



Gloucestershire
Wildlife Trust

Research Project Portfolio

Using research to inform conservation & management

Academic year 2026-2027

Partners with:



**Conservation
Evidence**

Providing Evidence to Improve Practice

About us

Gloucestershire Wildlife Trust (GWT) is the largest conservation charity in the county of Gloucestershire. We manage 60 nature reserves covering over 2,000 acres in addition to identifying key sites of nature importance. Our aim is to secure a natural environment which the people of Gloucestershire and visitors to the area can enjoy for generations to come. We aim to connect and improve Gloucestershire's wildlife and wild places as well as urban areas. We have a local membership of over 26,500 people and work with 500 regular volunteers who give their time to support the Trust's work.



Our research portfolio

As a trust we are striving to make more of our management decisions based on solid scientific evidence. In an absence of evidence, we aim to document our management interventions and the resulting changes in a scientific manner, building a body of research. The research work of students and interns is vital for our collection of data. Many of the reports and papers produced will feed into our management plans for species, reserves and habitats across the county.

This portfolio contains a one-page summary of the more developed projects we currently have available with a brief description of work that will be undertaken and skills required, as well as gained. Additionally we have added a list of potential research areas or data processing that could be developed into projects.

For more information

Email info@gloucestershirowildlifetrust.co.uk, marked FAO Head of Evidence

HABITAT RESTORATION

How does the soil community of historic heathland sites compare with heathland restoration site?

University supervisor: Any

Skills required: Data collation and review, GIS mapping

Project summary

GWT have 6 heathland/grassland restoration nature reserves across the Forest of Dean district. Some of which have consistently been acid grassland/heathland and some of which are being restored from clearfelled forestry. Within some of the larger reserves, there are also compartments that were felled at different times so a timeline of restoration stages is available. Other heathlands and restoration sites in other counties could be used for additional comparison.

While the above ground vegetation changes are easy to see, we do not know the status of the soil community (fungi, bacteria and invertebrates). In meadow soils, disturbance such as ploughing or nutrient inputs impact the structure of the soil community resulting in higher bacterial to fungal ratios and different fungal species are found. Do we see a similar response in heathland soils, how long does it take for the soil community to stabilize. Are the soil communities of the historic and restoration heathlands the same or are the restoration soil communities lacking elements or showing the impacts of recent disturbance, e.g. a higher bacterial to fungal ratio.

Disturbance is also a long term management technique on heathlands to arrest the succession of vegetation, but would some of the more extreme resets such as scraping areas of soil, be negative to the restoration effort due to the impact on the soil community?

Main questions:

Are the soil communities of the historic and restoration heathlands the same?

How long does it take the soil community to stabilise on restoration sites?

Are we missing species on restoration sites compared with long established historic sites?

Skills gained

GIS, handling of large data sets, accessing open data services, soil eDNA analysis. The findings of the study will feed into real-life conservation management undertaken by Gloucestershire Wildlife Trust. We are able to provide some time with GWT reserve staff to learn about the reserve and the work undertaken.

Further reading

- Mitchell et.al., 2001, A study of the restoration of heathland on successional sites: changes in vegetation and soil chemical properties, Journal of Applied Ecology, Vol 36 pp770-783.
- Wilton-Jones G. & Ausden M., 2005, Restoring heathland by conifer plantation removal at The Lodge RSPB Reserve, Bedfordshire, England, Conservation Evidence Vol 2, pp70-71.
- Radujković, et. al., 2019, Initial soil community drives heathland fungal community trajectory over multiple years through altered plant–soil interactions, New Phytologist, Volume225, pp2140-2151.

BIRDS & INVERTEBRATES

Moth data interpretation: understanding the moth community at the Tidenham chase nature reserves, habitat preferences and how does that relate to nightjar feeding preferences.

University supervisor: Any (invertebrate knowledge desirable)

Skills required: population interpretation through Pantheon, GIS mapping

Project summary

Moth surveys (through light traps) have been carried out monthly since 2022 on our Tidenham nature reserves (Poor's Allotment, The Park and Ridley Bottom). The species, count, and weather detailed are recorded and provided to the trust, however, no interpretation has yet been carried out on this data. The moth communities will be influenced by the habitat management we carry out and could be a good indicator of habitat condition. Nightjar are also feed on moths as the main component of their diet, so the ability of the reserves to support nightjar is also of interest.

