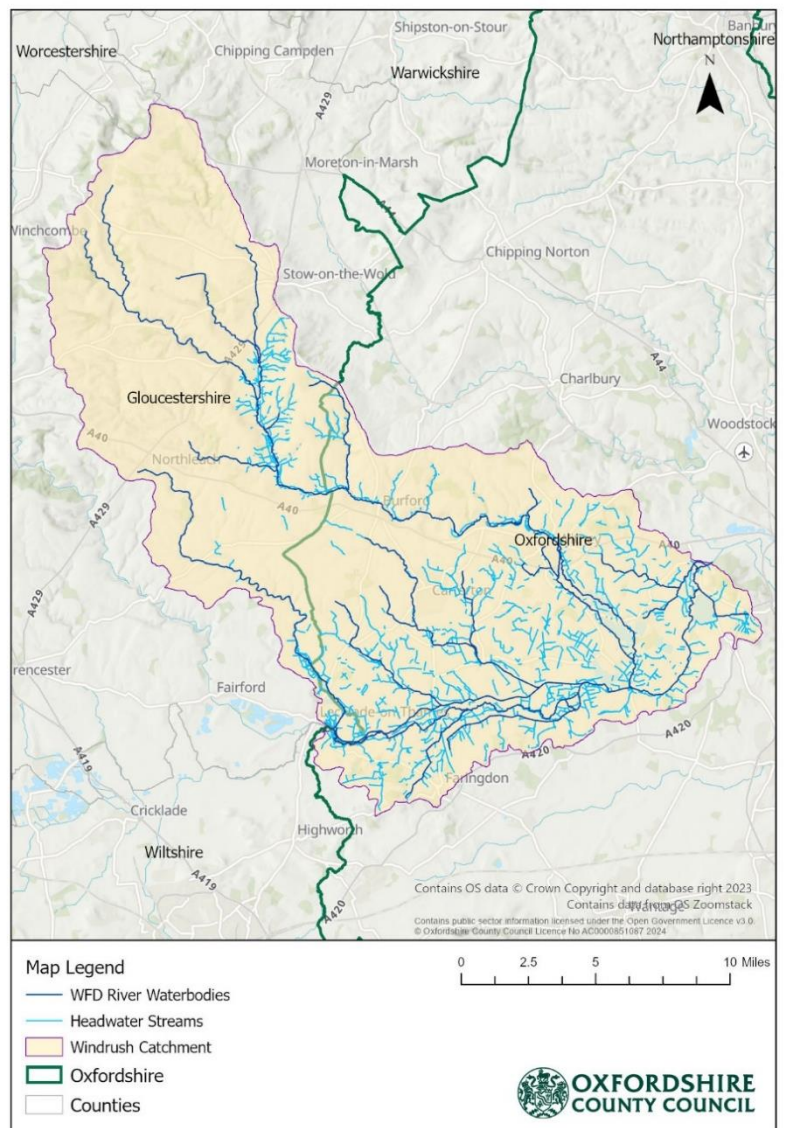
## Description:

The River Windrush is 73 kilometres long and rises (starts) in the Cotswolds of Gloucestershire. The river catchment covers 365km<sup>2</sup> of West Oxfordshire and is mostly within the Cotswold's National Landscape. It enters Oxfordshire west of Burford and flows through Witney, where the river splits into two distinct channels across the floodplain before they re-join each other. The Windrush then joins the River Thames at Newbridge. Most of the larger tributaries to the Windrush are found in the upper parts of the catchment in Gloucestershire, but a few smaller tributaries rise in the Cotswolds hills to join the river in Oxfordshire, such as the Coombe Brook and Swinbrook.

Land use in the Windrush catchment is mainly rural, with arable land, grassland, and woodland. Witney is the only major urban settlement.

The River Windrush is mostly fed by water that comes from springs and seepages rising from the water table in the Oolitic Limestones of the Cotswolds Hills. Some flow also comes from surface run-off from impermeable parts of the catchment underlain by clay, and from run off from roads and paved areas. As the upper reaches are fed with high quality spring water, water quality has, until recently, been predominately good throughout the catchment. In recent years the extent of releases of untreated sewage from storm tanks at sewage treatment works in the catchment has become apparent, leading to a sharp focus on the

Rivers in the Windrush Operational Catchment



water quality of this catchment. This has led to pressure on organisations to address the lack of investment in sewerage infrastructure and better compliance with existing permits.

### **Ecological Importance:**

The Windrush catchment is one of the most notable in the Upper Thames for the ecological value of the river and floodplain habitats. There are 12 Sites of Special Scientific Interest (SSSIs) in the catchment including the Brassey Reserve and Windrush Valley (Gloucestershire), Westwell Gorse and Ducklington Mead. Otter are present along the whole river catchment, water vole populations are doing well (and have benefitted from both research and focused mink control in this catchment), and two of the small Oxfordshire tributaries have remnant populations of native crayfish, which may be the last remaining populations in the county.

In the upper reaches and upper tributaries brown trout are the dominant fish species. Downstream, there is a mixed fishery with a good population of coarse fish such as chub, roach, and dace. Environment Agency monitoring has shown that the Windrush has had some of the most diverse aquatic invertebrate populations of any river in the Thames catchment; the current pressures from STW storming and reduced monitoring capacity mean that more comprehensive monitoring is required to assess whether and how much these communities are being currently compromised.

### **Challenges and Opportunities:**

The relatively stable river flows arising from the limestone aquifer that supports the river led to the Windrush becoming an important river for the establishment of watermills to help produce cloth and wool, as well as to grind cereal grain. At one time there were as many as 20 mills operating along the river, which resulted in a lot of channel modification and impoundments. More recently, in the post-war years, much of the river was subject to dredging for the purposes of land drainage and flood defence leading to highly modified river channels and a degree of disconnection from the floodplain. This combined history of milling and dredging presents many challenges and opportunities for physical habitat restoration in concert with floodplain habitat enhancement. There is a perception that the River Windrush has been degraded through reduced flow over the years, particularly in the lower catchment, through licenced abstractions and gravel extraction. The river and groundwater are used as water sources in the Windrush catchment, although the largest abstraction point at Worsham that supplied drinking water to Witney and the surrounding area closed in 2002, and the river flow regime does not depart much from natural. Sand and gravel have been worked in the Lower Windrush valley, particularly near Stanton Harcourt and Standlake, for over 40 years. However, mineral-extraction sites can offer significant opportunity for people and nature and the flooded gravel pits in this area do now accommodate a variety of recreational activities such as windsurfing, water-skiing, sailing and fishing, as well as providing habitat for an important number of breeding and wintering birds, with a few of the restored pits being managed solely for nature conservation.

The Windrush would benefit from significant investment in waste water treatment works and the reduction of storm discharges. The impact of future housing developments may rest on understanding the capacity in an already struggling sewerage system. These are matters which largely fall to regulators, water companies and planners to secure, but there is wide



stakeholder pressure and interest in ensuring that appropriate action is taken as soon as possible to address the under-investment of the past.

Habitat quality in the rivers and tributaries is variable but some of it is in good condition, reflecting where historic dredging was avoided or where the river has been able to recover through its own dynamic processes. There have also been a number of channel restoration schemes to help the river recover. More work is always needed to further undo some of the impacts of urbanisation and land drainage, such as the removal of in-stream structures, and encouraging better connection with the floodplain by naturalising channel profiles and lowering embankments. Good river and floodplain habitat should be protected from encroachment by development however this is a matter for planners, Defra advised LNRs that LNRs cannot afford protections to any particular areas from development. Connectivity for movement of species, and natural sediment processes is vital. Encouraging restoration of species-rich, floodplain hay meadows and floodplain wetlands in connection with river restoration will provide multiple benefits of taking an holistic approach.

