



Surrey
Wildlife Trust

Research Prospectus

2022/23

Foreword



I am delighted to introduce this prospectus; highlighting the importance of continually identifying and implementing key areas of research which can support our decision making.

Surrey Wildlife Trust was established over 60 years ago and is a member of the Royal Society for Wildlife Trusts. One of our main objectives as a charity is for the benefit of the public through the advancement of science and natural heritage; to promote research in all branches of nature study and to publish the results.

This prospectus is a significant step forward in further meeting this mission objective and follows the publication of our research strategy naturally informed which was published in 2018.

We know that we are facing complex challenges with ongoing biodiversity and bio-abundance losses as well as the impact of climate change. We also know that the restoration of biodiversity through a range of nature-based solutions is essential to achieve targets such as 30% of land protected and managed for nature by 2030.

In Surrey we have been building our knowledge and evidence base through work such as the State of Surrey's Nature, also published in 2017. We know that over a third of species in Surrey are lost or in decline, mirroring the national picture. The role of research in guiding our work to halt and reverse this trend is vital.

Our strategic direction acknowledges that collaboration with a wide range of partners is essential, not only to implement but also to evaluate the interventions we make. This is where our relationships with academic partners and other specialist groups are so vital and this prospectus will encourage even more of these activities.

We look forward to working with you.

A handwritten signature in black ink that reads "S Chimbwandira". The signature is written in a cursive, flowing style.

Sarah Jane Chimbwandira
CEO, Surrey Wildlife Trust



Introduction

At Surrey Wildlife Trust, we are committed to finding the long-term solutions to ongoing biodiversity declines that nature so badly needs in our county.

Science is at the heart of our decision-making, and we strive to use sound scientific evidence to inform both our policy and our actions. Building this evidence-base is a continually iterative work-stream, ever growing with advancements in applied science and conservation experience. As part of our role to ensure we can contribute to this process, to inform both ourselves and others, we are keen to work with external partners to further understanding of the natural world.

There are six themes to this work:

1. Understanding the pressures on the natural world and how they impact both biodiversity and bio-abundance.
2. Understanding the causes for decline of key priority species in Surrey and establishing a course of action to reverse this.
3. Discovering better ways to manage and restore the natural environment to support biodiversity, bio-abundance and enhance habitat connectivity.
4. Understanding how new technology can be utilised for various applications across the field of nature conservation. For example, to capture monitoring information about the natural environment or as a tool to widen voluntary participation and accessibility.
5. Understanding how people benefit from and interact with the natural environment, from a variety of aspects including education, social, and health and wellbeing.
6. Understanding the economic and social value of natural assets (Natural Capital) within Surrey and how this can then provide the necessary evidence to influence local policy makers, to embed more sustainable practice within all forms of commerce, including the development sector.

Our commitment

We are committed to investing in successor generations of scientists and researchers, and ensuring they are involved in worthwhile and meaningful projects during their secondary and tertiary education. Through our research placements, we aim to provide vital experience in the sector for young people and help them develop new skills in real-world research, monitoring and conservation work. By working as part of The Wildlife Trusts national movement, there will be ample opportunity for networking to promote future employment prospects.

Contact and further information

The primary contact for research projects is ben.siggery@surreywt.org.uk, please contact him in the first instance to express interest.

This document will be updated on the Surrey Wildlife Trust website as projects are allocated, which will then be indicated by a "reserved" watermark.

Summaries of completed projects can be found at the end of the document.

Please check the current version at: surreywildlifetrust.org/research

Our work with universities

Surrey Wildlife Trust has been working with local universities for many years in different ways.

We are partnered with the School of Veterinary Medicine at the University of Surrey and have provided cattle and other livestock for their students to gain experience with farm animals. Additionally, Imperial College London has conducted annual visits to the Trust as part of the Environmental Management MSc course. They receive talks from various departments and partake in practical conservation experience. The University of Surrey's final year Biological Sciences BSc students joined us for a similar visit for the first time this year. We are also assisting examination of a PhD from the University of Surrey's Centre for Environment and Sustainability. We are beginning to build relationships with other universities including Royal Holloway and Kingston University.

Past Students



Rachel - MSc Environmental Technology, Imperial College London

I collaborated with the Surrey Wildlife Trust (SWT) on my postgraduate thesis during the summer of 2021. After listening to a lecture from SWT during my second term on the work that the Trust was conducting regarding connectivity, I reached out to and asked if they would consider supervising me, as I wanted to do a project on this too. They had previously worked with students on similar projects, so they were aware of the entire thesis process. SWT were incredibly quick to respond and supportive in helping me pick the direction I wanted to go, giving me freedom in doing so. I wanted to look at how collaboration between farmers could improve connectivity across landscapes. Through the support and the expertise from various members of staff, I was able to learn how to use new software programmes like GIS, which became integral to my project. As I was new to this software, I was able to ask for meetings at any point, which I found incredibly helpful as this project was done during the pandemic. Collaborating with the SWT also enabled me to learn from different members of the organisation, providing many contacts that I could interview to support and strengthen my work. It was a great experience being able to work with an organisation outside of an academic setting and I am incredibly thankful for the opportunity that SWT provided me.