Main questions

Can Pantheon be used to classify the moth community into habitat preferences and can that be used to inform GWT management of the sites?

What component of the moth community is suitable food for nightjar and what are the habitat requirements for those moth species?

Skills gained

This project enables students to learn and practice moth ID skills, the use of Pantheon for moth community analysis and GIS. The findings of the study will feed into real-life conservation management undertaken by Gloucestershire Wildlife Trust. We are able to provide some time with GWT reserve staff to learn about the reserve and the work undertaken.

Further reading:

- <https://pantheon.brc.ac.uk/>
- Sierro et. al. 2001, Habitat use and foraging ecology of the nightjar (*Caprimulgus europaeus*) in the Swiss Alps: towards a conservation scheme, Biological Conservation, Volume 98, Issue 3, Pages 325-331,
- Mitchell et. al., 2022, Metabarcoding reveals selective dietary responses to environmental availability in the diet of a nocturnal, aerial insectivore, the European Nightjar (*Caprimulgus europaeus*), Ibis, Vol 164, pp 60-73.

INVERTEBRATES

Large blue butterfly expansion modelling

University supervisor: GIS/Spatial ecology focus

Skills required: GIS modelling

Project summary

The reintroduction of the large blue butterfly on GWT Cotswold reserves has been a great success, however the butterfly used to be much more widespread across the Cotswolds. The survival of the species is not just dependant on it's association with the ant and food plants. The recent run of climate extremes, either very wet and cold or dry and hot summers has demonstrated the need for a variety of sites with slopes on different aspects (i.e. north, south, east or west facing slopes) to ensure the survival of the population. Level of exposure to sun, and resultant soil temperature and moisture seem to impact success.

This project would create connectivity and habitat suitability modelling for large blue, incorporating data such as the ant and foodplant distribution, together with testing the suitability of sites with different aspects under different climate scenarios. Current blockers to connectivity, e.g. dense woodland should also be considered.

Main questions

Which locations within Gloucestershire are suitable for large blue expansion under different summer weather scenarios?

In terms of connectivity, working outwards from existing sites, what is the optimal network of sites for the large blue to expand into through natural colonisation?

Skills gained

GIS modelling, handling of large data sets, accessing open data services. The findings of the study could feed into landscape scale project work.

Further reading

- Rytteri et al, 2017, Can we predict the expansion rate of a translocated butterfly population based on a priori estimated movement rates? Biological Conservation, Vol 215, pp 189-2195
- Vasudev et al, 2015, From dispersal constraints to landscape connectivity: lessons from species distribution modeling, Ecogeography, Vol 38, pp967-978
- Thomas et al, 2011, The restoration of the large blue butterfly to the UK pp 9-14 <https://www.iucn-ctsg.org/wp-content/uploads/2017/12/rsg-book-2011.pdf#page=25>

Population distribution and trends of Wood Ant and Glow Worm in Gloucestershire

University supervisor: Any (statistical, or population analysis knowledge desirable)

Skills required: Data collation and manipulation large data sets, Statistical analysis, GIS mapping

Project summary

Anecdotally, populations of Wood Ant and Glow Worms, well known and easily observed invertebrates, appear to be becoming more isolated and less abundant Gloucestershire. Our concern is that although conservation practitioners are working to restore habitat, the ability of key invertebrates such as these, to find the restoration sites is limited due to poor habitat connectivity, or simply too small and isolated populations.

Site management may also impact these species but trends at individual sites also need to be compared to national trends to account for variables such as weather.

The Gloucestershire Centre for Environmental Records can supply local species data, while national data sets can be downloaded from the NBN Gateway.

One or more of the suggested species could be studied.

Main questions:

What is the abundance and distribution of these invertebrates across Gloucestershire and how isolated are the populations?

How do the population trends in Gloucestershire compare to national trends, and can any causes of decline be identified ?