**More information about the Windrush Catchment’s vision, aims, and how to get involved can be found here:** [Ripple Effect: Empowering the Windrush Catchment \(arcgis.com\)](https://storymaps.arcgis.com/collections/0120c7d0b67c490f96413e83a7f17913)  
<https://storymaps.arcgis.com/collections/0120c7d0b67c490f96413e83a7f17913>

**More information about this catchment can be found here:** [Windrush Operational Catchment | Catchment Data Explorer](#)

# River Evenlode

## Introduction:

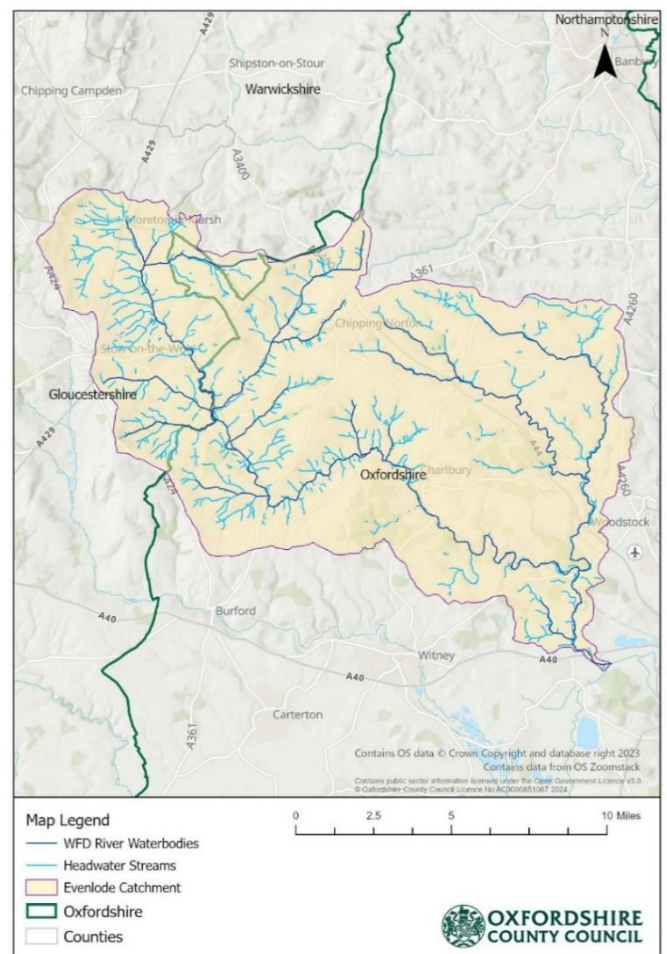
The Evenlode river rises (starts) at Moreton-in-Marsh in Gloucestershire and flows for 66km to join the River Thames at Cassington in Oxfordshire. The majority of the upper catchment is on clay, with tributaries rising from limestone on the valley sides. The middle to lower reaches of the Evenlode flow over limestone and receive a basal groundwater flow. It has several tributaries, the largest being the groundwater fed river Glyme which enters the river Evenlode in its lower reaches at Bladon, near Blenheim Park in Woodstock. The Evenlode catchment area covers 435km<sup>2</sup>. The Evenlode responds rapidly to rainfall as the water sheds quickly off the clay soils.

## Description:

The Evenlode is mostly within the Cotwolds National Landscape where the river runs through a wide valley with gently sloping sides in a rural, agricultural setting. The larger settlements along the river are Moreton-in-Marsh, Bledington, Shipton and Ascott under Wychwood and Charlbury. There is a section, halfway along the river's length that passes between steep limestone hills of grassland and broadleaved ash/wych elm woodlands. The main tributaries (streams and rivers) that join the Evenlode River include the Cornwell Brook, Bledington Brook, Sars Brook, Littlestock Brook and River Glyme. The river Glyme and its tributary the Dorn have a different nature to much of the main Evenlode as they run through an area of limestone geology, and the water that runs into them has drained through more permeable limestone soils.

Historically the river has been modified by a number of water mills along its length. In addition, a number of sections were straightened and moved to accommodate the Cotswold Line railway, built around 1850, which follows the Evenlode along its length. After the Second World War the Evenlode was subject to a number of extensive dredging schemes for land drainage purposes, as a result of which significant sections are overly deep and have a trapezoidal cross-section, leading to stretches of very uniform habitats and a loss of connection between the river and the floodplain. Much of the river remains in its original planform (channel route) however. The substantial historic dredging of the river has facilitated land drainage and arable agriculture to be established along many reaches of the

Rivers in the Evenlode Operational Catchment



Evenlode, with often very little buffer to the river, and in a few places embanking along the banktop which further reduces connectivity between river and floodplain.

The River Glyme and other tributaries have also been engineered in the past to varying extent, and the Glyme in particular has a number of on-line amenity lakes along its length which are barriers to fish passage and radically change channel characteristics. The lower end of the Glyme passes through the large lake at Blenheim Palace, recently subject to extensive desilting due to the accumulation of silt on the bed of the lake.

### **Ecological Importance:**

The historic engineering of the main Evenlode and some of its tributaries means that there has been a loss of some of the diversity of structure in the natural characteristics within the river channels, including a particular loss of natural gravel-bedded sections of watercourse which are now very scarce. These gravel bedded sections are of high value for invertebrates and some gravel-spawning fish species. The river channel is now often uniform with little variation in flow types, and a silty bed lacking coarser gravel material. There are however a few infrequent areas of riffle features remaining on the main Evenlode and Glyme, where the plant 'stream water crowfoot' is common.

The Evenlode does have a wild population of Brown Trout, most commonly in the upper reaches and on some of the steeper, faster-flowing tributaries. In the lower reaches, with its slower, deeper nature, the river supports more coarse fish species. There are several barriers on the Evenlode which prevent fish from migrating through the river as they normally would. The most significant barrier to fish movement is the weir at Cassington Mill which prevents fish moving from the Thames into the Evenlode. These barriers, as well as the engineered nature of the channel, explain the relatively poor fish and invertebrate populations on parts of the Evenlode catchment. Otters are however active throughout the catchment, although water vole populations are very isolated with little recent evidence.

The Evenlode was chosen as one of the pilot areas for trialling Natural Flood Management (NFM) projects in the Thames Basin, building on initial work to address flood risk from the Littlestock Brook, a flashy and steep-gradient tributary near Ascott-under-Wychwood. Being part of this project has informed local understanding of the effectiveness of working with natural processes for flood risk management in a lowland agricultural landscape. Actions were taken in the area to 'slow the flow' by the use of large woody debris in the channel of the Brook, and creation of flood storage features and tree-planting on valley sides. Since then, hydraulic modelling (which predicts where water will move) shows positive results; the new actions have reduced the severity of flooding to 12 properties in an agricultural area for a range of flood events

### **Challenges and Opportunities:**

A priority for the Evenlode and its clay dominated tributaries is to undertake restoration of river channel habitat to address the damage caused by historic dredging for land drainage purposes. A number of enhancement and restoration schemes have been undertaken

around the catchment over the last three decades to re-instate riffle features, diversify channel habitats and improve fish passage, and much remains to be done to ensure that habitat quality is not a constraint on ecological potential. Removal of embankments, reactivation of historic paleo channels, re-gravelling and raising the bed of over-deepened sections, and where appropriate slowing the flow using significant large wood debris dams are all measures which will help restore the aquatic ecology and also benefit associated floodplain habitats. Arable farming on the floodplains in the Evenlode catchment is frequently unsustainable, so using options open through e.g. agri-environment schemes to allow less intensive, more wildlife-rich habitats to be established in the floodplain, and the multiple water quality, flood risk and public enjoyment benefits this could secure, should be encouraged. Recently, the Evenlode has also been selected as one of the pilot areas for a new Landscape Recovery Scheme – a scheme looking to deliver catchment-scale improvements through agricultural payments and the creation of a funding stream through natural capital. The Landscape Recovery Scheme Pilot in the catchment will help understand how viable this is.

The ‘Evenlode [Catchment Partnership](#)’ is made up of partners who are creating and delivering projects to improve the quality and state of the river and the areas of land surrounding the river. The Environment Agency is part of the partnership which consists of a host of organisations that are committed to developing, coordinating and delivering meaningful improvements to the river, floodplain and catchment management.

Whilst better floodplain connection and sound catchment land management practices will help water quality through reduction in fine sediment load to the river, the catchment also has several underperforming wastewater treatment works. Significant investment in these is necessary if we are to see real, long term improvements in water quality. Plans for new housing developments need to fully understand the capacity of the existing sewer network, before adding further to the burden.