Rocio – Doctoral Practitioner, University of Surrey

I am currently a PhD student at the program Practitioner Doctorate in Sustainability (Centre for the Environment and Sustainability, University of Surrey). The Surrey Wildlife Trust is an industry partner of this doctoral project, which focuses on urban development, biodiversity conservation and community wellbeing. The SWT has been critical for the completion of this project because working with them has allowed me to, firstly, tap into their expertise on multiple fields, such as ecological connectivity modelling, environmental and planning legislation, and community engagement. Secondly, I could access their extensive network of contacts, partners, and collaborators, which allowed me to identify some of the knowledge gaps addressed by this research project. Finally, working with dedicated, purpose-driven professionals in the field of nature conservation has inspired me to continue my career in the field of sustainable urban development and environmental conservation.

Theme 1

Applied Conservation Science

● Project 1.1: Evidencing the relationship between biodiversity and bio-abundance

Working with: Research & Monitoring Team

Field Season: N/A

The interdependence of healthy ecosystem function and maximised biodiversity is often assumed as a given but remains relatively poorly evidenced, at least for the purposes of confidence in practical environmental policy-making. Indeed, there is little agreement in how to monitor and quantify biodiversity change for the assessment of ecosystems and biodiversity for policy targets (Hill et al., 2016). In the absence of data on abundance, biodiversity serves largely as a proxy for bio-abundance, this being the more likely critical factor. Species richness, often used as the metric for biodiversity, tells us relatively little about important 'keystone' components driving ecosystems (Hillebrand et al., 2017). There has, in addition, been research which suggests that this assumed proxy may be incorrect for some groups of animals (Nimmo et al., 2011).

This question remains relevant globally as well as locally. Surrey-based research could therefore attempt to explore and provide evidence for this suggested correlation of biodiversity and bio-abundance using our county as a case study. As a very mixed and highly crowded county in terms of land-use and habitat, it would hopefully provide a useful exemplar for global urbanisation impacts in general.

The project is somewhat open in terms of methods, but it is expected to be a desk-based study in which available data would be utilised to analyse the relationship between biodiversity and bio-abundance by investigating historical records for species relative to their changing statuses. Data would be provided by ourselves in collaboration with the Surrey Biodiversity Information Centre.

Key references:

- Hill, S.L.L., Harfoot, M., Purvis, A., Purves, D.W., Collen, B., Newbold, T., Burgess, N.D. and Mace, G.M. (2016). Reconciling Biodiversity Indicators to Guide Understanding and Action. *Conservation Letters*, 9(6), pp.405–412.
- Hillebrand, H., Blasius, B., Borer, E.T., Chase, J.M., Downing, J.A., Eriksson, B.K., Filstrup, C.T., Harpole, W.S., Hodapp, D., Larsen, S., Lewandowska, A.M., Seabloom, E.W., Van de Waal, D.B. and Ryabov, A.B. (2017). Biodiversity change is uncoupled from species richness trends: Consequences for conservation and monitoring. *Journal of Applied Ecology*, 55(1), pp.169–184.
- Nimmo, D.G., James, S.G., Kelly, L.T., Watson, S.J. and Bennett, A.F. (2011). The decoupling of abundance and species richness in lizard communities. *Journal of Animal Ecology*, 80(3), pp.650–656.



● Project 1.2: Post-wildfire recovery of reptiles on lowland heaths

Working with: Land Management Team, SARG

Field Season: tbc

In recent years wildfires on lowland heathland have occurred with increasing frequency, related to higher temperatures and drought conditions associated with climate change. It is estimated that the number of days able to support serious wildfires in the south of England will climb from 20 per annum in 2020 to 111 by the 2080s (Arnell et al., 2021). These fires can be catastrophic for local wildlife populations, especially those with limited mobility such as reptiles. It is estimated that following a severe burn, sites can take up to 10 years to fully recover (Hobbs and Gimingham, 1984).

In Surrey numerous sites saw their most extensive ever fires in 2022, but most have seen large burns in previous years over the last decade including a burn of over 30 hectares at Chobham Common NNR in 2020 (Countryfile, 2020). Surrey's heathland sites are home to nationally important populations of the six native reptile species, which are among the most impacted groups. With the increasing frequency of large-scale fires, it is crucial for us to better understand the long-term impacts of these now unavoidable events.

The project will involve a mix of field and desk-based work, including ecological surveys for reptiles in different heathland reserves and use of historical data. Genetic sampling may also provide insights into the inter-relatedness and relative isolation of populations. The data would be analysed using statistical software and mapped using GIS. Support would be provided for survey and sampling work, and species identification.

Key references:

- Arnell, N.W., Freeman, A. and Gazzard, R. (2021). The effect of climate change on indicators of fire danger in the UK. *Environmental Research Letters*, 16(4), p.044027.
- Countryfile. (2020). Chobham Common wildfire destroys vital wildlife habitat. [online] Available at: <https://www.countryfile.com/news/chobham-common-wildfire-destroys-vital-wildlife-habitat/>.
- Hobbs, R.J. and Gimingham, C.H. (1984). Studies on Fire in Scottish Heathland Communities II. Post-Fire Vegetation Development. *The Journal of Ecology*, 72(2), p.585.