What conservation interventions could increase the resilience of these populations?

Skills gained

This project enables students to learn and practice ID skills, the interrogation of national species and climatic databases and GIS. The findings of the study could feed into real-life conservation project design by Gloucestershire Wildlife Trust.

Further reading:

- <https://nbn.org.uk/the-national-biodiversity-network/archive-information/nbn-gateway/>
- Storck-Tonon *et al.* 2020, Habitat patch size and isolation drive the near-complete collapse of Amazonian dung beetle assemblages in a 30-year-old forest archipelago. *Biodivers Conserv* vol **29**, pp2419–2438 .
- Robinson and Stockan (Ed), 2016, Wood and ecology and Conservation, Cambridge University Press
- Stewart *et al* 2020, Artificial lighting impairs mate attraction in a nocturnal capital breeder, *J Exp Biol*, Vol 223 (19):

DESK BASED

Quality v. quantity of urban gardens: distinguishing the value of garden habitat through satellite imagery

University supervisor: GIS/Spatial ecology focus

Skills required: GIS & R proficiency

Project summary

This project aims to identify urban green spaces, particularly gardens, that are good and bad for wildlife. By putting gardens into categories based on their value to wildlife, this can reflect their permeability for the movement of wildlife. As a result, a better understanding of landscape connectivity can be achieved and feed into county and country-level connectivity mapping.

The study will sample gardens from urban areas across the county in towns including Gloucester, Stroud, Cheltenham & Coleford. This will allow a county-wide comparison but also comparison based on socioeconomic factors.

The data will primarily comprise NDVI/Spot/ Sentinel imagery (or a combination) and garden values can be compared with known habitat classifications. All of this data is available online.

This project could be undertaken by multiple students in a cluster, with a focus on different geographic areas or different socioeconomic factors.

Skills gained

This project will have a strong GIS focus and will improve processing and analytical skills in this field. The study and its findings will contribute to a real-life, long term study looking into the connectivity of habitats across the county. Findings will contribute to management and engagement strategies with the general public in relation to urban gardens. Where possible, students may be able to spend time with GWT staff to find out about the Nature Recovery Network and the work GWT is doing on landscape connectivity.

Further reading

- <https://gcerdata.com/naturalcapital/>
- Deng *et al.* 2019. Methodology to monitor urban expansion & green space... *Remote Sensing* **11**.
- Singh 2018. Urban green space availability in Bathinda City, India. *Environ Monit Assess* **190**.
- Mathieu *et al.* 2007. Mapping private gardens in urban areas using... *Landscape and Urban Planning* **81**.

OTHER QUESTIONS THAT COULD BE DEVELOPED INTO RESEARCH PROJECTS OR DATA PROJECTS

Duke of burgundy butterfly (food plant - primula) - assess population, modelling connectivity, habitat condition
Pearl bordered fritillary (food plant - violets) - assess population, modelling connectivity, habitat condition
Marsh frit (food plant – devil's bit scabious) - assess population, modelling connectivity, habitat condition
Reassessment of Gloucestershire distribution of plants added to red data list, of any species that depend on them and the condition of habitats that contain them.
Bird records data 1960s - 2000 look at changes over time - could use AI to help analyse. Ad hock recording data so statistics would need to take account of this. Some data consists of lots of repeat visits to sites year on year.
Testing the value of Bioacoustic monitoring on reserves 10 songmeter micros for birds and two bat ones available. Student would need to be able to analyse the data
AI research into how to get records from analogue sources.
Review habitat connectivity modelling. What updates have there been to connectivity methodologies since the Gloucestershire Nature Recovery Network Modelling was produced in 2019.
Where should we be planting trees to improve native woodland connectivity, use Gloucestershire NRN/LNRS, Forestry Commission places to plant trees data layer and other relevant data sources.
Examining moving climate envelopes for species. Which species within Gloucestershire will likely be tracking north out of the county and which to the south of us will be coming in due to climate change.
Why are young people not becoming interested in being species experts
Study of recreational pressures for planning, which greenspace or nature sites are people using and why, where does capacity exist and where is it missing?