The Oxfordshire Way, a long distance path, follows the valley of the Evenlode for much of its course offering people an opportunity to connect with nature. This offers strong opportunity to bring people in to help resolve challenges and help with opportunities for biodiversity.

**More information about the Evenlode catchment partnership can be found here:** [Evenlode Operational Catchment | Catchment Data Explorer](#) or see the ‘Beneath the Surface’ video, learn about the breadth of work of the Evenlode Catchment Partnership <https://wild-oxfordshire.webflow.io/evenlode/evenlode-catchment-partnership>

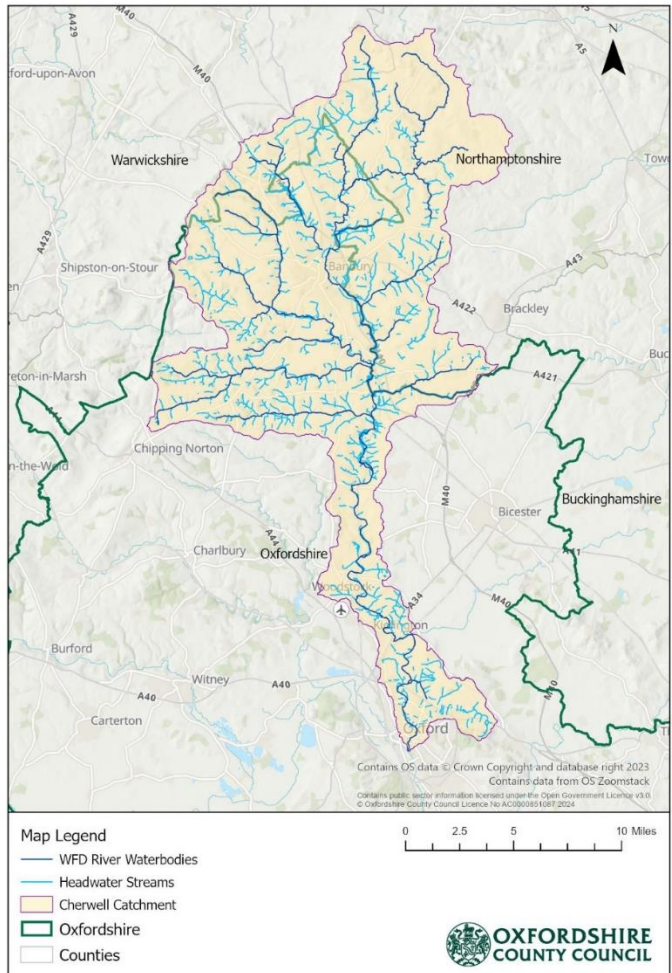
## River Cherwell (the Ray is included after the Cherwell)

Thanks to the Environment Agency and the Cherwell and Ray Catchment Partnership for support to create this section.

### Introduction:

Originating (rising) in the town of Charwelton in Northamptonshire, the River Cherwell flows southward into Oxfordshire through a rural landscape of farms and small villages, until it joins the River Thames near Iffley Fields in Oxford. The Cherwell is joined by a number of tributaries including the Byfield Brook, Ashby Brook, Highfurlong Brook, Farthinghoe Stream, King's Sutton Stream, Charlton Brook, Sor Brook, the River Swere, Ockley Brook and Deddington Brook. The largest tributary, the River Ray, joins the Cherwell at Islip from its headwaters at Quanton in Buckinghamshire. Shortly before the Thames confluence, the Bayswater Brook also flows into the Cherwell. In addition, the route of the Oxford Canal runs parallel to the Cherwell for much of its course, and for 1.5km between Enslow and Shipton-on-Cherwell the two watercourses occupy the same channel.

Rivers in the Cherwell Operational Catchment



The river and canal interact at various points by way of overflows and abstractions. The Cherwell Valley Railway line runs from Didcot to Banbury via Oxford, and then joins the Chiltern Main Line northwards to Coventry. It follows the course of the river, crossing it 11 times with a further 6 main river tributary crossings.

### Description:

The headwaters of the river rise in an area dominated by deep clays. Further south, the river flows for a short distance downstream of Tackley over the Inferior Oolite and Great Oolite limestones, with groundwater influence contributing to the base flow of the river, and several of the tributaries in the upper part of the catchment also rise from Cotswold limestone strata. As the Cherwell catchment is dominated by clays, 80% of the catchment is of very low permeability (meaning that the ground around the river struggles to hold any water within it) and so any rainfall that builds up on the land quickly saturates the soil and is conveyed to the river as direct runoff. That means that this river catchment responds

rapidly to rainfall events and is liable to flooding. The large quantity of agricultural land in the catchment, combined with the high volume of surface run-off, increases the risk of diffuse pollution (fine sediments, fertilisers and farm chemicals) entering the river.

### **Ecological Importance:**

The main stem of the Cherwell as well as many of its tributaries have been subject to considerable deepening and/or widening, as has often been the case for rivers on clay catchments. This has resulted in many sections of the river not exhibiting the range of natural channel features which would have existed with a particular loss of shallow gravel-bedded sections of watercourse. Such 're-sectioning' of rivers does not prevent flooding but does facilitate drainage of the surrounding floodplain with loss of wetland habitats. The Upper Cherwell has a particularly important stretch of the river floodplain, supporting areas of floodplain grazing marsh. There are several more biodiverse areas, particularly between Somerton and Clifton. There are also high quality lowland meadows many of which were formerly grazing marsh before changes to the river and field drainage systems. The River Cherwell supports relatively diverse fish populations, mainly coarse fish but with trout in some of the better sections of the headwaters. Otters are active throughout the valley. Several 'priority' bird species are found including curlew and lapwing on the grazing marsh although these continue to decline. Additionally tree sparrow, reed bunting, skylark, grey partridge, yellow wagtail, yellowhammer and bullfinch are present. Bestmoor SSSI holds a high proportion of the UK population of narrow-leaved water dropwort.

The Lower Cherwell includes small patches of fen, swamp and reedbed at locations including Enslow Marsh, Northbrook Marsh and around Kidlington. Lowland meadow is also found here at Rushy Meads SSSI.

The Oxford Canal is intimately connected to the river and offers more wetland habitat, some of which is protected to some extent by being between the two watercourses. The canal is important for a surviving population of water voles.

### **Challenges and Opportunities:**

Like other clay dominated catchments in the county, the Cherwell and tributaries would benefit significantly from steps to re-naturalise channel profiles and floodplain connection, and to slow the flow using natural materials such as large woody debris. These floodplains would once have supported large areas of species rich floodplain hay meadows, which would store floodwater during periods of heavy flow to the benefits of urban areas downstream. As we learn more about the benefits of changing agricultural practices in the floodplain and on the valley sides on such impermeable soils, the options available to farm managers and landowners should grow.

The [Cherwell and Ray catchment partnership](#) is hosted by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) and Thames21, a local Rivers Trust and contains members from organisations, local parish councils, district councils, government bodies, and local people and organisations who own and manage land. In this catchment, diffuse pollution, sediment from agricultural run-off, and pollution from waste water treatment

works are priority issues to tackle alongside restoring the profile and structure of the river bank and channels which have previously been heavily modified. In the upper Cherwell, natural low flows (exacerbated by over-engineered river channels) and invasive non-native species, such as the American signal crayfish, are also significant issues that need addressing. There are also a number of barriers to fish passage in this catchment, a few of which have been provisioned with fish passes; there is a developing plan to provide fish passage at the lowermost barrier on the Cherwell working with Oxford University, which will provide connectivity with the Thames for fish for the first time in several generations.

**More information about this catchment can be found here:** [Cherwell Operational Catchment | Catchment Data Explorer](#) and you can view the Cherwell and Ray Catchment Partnership and Action Plan [here](#).