● Project 1.3: Invasion of the Signal Crayfish *Pacifastacus leniusculus*

Working with: Wetlands Manager

Field Season: N/A

Signal Crayfish *Pacifastacus leniusculus* is a non-native invasive species originally from western North America. It was imported into the UK in the 1970s as a commercial species, and soon escaped from commercial fisheries into UK rivers. The crayfish carries Crayfish Plague *Aphanomyces astaci* which, alongside their larger size and aggressive behaviour, has decimated populations of the native White-clawed Crayfish *Austropotamobius pallipes* (James et al., 2017; Hudina and Hock, 2012). The Signal Crayfish is an extremely successful invader, capable of covering distances of over 150 metres/day and have thus far circumvented any pragmatic method of successfully controlling its population and spread (Chadwick et al., 2020)

We believe that *P. leniusculus* may have been present in Surrey from as early as the late '70s to early '80s, when it was found in many rivers across southern England. There are a handful of Surrey records from this period, with many more from the '90s onwards – following the trend of an

estimated 43% increase in occurrence between 1997–2001 (GB NNSS, 2019). The native *A. pallipes* populations are limited to a few headwater sites where *P. leniusculus* has not yet reached. To inform the crucial protection of these refuge sites, we need to understand how far the invaders have travelled upstream and what is preventing them from travelling further. It would also be pertinent to reaffirm locations of persisting *A. pallipes*.

The project will involve a mix of field and desk-based work, including ecological surveys of Signal Crayfish in different headwaters across Surrey, with the potential for using eDNA to survey for *A. pallipes* (dependent on funding). The data would be analysed using statistical software and mapped using GIS. Support would be provided for survey work and species identification.

Key references:

- Chadwick, D.D.A., Pritchard, E.G., Bradley, P., Sayer, C.D., Chadwick, M.A., Eagle, L.J.B. and Axmacher, J.C. (2020). A novel 'triple drawdown' method highlights deficiencies in invasive alien crayfish survey and control techniques. *Journal of Applied Ecology*. doi:10.1111/1365-2664.13758.
- GB NNSS. (2019). Signal Crayfish» NNSS. [online] Available at: <https://www.nonnativespecies.org/non-native-species/information-portal/view/2498> [Accessed 18 Jul. 2022].
- Hudina, S. and Hock, K. (2012). Behavioural determinants of agonistic success in invasive crayfish. *Behavioural Processes*, 91(1), pp.77–81. doi:10.1016/j.beproc.2012.05.011.
- James, J., Nutbeam-Tuffs, S., Cable, J., Mrugała, A., Viñuela-Rodríguez, N., Petrusek, A. And Oidtmann, B. (2017) "The prevalence of *Aphanomyces astaci* in invasive signal crayfish from the UK and implications for native crayfish conservation," *Parasitology*. Cambridge University Press, 144(4), pp. 411–418. doi: 10.1017/S0031182016002419.

● Project 1.4: Resilience of managed & restored land to climate change

Working with: Research & Monitoring Team

Field Season: N/A

This summer, the UK has experienced its highest ever recorded temperatures since records began, with parts of the country reaching above 40°C. The Met Office has estimated that the heatwaves we have seen in recent years are 20–30 times more likely to occur due to climate change, and that breaching the 40°C threshold would have been virtually impossible in an undisrupted climate (Carbon Brief, 2022). Whilst we cannot currently know the extent of the damage caused to wildlife, anecdotally there were reports of "swifts falling out of the sky" and Professor Dave Goulson estimates that bumblebees would have been unable to forage in temperatures that high

(The Guardian, 2022).

Within Surrey, we saw extensive wildfires across many of our western heathlands in 2022, with nearly 1000Ha of lowland heath burned during the summer – with frequencies set to increase in coming years (The Wildlife Trusts, 2022). Surrey Wildlife Trust manages many of these sites, as well as areas of woodland and chalk grassland. We also work with many landowners, farmers and local communities, all of whom will have been impacted in different ways throughout the heatwave. Climate change is likely to cause us to rethink many of the traditional approaches to land management within the conservation sector, and it would be pertinent to begin to investigate which areas, under which management, have shown the most resilience to conditions experienced in mid-July.

This project would be largely desk base, utilising remote sensing and GIS to compare and contrast the resilience of different areas during the 2022 UK Heatwave. Assistance would be provided with technical work.

Key references:

- Carbon Brief. (2022). Media reaction: UK's record-smashing 40C heatwave and climate change. [online] Available at: <https://www.carbonbrief.org/media-reaction-uks-record-smashing-40c-heatwave-and-climate-change/>
- The Guardian. (2022). Falling birds and dehydrated hedgehogs: heatwave takes its toll on UK wildlife. [online] Available at: <https://www.theguardian.com/environment/2022/jul/25/falling-birds-and-dehydrated-hedgehogs-heatwave-takes-its-toll-on-wildlife-aoe>
- The Wildlife Trusts. (2022). Changing Nature A climate adaptation report by The Wildlife Trusts. [online] Available at: <https://www.wildlifetrusts.org/sites/default/files/2022-06/AdaptationReport.pdf>

● Project 1.5: Determining the lost range of Surrey's Adders

Working with: Research & Monitoring Team, SARG

Field Season: N/A

Reptile populations in the UK have experienced widespread declines, largely as a result of habitat loss and fragmentation as well as intentional disturbance. Adders have particularly suffered widespread declines, with estimates that their range has reduced by 39% in recent times (Gleed-Owen and Langham, 2012). The shrinking range of Adder populations has also heightened concerns around the genetic vulnerability of these populations (Ball et al., 2020).

Locally within Surrey, it is widely accepted that the Adder's range has declined but there is no study

to specifically map and quantify this loss. There is potential for using historical records collected by the Surrey Amphibian & Reptile Group (SARG) to examine the population trends of the Adder and map its declining range in recent years. It may also be possible to correlate impacts of events such as wildfires on range loss, and to estimate the date of loss on certain key sites.