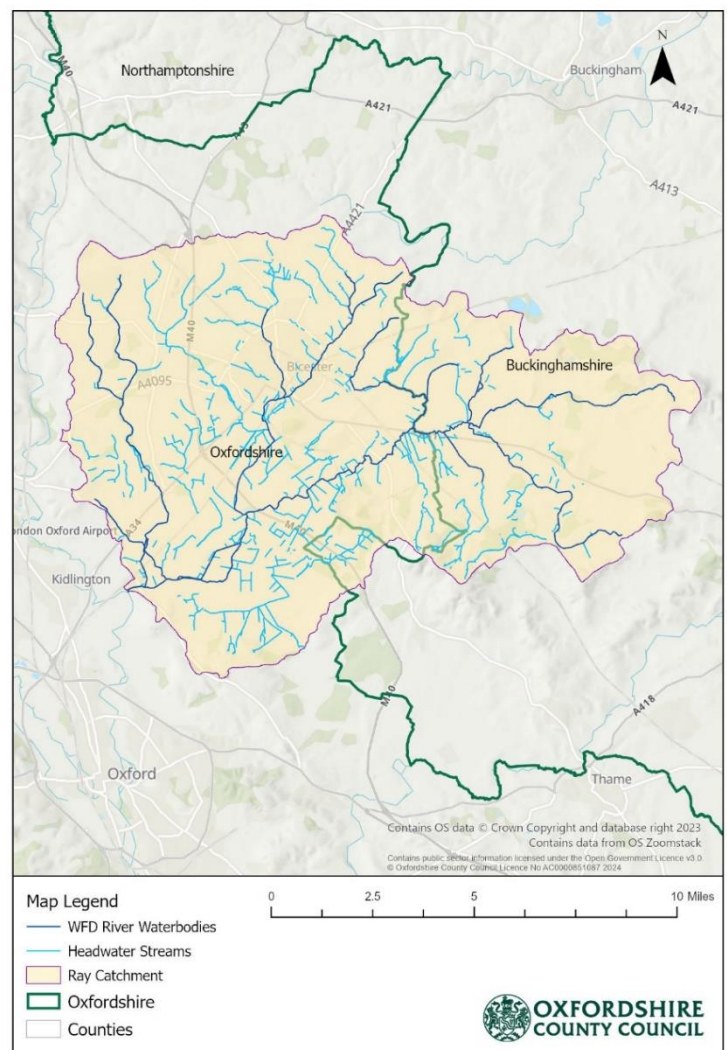
## River Ray – the Ray is tributary of the Cherwell (above)

### Introduction:

The River Ray rises in Buckinghamshire on the east of Quainton Hill in a landscape of mixed farming and ancient woodlands. It flows west, soon reaching the first of two main floodplains where it is joined by tributaries including Tetchwick Brook and Gubbinshole Ditch. Here there are surviving species-rich meadows and a long-standing BBOWT landscape project to acquire and restore meadows and grazing marsh. Further west, the river passes through a narrowing of the valley at Blackthorn before entering the Otmoor Basin, the site of a Medieval marshland, which despite various historic drainage schemes still contains some of the most valuable floodplain wetland habitats in the whole of the upper Thames. The Ray continues to flow westwards to join the Cherwell at Islip.

### Description:

Rivers in the Ray Operational Catchment



The alluvial floodplain of the River Ray extends eastward from Islip, joined by a number of small tributary streams, and reaches into Buckinghamshire. The catchment is largely underlain by clay which results in relatively rapid discharge of rainfall off the land to the watercourses. The river has one of the lowest gradients of any sub-catchment in the UK, which combined with the flashy clay nature increases its propensity for extensive and prolonged flooding. There is also a band of cornbrash (a thin layer of rubbly limestone) which connects groundwater to the river via several of the small tributaries. There are significant areas of wet grassland, lowland meadow, much of it with large areas of surviving ridge and furrow. These habitats survive despite parts of the Ray having been subject to often extensive engineering to try to facilitate land drainage in a naturally flood-prone catchment; some reaches of the river were historically widened and deepened to many times their original dimension, with attendant loss of natural features and connectivity with the floodplain.

### **Ecological Importance:**

Lowland Meadow and floodplain wet grassland are the key habitats in this area. They are found in a number of SSSIs and Local Wildlife Sites. North-west of Blackthorn Hill there is a larger group of meadows which are largely on the Oxford Clay. Remnants of this habitat are found elsewhere especially between Bicester and Blackthorn Hill and in some meadows in Buckinghamshire including BBOWT's Upper Ray Meadows complex. Wet Grassland/Floodplain Grazing Marsh is found in meadows along with lowland meadow habitat with remnants elsewhere. Parts of the BBOWT Upper Ray Reserves have been restored to floodplain grazing marsh.

Otmoor is now one of the largest inland wetland complexes in the country, providing a vital link between the major wetlands of Somerset and the Fens. It is especially important for breeding waders such as lapwing, redshank, curlew and snipe but also provides habitat for thousands of wintering birds and much other wildlife all year round. Important plant species at Otmoor include fen violet, greater bladderwort and water-violet. Otmoor SSSI provided the main refuge for many of these species until the area of high-quality habitat was considerably extended by the RSPB's purchase of parts of the Otmoor basin from the late 1990s, leading to the development of what is now a 485 Ha nature reserve which includes the largest reedbed in Oxfordshire. Unlike Otmoor SSSI, the RSPB reserve is less connected to natural floodplain processes because the reserve is largely on land which was previously banded and pump-drained for arable production.

The whole area is important for rich and well-structured hedgerows with brown and black hairstreak butterflies. Ponds are an important wetland habitat. Other Species: true fox sedge is found in a number of sites in this catchment.

### **Challenges and Opportunities:**

The mix of pollution sources is similar to the main Cherwell catchment, with farming sources of diffuse nutrient and chemical pollution prevalent in the upper reaches and sewage treatment works notably at Grendon Underwood, Marsh Gibbon and the largest, Bicester



works. The low gradient and natural low summer flows of the Ray presents particular challenges with respect to the ability of the river to cope with nutrient enrichment, and the efficiency of sewage treatment processes and the reduction in agricultural inputs are critical to allowing the river to meet its ecological potential.

Although parts of the main river channel are well buffered by low-intensity and wildlife-rich habitats, there are still opportunities to work with farmers to revert arable land in the floodplain to grassland or other habitats which will be more sustainable land-uses in the light of climate change, and allow better connectivity with existing high quality habitats. Restoring the river channel to more natural characteristics will be a particular challenge but could be essential for realising better ecological quality of the river as well as facilitating floodplain habitat restoration.

**More information about this catchment can be found here:**

<https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3350> and you can view the Cherwell and Ray Catchment Partnership and Action Plan [here](#).

## River Ock

### Introduction:

The Ock catchment covers an area of 234km<sup>2</sup> and the main channel of the River Ock itself is 37km in length. From its start, at headsprings at Little Coxwell, the River Ock meanders through open semi-natural landscapes of the Vale of White Horse in Oxfordshire, before joining the River Thames at Abingdon. The Ock catchment is predominantly underlain by clay, but is bordered to the north by the limestone and sandstone of the Midvale Ridge which form a small escarpment, and to the south by chalk which forms an upland ridge (traversed by the Ridgeway) which rises to a maximum of 240m at White Horse Hill. There are many small to medium-sized tributaries which join the Ock along its length.

### Description:

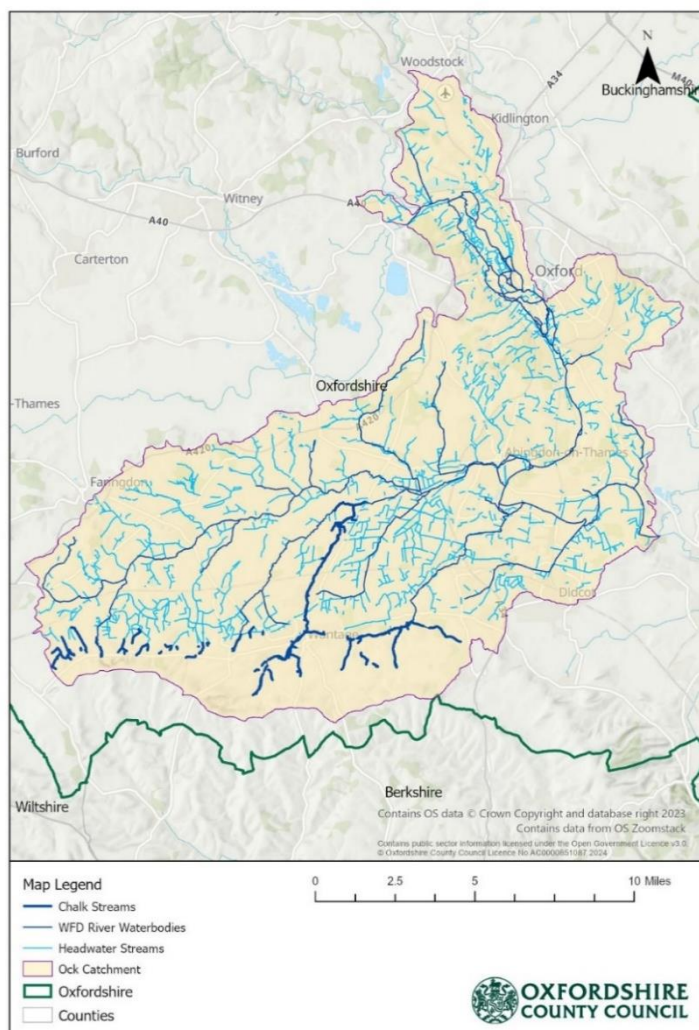
The predominant characteristic of this catchment is that it has been adversely affected by past river engineering works, particularly those parts which flow over clay bedrock. During the early 1960s major improvement works were carried out on the Ock for agricultural purposes. The works, largely involving dredging, aimed to contain a 1 in 10 year flood event within the channel. In the mid 1970s to early 1980s flood alleviation works were carried out to protect urban property adjacent to the River Ock in Abingdon. The scheme was designed to give flood relief for up to a 1 in 25 year flood. This has resulted in a generally highly modified channel, particularly on the main stem of the river and many of the tributaries.

Some of the tributaries have in part been less heavily impacted by engineering works, although the main chalk stream tributary, the Letcombe Brook, has not escaped this modification and has also been subject to milling with associated impoundments and barriers to fish passage.

### Ecological Importance:

The catchment falls partly within the North Wessex Downs National Landscape, notably in the Wantage area where the Letcombe Brook rises at the foot of the chalk escarpment.

## Rivers in the Ock Operational Catchment



There are relatively few SSSIs in this catchment, largely found on the higher ground on valley sides on the more calcareous geology, including Cothill Fen SAC/SSSI and Dry Sandford Pit SSSI, which are the only locations in the Thames catchment where the Southern Damselfly can be found. Cothill is one of the most important lowland fen sites in the country and is dependent on the groundwater springs which feed the Sandford Brook tributary to the Ock.

Water vole populations have recovered significantly in the Letcombe Brook in the last 10 years. Until recently there was a substantial white clawed crayfish population but all indications are that this has been lost, at least in part due to the presence of American signal crayfish, and it is unlikely that populations of white clawed crayfish remain in the catchment. Otter activity is found throughout the catchment. There are brown trout in a number of tributaries, and generally diverse fish populations in the lower Ock, but throughout fish and invertebrate populations show mixed fortunes.

### **Challenges and Opportunities:**

There are seven main tributaries of the Ock, and in their upper reaches many have also been managed for agricultural land drainage purposes, and some are little more than field drains in narrow entrenched channels in their upper reaches, the majority of which do not flow all year round. As a result of the engineering works made to this catchment much of the river and riparian habitat has been degraded, offering reduced habitat diversity; this in part explains the lack of SSSI and low number of local wildlife sites in most of the river valley corridor and floodplain. Natural recovery is slow and there is a great deal of scope for channel and riparian habitat enhancement.

The Letcombe Brook, the main substantial chalk stream tributary, flows through disused watercress beds and enters the Letcombe Valley Nature Reserve approximately 1km downstream, which is managed by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT). Downstream of the reserve, the watercourse flows for a further 11km through Letcombe Regis, Wantage and Grove before confluencing (joining together) with the Childrey Brook, to the north of East Hanney. The Letcombe Brook remains a very good quality chalk stream in its upper lengths but by the time it flows into Wantage it loses much of its typical chalk stream character.

The Letcombe Brook has been heavily modified over many years by dredging, realignment and straightening, with numerous low weirs, bridges and mills being incorporated. It has also historically suffered from low flows due to abstraction from a local pumping station, which resulted in low groundwater levels and required augmentation (water pumped to the river from elsewhere in the chalk aquifer) by the Environment Agency to compensate for the impacts on river flows (this groundwater source is now an emergency supply only so flows in the Letcombe Brook are now near-natural). In light of these pressures, and the fact that the Letcombe Brook is an internationally rare chalk stream, the Letcombe Brook Project was set up in 2003. The project has already achieved environmental benefits for people and wildlife by improving the brook in partnership with local people, landowners, and the Environment Agency.

The Ock catchment continues to suffer from the effects of human activity and one of the main issues affecting the catchment is water pollution. The River Ock Catchment [Partnership](#), which is part of the Defra-supported Catchment-based approach (CaBA) and led by the Freshwater Habitats Trust, is working to protect and restore freshwater and wetland habitats, and to manage the catchment to reduce flooding and diffuse pollution.

The Ock and its clay dominated tributaries would benefit significantly from steps to restore its nature profile, and to reconnect it to its floodplain. These reconnected floodplains could support restored species rich floodplain meadows and a network of ponds and other wetlands. These options should be pursued as they provide multiple benefits to the wider catchment in terms of natural flood management, and water quality in addition to the more obvious biodiversity benefits. Other challenges include removing or bypassing barriers to fish passage – some good progress has been made at a few locations, including the lower Ock and Letcombe Brook, with more planned.

The planned new reservoir for Oxfordshire falls into the lower Ock catchment, mainly in the floodplains of two small tributaries on very low-lying land. This scheme is locally controversial (as would be expected for any large infrastructure scheme) but also has opportunities for significant wildlife habitat creation and access to greenspace, and will require careful planning and stewardship.

**More information about** this catchment can be found here: [Ock Operational Catchment | Catchment Data Explorer](#) You can see more information about the Ock Catchment Partnership [here](#) and view their [vision](#) for the Ock. There is also an [Ock Catchment Farmer Cluster](#) who are recovering the landscape whilst farming.

# River Thames

## Introduction:

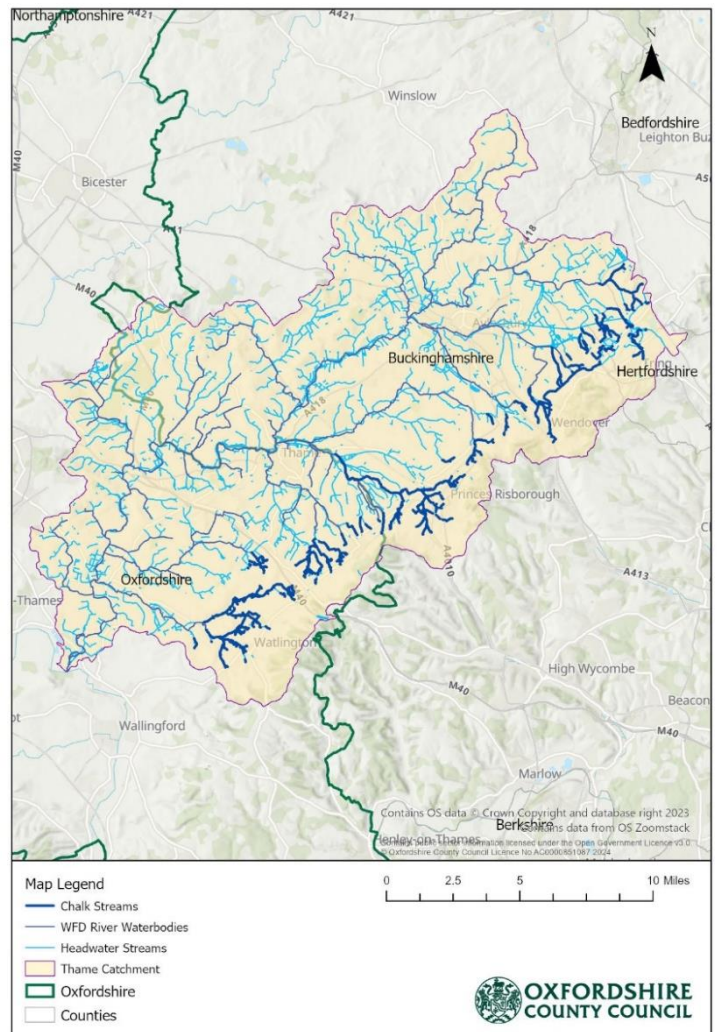
The Thames River rises (starts) east of Aylesbury in Buckinghamshire and the catchment covers 684km<sup>2</sup>. The Thames flows generally south-westward in a broad shallow floodplain and joins the River Thames in Dorchester. The river has a considerable number of tributaries draining the clay lowlands, but several of the Oxfordshire streams rise from below the Chilterns escarpment which are chalk streams for at least some of their length. Globally, chalk streams are a rare river type, and these streams are an important international asset supporting unique groups of aquatic species, although those in the Thames catchment are generally small streams compared to some of our more well-known chalk rivers.