This would largely be a desktop-based project, with the potential to supplement historical records with some reptile surveys dependent of the time of year the project is conducted at. Data will be provided by SARG and GIS support would be provided by SWT.

Key references:

Ball, S., Hand, N., Willman, F., Durrant, C., Uller, T., Claus, K., Mergeay, J., Bauwens, D. and Garner, T.W.J. (2020). Genetic and demographic vulnerability of adder populations: Results of a genetic study in mainland Britain. PLOS ONE, 15(4), p.e0231809. doi:10.1371/journal.pone.0231809.

Gleed-Owen, C., & Langham, S. (2012) The Adder Status Project – a conservation condition assessment of the adder (*Vipera berus*) in England, with recommendations for future monitoring and conservation policy. Unpublished report. CGO Ecology Ltd, Bournemouth



● Project 1.6: The potential for Natterjack toads *Epidalea calamita* on Surrey heathland

Working with: Research & Monitoring Team

Field Season: N/A

The Natterjack Toad is one of the rarest amphibian species in the UK and has undergone an ongoing historical decline since the 20th century (Griffiths et al, 2010). The decline of the species is been largely due to wholesale habitat conversion for commercial interests and the acidification of breeding ponds by historic SO2 levels in

rain (McGrath and Lorenzen, 2010). Many of the remaining populations are in coastal areas, inhabiting sand dune and salt-marsh systems where they will become increasingly threatened by rising sea levels resulting from climate change, putting into question the long-term survival of this species in the UK.

Southern heathlands have been proposed as an alternative habitat under different climate change scenarios. Increased summer temperatures and early, prolonged summer rainfall create favourable reproductive conditions for *E. calamita* as tadpoles depend on high water temperatures to promote rapid development (Beebee, 2010). Given that Surrey heathlands were once an historical hotspot for *E. calamita*, it is important for Surrey Wildlife Trust to investigate the potential viability for sites in their management portfolio to support the species. The Natterjack has become extinct once already in Surrey and currently exists in only two sites as reintroductions.

The project methodology would be based on use of Ellenberg indicators to assess appropriateness of sites for potential reintroductions. It would involve an element of field work to conduct botanical surveys (if done in the correct season) but could be entirely desk-based working on data from previous surveys. Support would be provided with fieldwork.

Key references:

- Beebee, T.J.C. (2011). Modelling factors affecting population trends in an endangered amphibian. *Journal of Zoology*, 284(2), pp.97–104. doi:10.1111/j.1469-7998.2010.00785.x. Griffiths R.A., McGrath A. & Buckley J. (2010.) Reintroduction of the natterjack toad in the UK. *Global Re-introduction Perspectives: 2010. Additional case studies from around the globe.* pp.62-65. IUCN/SSC Re-introduction Specialist Group, Gland, Switzerland.
- McGrath, A.L and Loren McGrath, A.L. and Lorenzen, K. (2010). Management history and climate as key factors driving natterjack toad population trends in Britain. *Animal Conservation*, 13(5), pp.483–494. doi:10.1111/j.1469-1795.2010.00367.x.

Theme 2

**Priority
species
autecological
research**

● Project 2.1: Recovering Small Fleabane to Surrey

Working with: SWT Ecology Services

Field Season: tbc

Small Fleabane *Pulicaria vulgaris* is a NERC Act Section 41 Species of Principal Importance, which has experienced a significant decline in the UK due to loss of habitat and declining condition of remaining habitat (JNCC, 2019). As its Latin name would suggest, *P. vulgaris* ('vulgaris' meaning 'common') was formerly widespread in south-east England but is now restricted to a small number of localities in the New Forest, disappearing from neighbouring counties in the past 50 years (FWHT, 2013). The species is restricted to seasonally-flooded pond margins, hollows and grazed damp acidic grassland, declining management of which is often associated with that of 'commoning' as a modern agricultural practice (Lousley, 1976).

P. vulgaris is believed locally extinct in Surrey since the early 2000s, after the cessation of grazing on its former stronghold site on Backside Common. This site is a Surrey Wildlife Trust nature reserve where a restoration programme to involve suitable site management, seedbank recovery and monitoring is the only way back for this unspectacular but no less-deserving plant – a good indicator for the ideal management of formerly grazed common land. There is significant evidence that the species can recover from dormant seed-bank populations, as has been achieved at Backside Common previously, which may provide viable, genetically appropriate propagules for a reintroduction programme (Chatters et al., 2014).

The project will involve a mix of field and desk-based work, including ecological surveys of Backside Common and experimental plots to germinate seed-bank propagules. The data would be analysed using statistical software. Support would be provided for survey work and species identification. Further interested parties may include the Surrey Botanical Society and Plantlife.

Key references:

- Chatters, C., Mcguire, C., Rand, M. and Sanderson, N. (2014) Small Fleabane in the New Forest. [online] . Available at: http://newforestnpa.newforest-zestyvirtual.tibus.net/app/uploads/sites/3/2018/03/Small_Fleabane_report_140213_Final_Report_CC_CM.pdf. FWHT (2013) Creating ponds for Small Fleabane *Pulicaria vulgaris* [online] . Available at: <https://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/Small-Fleabane-new-logo.pdf>
- JNCC (2019). Report on the Species and Habitat Review (UK BAP) | JNCC Resource Hub. [online] Available at: <https://hub.jncc.gov.uk/assets/bdd8ad64-c247-4b69-ab33-19c2e0d63736>
- Lousley, J.E. and Surrey Flora Committee (1976). Flora of Surrey. Newton Abbot: David & Charles.