## Description:

The River Thames and its clay dominated tributaries are relatively deep, low gradient, low energy, semi-natural lowland rivers that meander for much of their length. Despite this meandering nature, the River Thames and many of its tributaries have been subject to re-sectioning in the past, having been widened and/or deepened to reduce frequency of flooding and (perhaps more importantly) facilitate land drainage. However, a good proportion of the rural sections of some of the tributaries still exhibit characteristics of semi-natural streams with meandering reaches.

The upper part of the catchment area lies in Buckinghamshire and is more urban, with the Upper Thames and several of the tributaries flowing through the large town of Aylesbury, including the Bear, Wendover and Stoke Brooks, have been heavily modified as a result. The larger centres of population and some intensive areas of agriculture in the upper reaches of the Thames catchment influence the quality of the river as it flows into Oxfordshire. The Thames enters Oxfordshire just upstream of the town of Thame, where the county boundary follows one of its tributaries, the Scotsgrove Brook, for some of its length.

Rivers in the Thames Operational Catchment



The land around the river in its Oxfordshire reaches is mostly rural and agricultural, with permanent grassland in the floodplain which runs alongside the main river. Permanent grassland is the dominant land-use in some locations, although arable production can also be prevalent.

The floodplain of the Thames varies in width from less than one kilometre to several kilometres in places where tributaries (rivers and streams) join the main River Thames. However, it's likely that historic river engineering and modifications to the shape and depth has led to a very substantial reduction of floodplain wetland and other semi-natural habitats. Removing the access of river water to those areas reduced the wetland species present there and their habitats leaving only a few areas of biodiverse habitat surviving in the floodplain. There are a number of historic mills along the main Thames which, although many have been converted into residential homes, still retain weirs and associated structures. These are also present along some of the tributaries such as the Chalgrove Brook.

### **Ecological Importance:**

The extensive legacy of channel modifications has resulted in the main Thames and a number of tributaries exhibiting a somewhat poor diversity of natural channel forms. Although, as with all rivers, there has been some natural recovery from past interventions, and the Thames does have a reasonably diverse fish and invertebrate community. Brown trout, an indicator of better-quality gravel-bedded watercourses which are required for breeding and but are often removed with major dredging, are largely confined to a few of the tributaries such as the Chalgrove Brook and Horsenden Stream. Otters are present throughout the catchment, but water voles are considered currently absent – mink control is being stepped up to try to improve the fortunes for this species.

One feature of the catchment is the relative frequency of trees, shrubs and hedges lining many of the watercourses, providing important wildlife corridors even where the channel itself may not have a high ecological value. However, there is almost no substantive areas of woodland adjacent to the Thames except for small copses near Notley Abbey. The only areas of woodland of any size within the catchment are to the North West between Wheatley and Wooton Underwood. The catchment area is home to one of Britain's rarest native trees, the Black Poplar, with over half the national population in the Aylesbury Vale.

### **Challenges and Opportunities:**

The Thames suffers from high phosphate concentrations and is at a high risk of both diffuse and point source pollution. There are 31 major sewage treatment works in the catchment and, because of the extensive development that is happening in the area, these are being placed under increasing pressure.

The River Thames and its clay dominated tributaries have been heavily impacted by channel modifications driven by land drainage. There have been some small-scale schemes to improve river habitat over the years but further work to undo the significant impact of past river engineering is required for the river to be able to meet its ecological objectives. Steps to reconnect the rivers to their floodplain by changing channel profiles by using gravel for raising the bed, increasing the roughness by installing large woody debris, removing of embankments, and creating backwaters are all measures which can be suitable.

In the grazing lands in this area there is significant potential to achieve high quality soil health with diverse flowering species and fungi using livestock to help with this. Whilst improving biodiversity, these actions would also help to both store carbon and help the landscape store more water to mitigate flooding and droughts. Many of the species rich hay meadows and associated floodplain wetlands have been lost to agricultural improvement. Steps to restore these would provide multiple benefits such as natural flood management, as well as biodiversity improvements.

The chalk streams of the Chiltern escarpments are a national priority. These streams are particularly sensitive to changes in the nutrient and fine sediment regime, so assessing and reducing the impacts of point and agricultural sources is important. Historic modifications – culverts, weirs, channel modifications – have all caused a decline in the ecological quality of these stream. Steps should be taken to naturalise these channels, to remove structures, to encourage the return of natural sediment processes, and to add diversity of form and flow by using large woody debris.

The [Thame Catchment Partnership](#) is working to achieve its vision of a catchment full of thriving and functioning freshwater bodies, protected and monitored by an engaged group of partners, funders and local people.

**More information about this catchment can be found here:** [Thame Operational Catchment | Catchment Data Explorer](#)



## 6. Pressures on Oxfordshire's biodiversity and habitats



## 6. Pressures on Oxfordshire's environment and wildlife

### What is a 'pressure'?

In the context of the Local Nature Recovery Strategy (LNRS), a 'pressure' is considered to be something that puts Oxfordshire's biodiversity (animals, plants, fungi, and soil microorganisms) at significant risk of long-term harm (for example, something that may hinder or prevent a species or type of habitat from being able to survive). In other words, the pressures listed below are listed because they may cause damage to our nature and wildlife.

**Insufficient resource and support for nature recovery:** A key pressure is the lack of investment in the enablers of nature recovery. Delivery of the actions needed won't be possible without financial investment, trained and willing people, and resources and equipment suitable to improve and create habitats.

**Pollution:** Pollution from various sources, including industry, transportation, wastewater, sewage, and household activities, contaminates soil and water, impacting the health and diversity of fungi, soil microbes, and associated wildlife. Whilst the LNRS cannot change the levels of pollution entering the environment, reducing pollution entering our environment was a clear and frequent request from people and organisations across the county.

**Urbanization and Infrastructure Development:** Oxfordshire's Biodiversity Action Plan describes that this county's growing population and urban expansion could lead to habitat loss and fragmentation, disrupting ecosystems and endangering wildlife. However, if carefully considered, improvements to development design and delivery could improve the presence of biodiversity alongside people and wildlife corridors or areas of nature could enable wildlife to move through our landscape unhindered. Urban expansion is a particular concern for Oxfordshire. Oxfordshire's Strategic Plan 2022 to 2025 tells us that the county's population grew by 71,500 people (an increase of 10.9%) since 2011. Meanwhile England's growth rate overall was 6.6%. Oxfordshire needs to carefully consider how to safeguard wildlife, nature, and people in the lead up to 2030 where this county's resident population is predicted to expand from the current 725,000 to 853,000. Housing has been added to Oxfordshire at a rapid rate of 3,154 houses per year in the years between 2011 - 2020 ([Pathways to a zero carbon Oxfordshire](#), p29). Future developments could, unless carefully managed, further fragment habitats in the county, reducing the ability of species to move across the county.

**Recreational pressure:** Oxfordshire has 50-109km<sup>2</sup> of publicly accessible greenspace, but the majority of greenspace (>700km<sup>2</sup>) is not publicly accessible (Oxfordshire's green space deprived neighbourhoods, Martha Crockatt 2024). The county also does not yet have any accessible sites of 500 hectares or more within 10km of residents (under ANGST criteria) (An Analysis of Accessible Green Space Provision in Oxfordshire May 2017, TVERC). In light of Oxfordshire's growing population, those areas which do provide accessible green space are likely to experience increasing numbers of people and pets, and where increased levels of disturbance coincide with particularly sensitive habitats or species this, biodiversity can become reduced in those areas and certain sensitive species could be lost. The LNRS is not a strategy that has powers to influence public access on sites but, by achieving LNRS priorities to create more habitats

across the county which are bigger, better, and more joined up, there could be more space for people, for nature, and for biodiversity.

**Air quality:** In Oxfordshire there have been significant improvements in air quality in recent decades, primarily due to reductions in coal burning (Director of Health Annual Report 2023/24), with reductions in nitrogen dioxides, and particulate matter between 2010 and 2021, however ammonia emissions have remained largely the same. Ammonia and Nitrogen Dioxide pollution result in increased nitrogen deposition which can affect many sensitive habitats and species who cannot tolerate raised levels of pollution. High risk areas for nitrogen deposition include habitats close to urban areas and major roads, combustion plants and intensive livestock units (apis.co.uk)

**Agricultural Intensification:** Intensive, conventional farming practices, such as the heavy use of pesticides and fertilizers, degrade soil quality, reduce biodiversity, and harm fungi which, alongside soil microorganisms are crucial for nutrient cycling within habitats to create functioning ecosystems [Source: Oxfordshire County Council Agriculture Strategy]. Since more than 70% of Oxfordshire's land is farmed to produce food, there is a great area of opportunity within this county to offer more space for nature across the county if farmers can be supported to build nature into their businesses. Many farmers in the county are already taking action to increase tree cover, change their cultivation practices, use cover crops and leys, and offer more areas of their land to support biodiversity. But unless those farmers are supported financially to continue to be able to do this, we risk losing those positive steps (and public services) that they are delivering. Farmers, who manage their land to support nature whilst producing food, offer very real opportunities to tackle the biodiversity crisis to create a more resilient network of nature throughout Oxfordshire.

**Changing weather patterns – climate change:** Climate change is expected to result in significant changes to average temperatures and weather patterns in Oxfordshire and data from the University of Oxford Radcliffe Observatory data shows that maximum temperatures in Oxford are increasing at a much faster rate than average temperature increases in the 1800s. The changes to Oxfordshire's climate are likely to be of sufficient magnitude that many species will find themselves in environmental conditions that are sub-optimal for their survival or success. The UK is predicted to experience warmer, wetter winters and hotter, drier summers. The rising temperatures, changing rain patterns, and increased extreme weather events pose threats to Oxfordshire's ecosystems and wildlife [Source: Oxfordshire Climate Change Risk Assessment]. Changes to weather patterns is expected to be a catalyst that pushes many species to need to move from their current locations into new cooler, drier, more sheltered areas. To survive, they will either need to be able to endure sub-optimal conditions in the absence of competition from better adapted species, have the genetic capacity to adapt to the new conditions, or many species may need to move and migrate in order to find new locations with suitable environmental conditions. Previously the conditions had enabled them to survive but with changing weather patterns which cannot be so easily predicted, it is expected that this will harm the survival chances of many species and ecosystems. Weather events that could threaten species and ecosystems include drought, floods, storms, and an overall change in temperature and weather patterns.

For example, wetland specialist plants or birds who can only tolerate certain, consistent levels of water would be threatened by changes to seasonal rainfall patterns. Warmer, wetter winters may stop species from being able to hibernate and may lead to conditions that allow existing, or new, pests and diseases

to be able to survive in the county over winter which could offer new threats to the survival of species in the county. More frequent flooding will increase the risk of pollution run-off and sewage releases.

Creating new habitats and improving existing habitats to create a larger network for nature which is bigger, better, and more joined up offers opportunities to tackle climate change since all habitats can sequester great amounts of carbon whilst also benefitting biodiversity at a landscape scale. Delivering the LNRS priorities offers a chance to improve nature now, and create a network that could be more resilient to future climates, but if we do not act now to improve what we do have, we risk losing many species and habitats.

**Pests and disease:** Diseases and pests change over time and currently we are experiencing significant impact on wildlife as a result of disease and pest damage. It is expected that a warmer average temperatures and wetter environments could increase the prevalence of pests and disease even further in the UK. In recent decades the UK has lost around 30 million Elm trees due to Dutch Elm Disease. The Elm used to be one of the common English tree species (alongside Ash and Oak). Now Ash faces a current threat of extinction from Ash Dieback, a relatively new disease to the UK. Around 90% of Ash trees are expected to be lost, however research into this continues. These are just two examples of many further pests and diseases which may increase the vulnerability of Oxfordshire's species and habitats. Because of the increasing prevalence of pests and disease, it is more important than ever that we become ambitious in our attempts to facilitate nature to adapt and build resilience by increasing habitat area, improving management, and connecting habitats to each other.

**Invasive Species:** The introduction of non-native species threatens native flora and fauna and disrupts ecological balances [Source: Great Britain Invasive Species Strategy]. In Oxfordshire, we already have species which have been pushed to the brink of survival as a result of non-native species being introduced to the environment [Source: Oxfordshire Biodiversity Action Plan]. At the time of writing, there are a number of these invasive and non native species present in Oxfordshire including American Signal Crayfish, American Mink, Himalayan Balsam, grey squirrels, deer, and rabbits. Not all non-native species carry the same risks or threats to biodiversity but many can exterminate local populations of species of damage habitats. These risks should be expected to change over time, especially as weather patterns change and local actions will need to adapt in response to these threats

## **Additional pressures on Oxfordshire's rivers and waterways**

**Water Extraction and Abstraction:** the high demand for water resources for conventional agriculture, industry, and domestic use leads to excessive extraction and abstraction from rivers and waterways, resulting in reduced water levels, altered flow patterns, and habitat degradation for aquatic organisms. [Source: Oxfordshire Water Resources Management Plan]

**Pollution:** Pollution from various sources, including agricultural runoff, urban runoff, and sewage discharges, contaminates our water bodies with nutrients, chemicals, and pathogens, degrading water quality and threatening aquatic ecosystems and biodiversity.

[Source: Oxfordshire Water Quality Management Plan] Across the county rivers will be expected to take on the increased wastewater from any new housing developments and this should be carefully considered around areas that are already taxed or in areas upstream of those which are already liable to flooding. Within the Thames there are 31 major sewage treatment works in the catchment area and the increasing need for extensive development for new homes is placing increased pressure on these sewage works. Opportunity for more investment into the improved management of sewage is expected to have positive benefit for biodiversity and for the health of rivers and freshwater habitats. Whilst the LNRS cannot directly change sewage pollution or treatment works, the LNRS has focused on how to help freshwater habitats by identifying opportunities for targeted habitat creation and improvement work.

**Habitat Degradation:** Alterations to river channels, such as dredging, embankments, and floodplain encroachment, disrupt natural processes, diminish habitat diversity, and impede the movement of aquatic species, exacerbating the degradation of rivers and waterways. [Source: Oxfordshire Rivers Restoration Strategy]

### Summary on pressures

Addressing all the above pressures cannot be done through one strategy or one organisation alone. Reducing these pressures requires collaborative efforts among policymakers, researchers, conservation organisations, and local communities to implement sustainable land management practices, sustainable water resource management, habitat restoration initiatives, invasive species management strategies, and to mitigate the impacts of climate change. Steps now towards relieving the pressures on biodiversity could safeguard nature in Oxfordshire to create large, functioning and healthy ecosystems to pass on for generations to come.

## What you can do now

It was clear throughout the process of creating the LNRS that people are excited and motivated to help biodiversity and nature to recover. When our survey asked 650 people whether they would like to do more to increase nature in Oxfordshire 97% (626 people) either agreed or are already doing the most that they can. You can see a further breakdown of responses to our survey on the LNRS webpage.

The LNRS is on its way and we'd love to hear your thoughts on the drafted documents, but that's not the only thing that you can do.

If you would like to tell us your thoughts about this draft Local Nature Recovery Strategy (LNRS) for Oxfordshire you can find all the relevant documents and map information on our consultation website [here](#). We will be collecting responses and using these to make changes to this draft before we release the final version in 2025. The LNRS has four key elements which are this document, the draft Statement of Biodiversity Priorities, draft Species Priorities List, and the draft Local Habitat Map.