● Project 2.2: Impacts of grazing on *Hagenella clathrata*, the Window-winged Caddis

Working with: Conservation Manager West

Field Season: Spring

The Window-winged Caddis Fly is one of the rarest and most threatened caddisfly species in Europe and is known from only a small selection of sites across Northern Europe (Buczynska et al., 2012). It is also a Species of Principal Importance, which relies on lowland wet heath and transitional valley mire habitats, both now highly threatened by climate change. Decline in condition of the habitat is the prevalent cause of the decline of *H. clathrata* (Wallace, 2011). Relatively little research has been invested in effective conservation measures, but it has recently been proved that there is a clear co-occurrence of *Hagenella* with other endangered species (van Kleef et al., 2012). There are two nationally important populations of *H. clathrata* in Surrey; at Whitmoor Common and Chobham Common, both of which are managed by Surrey Wildlife Trust on behalf of Surrey County Council. The Species Recovery Trust has supported the species' on-going monitoring, but there remains plenty of scope for autecological research into this charismatic species. In particular, the potential benefit of conservation grazing still requires assessment for future conservation strategies. Conservation grazing is widely practiced across Surrey's heathlands, so it is important we understand its impacts on *Hagenella*.

The project will involve a mix of field and desk-based work, including ecological surveys of Whitmoor and Chobham Commons. The data would be analysed using statistical software. Support would be provided for survey work and species identification.

Key references:

- Buczyńska, Edyta & Cichocki, Włodzimierz & Patrycja, Dominiak. (2012). New data on the distribution and habitat preferences of *Hagenella clathrata* (Kolenati, 1848) (Trichoptera: Phryganeidae) in Poland – the species from Polish Red Book of Animals. *Annales - Universitatis Mariae Curie-Sklodowska, Sectio C. LXVII.* 25-32.
- van Kleef, H.H., van Duinen, G.-J.A., Verberk, W.C.E.P., Leuven, R.S.E.W., van der Velde, G. and Esselink, H. (2012). Moorland pools as refugia for endangered species characteristic of raised bog gradients. *Journal for Nature Conservation*, 20(5), pp.255–263
- Wallace, I. (2011). *Hagenella clathrata* Contact details Species dossier: *Hagenella clathrata*. [online] . Available at: <https://cdn.buglife.org.uk/2019/07/Hagenella-clathrata-species-dossier.pdf>

● Project 2.3: The use of hedgerows by Hazel Dormice

Working with: Conservation Manager Central

Field Season: Spring-Autumn

The Hazel Dormouse *Muscardinus avellanarius* is a charismatic species which has undergone well-documented declines in distribution and abundance across the UK, despite its conservation prioritisation and legal protection (Goodwin et al., 2017). It is a strongly arboreal rodent traditionally associated with coppiced woodland, and in particular Hazel *Corylus avellana* as suggested by its scientific name. It is widely understood that a key factor in its decline is changing woodland management practices (Bright and Morris, 2002). Dormice are often assumed to be limited in their dispersal abilities, but there is evidence that they are capable of crossing open land via hedgerows and can persist in landscapes with relatively little woodland (Mortelliti et al., 2013; Buchner, 2008).

Surrey is reliably assumed to be an important county for the Hazel Dormouse and has a national responsibility for its conservation, and there is good knowledge of the localities of several apparently strong populations. As part of Surrey Wildlife Trust's Hedgerow Heritage project, we are keen to further evidence the value of hedgerows for the Hazel Dormouse. This project aims to improve the management of hedges as a functional ecological connections at landscape-scale, and so an understanding of how dormice use hedges and the types of hedges they use preferentially is key to informing site management planning.

The project would involve using tunnels to survey hedges and monitoring dormice using them as corridors. Historic data would additionally be used, and this aspect would largely be desk-based involving data analysis and GIS work to consolidate an effective baseline and monitoring plan. Both aspects of this project would be partnered by the Surrey Dormouse Group.

Key references:

- Bright, P. and Morris, P. (2002). Putting Dormice back on the map. *British Wildlife*, 14, 91-100.
- Büchner, S. (2008). Dispersal of common dormice *Muscardinus avellanarius* in a habitat mosaic. *Acta Theriologica*, 53(3), pp.259-262.
- Goodwin, C.E.D., Hodgson, D.J., Al-Fulaij, N., Bailey, S., Langton, S. and McDonald, R.A. (2017). Voluntary recording scheme reveals ongoing decline in the United Kingdom hazel dormouse *Muscardinus avellanarius* population. *Mammal Review*, 47(3), pp.183-197.
- Mortelliti, A., Santarelli, L., Sozio, G., Fagiani, S. and Boitani, L. (2013). Long distance field crossings by hazel dormice (*Muscardinus avellanarius*) in fragmented landscapes. *Mammalian Biology*, 78(4), pp.309-312.



● Project 2.4: Rediscovering the spider assemblage at Chobham Common

Working with: Research & Monitoring Team

Field Season: Spring-Autumn

Chobham Common National Nature Reserve is the most biodiverse site for spiders in the UK, with records of many nationally endangered, rare and scarce species. However, many of these records are now very old. The spider assemblage is moreover a notified feature of its SSSI status. A long-term monitoring project to review and update our knowledge of this important assemblage is long overdue.