If you would like to help to take other actions to help nature or if you want to help before this LNRS is published, there are lots of local opportunities available with organisations and groups across Oxfordshire. See the 'How to help nature now' section on Oxfordshire's LNRS [webpage](#) to see what you could do now with LNRS partner organisations like BBOWT, Wild Oxfordshire, CAG Oxfordshire, the NFU, and more. This should help you find relevant resources to take nature-positive actions whether you're an individual, community group, parish council, farmer, or business.

**Together, people and organisations can recover biodiversity in Oxfordshire.**



# Appendices

**Appendix 1** - A table showing the amount of Oxfordshire which is made up by each National Character Area (NCA). The total area of Oxfordshire is 260,595.24 hectares.

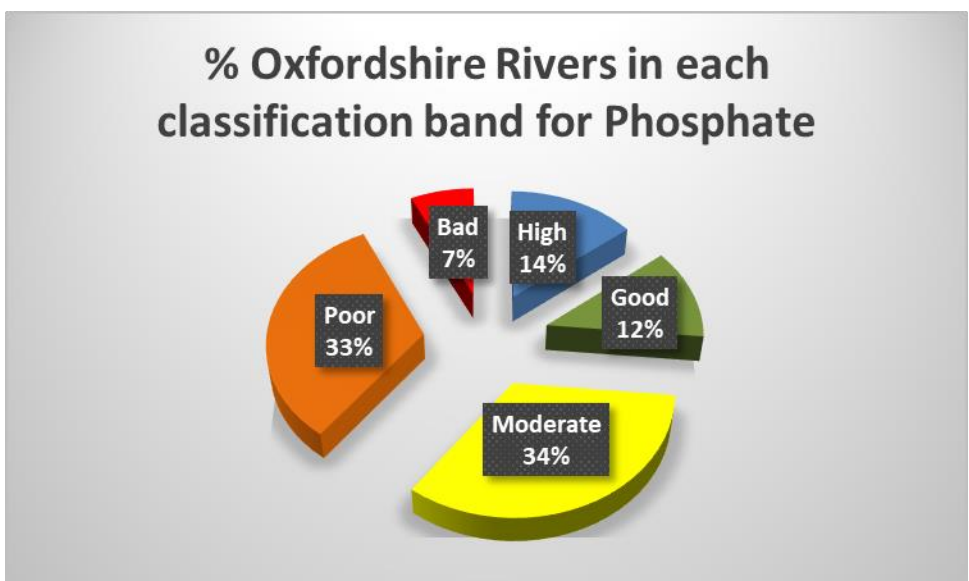
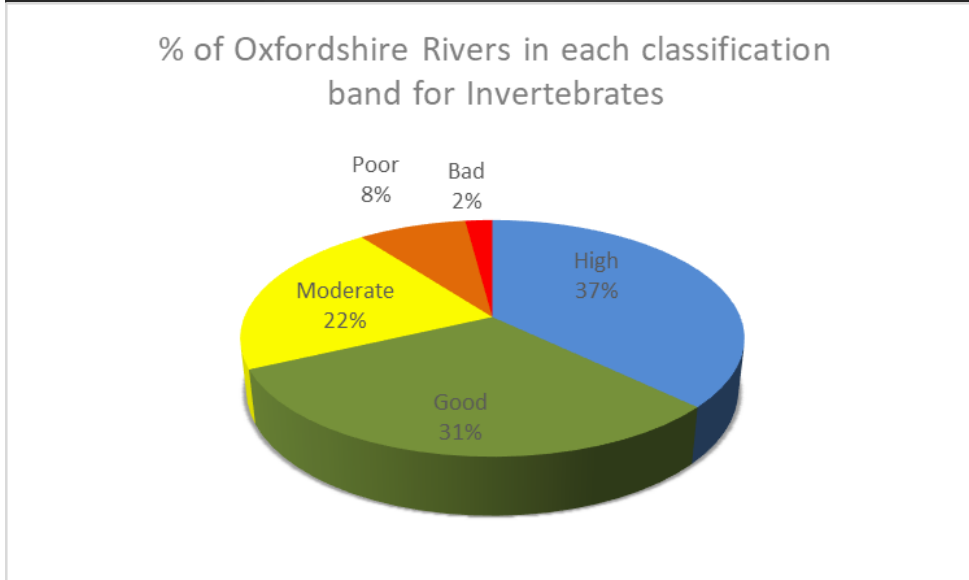
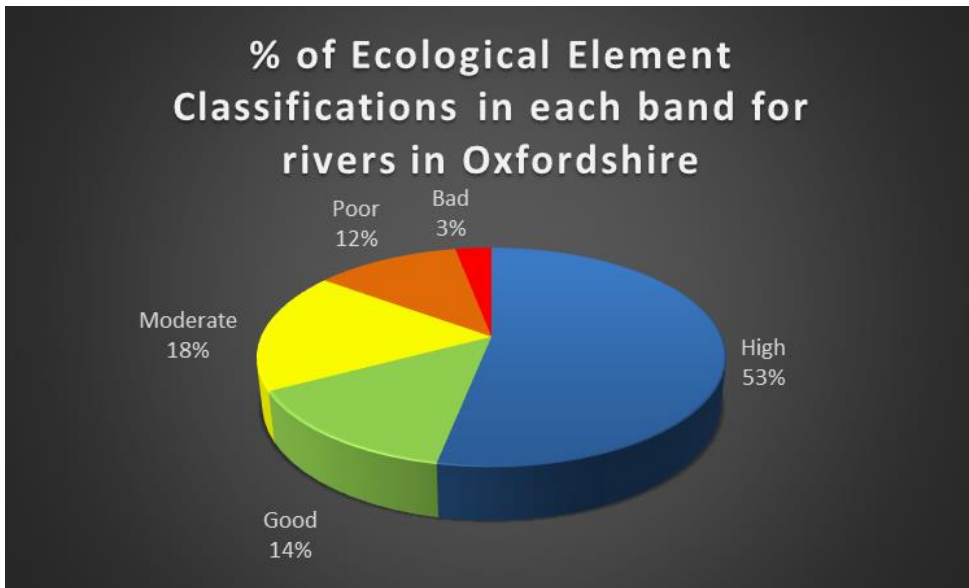
NCA Name	JCA CODE	Area of NCA (total) (sqkm)	Area of NCA (Oxfordshire) (sqkm)	Area of NCA (Oxfordshire) (ha)	Proportion of Oxfordshire's Area	NCA % in Oxfordshire
Bedfordshire and Cambridgeshire Claylands	88	2,606.00	29.70	2,970.41	0.011398502	<b>1.14%</b>
Northamptonshire Uplands	95	1,011.00	112.33	11,233.04	0.043105157	<b>4.31%</b>
Cotswolds	107	2,882.00	739.96	73,996.41	0.283950418	<b>28.40%</b>
Upper Thames Clay Vales	108	1,890.00	1,073.33	107,332.78	0.411873881	<b>41.19%</b>
Midvale Ridge	109	445.00	232.49	23,249.13	0.089215148	<b>8.92%</b>
Chilterns	110	1,641.00	260.61	26,060.50	0.100003368	<b>10.00%</b>
Thames Valley	115	861.00	1.65	165.17	0.000633833	<b>0.06%</b>
Berkshire and Marlborough Downs	116	1,110.00	155.89	15,588.79	0.059819692	<b>5.98%</b>
<b>Oxfordshire Area (ha)</b>						
<b>260,596.24</b>						

## **Appendix 2** - additional detail on River condition classifications and the Water Framework Directive status for individual elements

Looking at individual elements can give a different level of understanding of the quality of the waterbodies. For instance, using 2019 data (which is when the most recent, most comprehensive dataset was available for a full classification) 68% of waterbodies in Oxfordshire with invertebrate data were at high or good status and 91% were classified at high quality status for their levels of ammonia. Overall, 67% of all the element scores for Oxfordshire waterbodies were at good or high status. The small number of waterbodies with at least good status for phosphates, macrophytes and fish has generally driven the overall low scores.

The figures below show the percentage of all the elements in the county which met the different WFD classifications in 2019 (the most recent comprehensive assessment), with the

two figures below showing how the distribution of status classification varies between elements, with the examples of invertebrates and phosphate.



**END.**