The project would design and begin a long-term species recording and monitoring programme as an applied exercise in the purposes of ecological fieldwork, that would fully sample this extensive site within a decade; in combination with opportunistic autecological studies to ascertain the status of one or more species of conservation importance present on the site, such as *Cheiracanthium pennyi* (Endangered), *Lathys heterophthalma* (Vulnerable), *Dipoena erythropus* (Vulnerable) and *Araneus alsine* (Nationally Scarce).

The project would combine fieldwork and GIS mapping, providing experience on several applied survey methods including sweeping, pitfall trapping and DVAC sampling. Support would be provided for survey work and species identification.

Key references:

- Dodd, S G. (2011). The Spiders of Chobham Common, Surrey [VC 17]. Surrey Wildlife Trust Ecology Services.
- Harvey P et al. (2017). A review of the scarce and threatened spiders (*Araneae*) of Great Britain: Species Status No.22. British Arachnological Society



● Project 2.5: Investigating Smooth Snakes

Working with: Research & Monitoring Team, SARG

Field Season: tbc

The Smooth Snake is the rarest reptile in Britain and is extremely secretive, occurring naturally on a handful of lowland heathland sites in Southern England. They are well protected by UK and European legislation but have experienced an estimated 90% population decline in the last century (Langham, 2018). Part of the difficulty studying the Smooth Snake is the fact that it does not habitually bask in the open like other reptiles; they are far more reliant on stands of mature heather, so therefore requires well-established dry heathland and is therefore very vulnerable to wildfires.

Surrey Amphibian and Reptile Group (SARG) has monitored the Surrey population carefully over the recent decades. Detailed biometric data exists for each individual snake, which will enable researchers to answer many questions about the snake's movements, behaviour and population dynamics. One question concerns the genetic distinctiveness of Surrey's Smooth Snake population, which could be provisionally answered using the biometric data. A previous study found that even within the Dorset populations initial genetic differentiations could be detected (Pernetta et al., 2011).

The project would combine primary data, collected in the field, with secondary data provided by SARG to investigate long-term trends in Smooth Snake populations. GIS and statistics would be used in analysis. Support would be provided for survey work and species identification.

Key references:

- Langham, S. (2018). SARG: Smooth Snake. [online] Available at: http://surrey-arg.org.uk/SARGWEB.php?app=SpeciesData&Species=smooth_snake.
- Pernetta, A.P., Allen, J.A., Beebee, T.J.C. and Reading, C.J. (2011). Fine-scale population genetic structure and sex-biased dispersal in the smooth snake (*Coronella austriaca*) in southern England. *Heredity*, 107(3), pp.231–238.

● Project 2.6: In Search of the Red-Barbed Ant *Formica rufibarbis*

Working with: Research & Monitoring Team

Field Season: tbc

The Red-Barbed Ant *Formica rufibarbis* is an extremely rare ant in the UK, with its own dedicated Species Action Plan and is a NERC Act S.41 Species of Principal Importance (Gamman, 2008). Part of its rarity in the UK can be attributed to its specific habitat requirements, as it is one of the most thermophilus species of the *Formica* genus and requires an open unvegetated habitat with sandy substrate to obtain sufficient warmth (Seifert and Schultz, 2009). However, due to its relatively small colony size and similar appearance to other formicine ants it is possible that there are a number of unknown populations on heathland and other non-heathland sandy grassland sites within the UK.

Whilst more common in continental Europe, the UK mainland population is restricted to 14 recently discovered colonies within Hampshire. Until their discovery it was confined to a single population within Surrey at Chobham Common (BWARS, 2002) However, this population has now been lost to *Formica sanguinea* slavery. *F. sanguinea* has become extremely prevalent in heathland sites in the south of England and as such it is unlikely that *F. rufibarbis* persists in heathland sites where *F. sanguinea* is present. Neighbouring sandy grassland sites in Surrey, especially those within a short distance of former populations, could support unknown *F. rufibarbis* colonies. If present, this would obviously have significant implications not only the protections of these sites but also their management.

The project will involve a mix of field and desk-based work, including ecological surveys of sites around Pirbright, Woking, Ash, Frimley, Chobham areas. The data would be analysed using statistical software and mapped using GIS. Support would be provided for survey work and species identification.

Key references:

- Bees, Wasps and Ants Recording Society. (2002). *Formica rufibarbis* Fabricius, 1793 | BWARS. [online] Available at: <https://www.bwars.com/ant/formicidae/formicinae/formica-rufibarbis> [Accessed 18 Jul. 2022].
- Gamman, N. (2008). Conserving the red-barbed ant (*Formica rufibarbis*) in the United Kingdom. Project Report 2008. <http://hymettus.org.uk/downloads/F%20rufibarbis%20tech%20report.pdf>
- Seifert, B. & Schultz, R. (2009). A taxonomic revision of the *Formica rufibarbis* FABRICIUS, 1793 group (Hymenoptera: Formicidae). *Myrmecological News*, 12, pp.255-272.

● Project 2.7: Brown Trout *Salmo trutta* in headwater streams

Working with: Research & Monitoring Team

Field Season: tbc

The native Brown Trout *Salmo trutta* is an anadromous species of fish that often migrates to sea, as a sea trout, from its birth-place in rivers (Klemetsen et al., 2003). Anthropogenic impacts on freshwater systems have led to the decline of many native fish populations. Particularly for salmonid fish like *S. trutta*, the historic construction of weirs across our river systems has limited their access to traditional breeding sites in the headwaters of our river catchments (Gosset et al., 2006).

Surrey's headwater streams are home to many genetically distinct populations of Brown Trout that have been isolated from other populations for centuries due to the impacts of instream barriers on fish passage. These isolated populations are very precious, however the extreme dry periods associated with climate change experienced in recent years are starting to impact Surrey's headwater streams, putting these populations under increasing pressure (Jonsson & Jonsson, 2009). We want to better understand where these populations are across Surrey and which of these are most vulnerable to climate change. This will help us target management interventions, at both the reach and landscape scale, to better protect them.

The project will involve a mix of field and desk-based work, including ecological surveys of brown trout in different headwaters across Surrey using eDNA as well as landscape analysis to map local pressures. The data would be analysed using statistical software and mapped using GIS. Support would be provided for survey work and species identification.

Key references:

- Gosset, C., Rives, J. and Labonne, J. (2006). Effect of habitat fragmentation on spawning migration of brown trout (*Salmo trutta* L.). *Ecology of Freshwater Fish*, 15(3), pp.247–254. doi:10.1111/j.1600-0633.2006.00144.x.
- Klemetsen, A., Amundsen, P.-A., Dempson, J.B., Jonsson, B., Jonsson, N., O'Connell, M.F. and Mortensen, E. (2003). Atlantic salmon *Salmo salar* L., brown trout *Salmo trutta* L. and Arctic charr *Salvelinus alpinus* (L.): a review of aspects of their life histories. *Ecology of Freshwater Fish*, [online] 12(1), pp.1–59. doi:10.1034/j.1600-0633.2003.00010.x.
- Jonsson, B. and Jonsson, N. (2009). A review of the likely effects of climate change on anadromous Atlantic salmon *Salmo salar* and brown trout *Salmo trutta*, with particular reference to water temperature and flow. *Journal of Fish Biology*, 75(10), pp.2381–2447. doi:10.1111/j.1095-8649.2009.02380.x.

● Project 2.8: Exploring crane fly diversity at Bay Pond, Boldermere and Eashing

Working with: Research & Monitoring Team

Field Season: tbc

The crane flies or Tipulidae are an under-recorded invertebrate group and yet they represent an important ecological indicator of the quality of wetland ecosystems. Relatively little research exists around these insects, but their essential role in the diet of various bird species (Rhymer et al., 2012) is well understood. As with many insect taxa, recent studies have shown that the phenology and distribution of the Tipulidae is likely to be impacted by climate change, which could then have trophic impacts on dependent predators (Devlin et al., 2022).

At least two Trust-managed SSSI (Boldermere at Ockham Common and Bay Pond near Godstone) include important crane fly assemblages as one of their notified features. A further privately-owned site close to a Trust-managed SANG near Eashing also has this feature. These sites all support Alder-dominated wet woodland, which is known to be an important habitat for crane flies, however the assemblages at the sites have not been formally re-assessed since the early 1980s. As discussed above, it would be prudent to improve our understanding of the current status of these assemblages to effectively monitor these sites in the coming years.

This project would review the three SSSI-qualifying datasets, conduct the necessary fieldwork and prepare a report summarising findings, with recommendations for conservation management. It would be partnered with Natural England. A new field guide (Stubbs, 2021) is set to make this group far more accessible to would-be Dipterists and experienced entomologists alike, who would also boost the flow of much-needed records into the UK Crane fly Recording Scheme.

Key references:

- Devlin, J.J., Thomas, R.J., Long, S.E., Boardman, P. and Dupuis, J.R. (2022). Impact of climate change on the elevational and latitudinal distributions of populations of Tipulidae (Diptera) in Wales, United Kingdom. *Biological Journal of the Linnean Society*, [online] 137(1), pp.30–46. doi:10.1093/biolinnean/blac079.
- Rhymer, C.M., Devereux, C.L., Denny, M.J.H. and Whittingham, M.J. (2012). Diet of Starling *Sturnus vulgaris* nestlings on farmland: the importance of Tipulidae larvae. *Bird Study*, 59(4), pp.426–436. doi:10.1080/00063657.2012.725026.
- Stubbs, A.E. (2021). *British crane flies*. Hurst: The British Entomological and Natural History Society.

Theme 3

**Wildlife
habitat
restoration:
Methodology &
Evidence**

● Project 3.1: Quantifying landscape resistance

Working with: Research & Monitoring Team

Field Season: N/A

Landscape resistance is commonly used in models analysing landscape connectivity for species movements (Zeller et al., 2012). Although much research already exists, and a variety of methodologies have been developed (Van Moorter et al., 2021), there remain many datasets reliant on assumptions and expert opinion rather than quantitative data collected from the field. Further work on the autecology and behavioural responses of these species will provide much needed insight, especially if this is conducted within direct context of the management activity under scrutiny.

Surrey Wildlife Trust have been working on quantifying landscape connectivity for several years and continues to develop and expand the methodology. Any work to further supplement the efforts to accurately model connectivity for the county would have vast applications throughout the Trust's projects.

There are a variety of approaches to this project. As a possible proxy value for how isolated populations of these species actually are within a fragmented landscape, their degree of interrelatedness may be researched by genetic profiling. Radio-telemetry of tagged individuals is also possible to research their dispersal movements (e.g. Sinsch et al., 2012).

Key references

- Sinsch, U., Oromi, N., Miaud, C., Denton, J. and Sanuy, D. (2012). Connectivity of local amphibian populations: modelling the migratory capacity of radio-tracked natterjack toads. *Animal Conservation*, 15(4), pp.388–396.
- Van Moorter, B., Kivimäki, I., Panzacchi, M. and Saerens, M. (2021). Defining and quantifying effective connectivity of landscapes for species' movements. *Ecography*, 44(6), pp.870–884.
- Zeller, K.A., McGarigal, K. and Whiteley, A.R. (2012). Estimating landscape resistance to movement: a review. *Landscape Ecology*, 27(6), pp.777–797.



● Project 3.2: Impact of Roadside Verge Management on Invertebrates

Working with: Research & Monitoring Team

Field Season: tbc

Whilst there has been some research on the role of roadside verges in promoting biodiversity, it is recognized that there are large knowledge gaps concerning roadside management and its effects on biodiversity (Jakobsson et al., 2018). However, existing research includes a study from the Netherlands providing evidence that mowing roadside verges only twice a year was overwhelmingly beneficial for insect diversity and abundance (Noordijk et al., 2009), as also has a more recent UK-based study (Garbuzov, 2014). Given the benefits to biodiversity among a myriad other ecosystem services, there is urgent need for additional evidence to support the case for conservation-focused verge management for our advocacy to responsible authorities as well as the general public (O'Sullivan et al., 2017).

In Surrey, there is a mixed approach among various management authorities, providing an opportunity for comparing alternative management approaches. There are also a variety of residential campaigns (including the 'Bookham Blue Hearts'), which could provide insight into the role of the public and local residents. The Trust is engaged with both these sectors and supports the belief that with appropriate management roadside verges can sustain and boost local invertebrate populations, while also serving as effective corridors to enhance habitat connectivity in the wider landscape. It is, therefore, important we have robust research to support the case for managing verges for wildlife.

Fieldwork would be conducted to gather data on abundance and diversity of invertebrates, sampled from a variety of verges across the county managed under varying regimes. This will compare verges managed by the different LPAs. There is also potential for inclusion of a sociological aspect, gathering information and opinions from the public and their representative parish and district elected councillors. Data would be analysed using statistical software. Support would be provided for survey work and species identification.

Key references:

- Garbuzov, M., Fensome, K.A. and Ratnieks, F.L.W. (2014). Public approval plus more wildlife: twin benefits of reduced mowing of amenity grass in a suburban public park in Saltdean, UK. *Insect Conservation and Diversity*, 8(2), pp.107–119.
- Jakobsson, S., Bernes, C., Bullock, J.M., Verheyen, K. and Lindborg, R. (2018). How does roadside vegetation management affect the diversity of vascular plants and invertebrates? A systematic review. *Environmental Evidence*, 7(17).
- Noordijk, J., Delille, K., Schaffers, A.P. and Sýkora, K.V. (2009). Optimizing grassland management for flower-visiting insects in roadside verges. *Biological Conservation*, 142(10), pp.2097–2103.
- O'Sullivan, O.S., Holt, A.R., Warren, P.H. and Evans, K.L. (2017). Optimising UK urban road verge contributions to biodiversity and ecosystem services with cost-effective management. *Journal of Environmental Management*, 191, pp.162–171.

● Project 3.3: Impact of Wildlife Gardening on Invertebrates

Working with: Research & Monitoring Team

Field Season: tbc

There appears to be limited research on the actual, quantified contribution of wildlife gardening to biodiversity conservation programmes, but that which exists does indicate that garden vegetation is an important predictor of both invertebrate species richness and abundance (Smith et al., 2006). Additionally, rare species across a number of invertebrate taxa have been found inhabiting urban green roofs (Kadas, 2006). Such evidence can be used to better inform wildlife gardening advice provided by environmental NGOs. For example, domestic gardens are often home to ornamental, non-native plants, which provide significantly less value for native invertebrates (both plant associated and soil-dwelling), than native or near-native vegetation (Sailsbury et al., 2017; Sailsbury et al., 2020). Indeed, there is a clear role for improved science communication and community engagement in changing gardening practices (van Heezik et al., 2012).

Gardens make up over 20,000 hectares of Surrey and are therefore a key element of our land-use, and should be considered as such in landscape-scale conservation. Promotion of wildlife gardening is already a core part of the Trust's engagement activities, which would benefit from additional research and justification. An annual wildlife gardening survey provides a large existing dataset capturing the spread of garden features across the county and would form the basis for this project.

This would primarily be a desk-based project, utilising the data from the survey mentioned

above. Additional work would be undertaken to gather information on species associations with popular garden features. Various methodological approaches could be taken, and flexibility and creativity is encouraged. Assistance would be provided for whichever approach is taken.

Key references:

- Kadas, G. (2006). Rare Invertebrates Colonizing Green Roofs in London. *Urban Habitats*, 4(1), pp.51-66.
- Salisbury, A., Al-Beidh, S., Armitage, J., Bird, S., Bostock, H., Platoni, A., Tatchell, M., Thompson, K. and Perry, J. (2017). Enhancing gardens as habitats for plant-associated invertebrates: should we plant native or exotic species? *Biodiversity and Conservation*, 26(11), pp.2657–2673.
- Salisbury, A., Al-Beidh, S., Armitage, J., Bird, S., Bostock, H., Platoni, A., Tatchell, M., Thompson, K. and Perry, J. (2019). Enhancing gardens as habitats for soil-surface-active invertebrates: should we plant native or exotic species? *Biodiversity and Conservation*, 29(1), pp.129–151.
- Smith, R.M., Warren, P.H., Thompson, K. and Gaston, K.J. (2005). Urban domestic gardens (VI): environmental correlates of invertebrate species richness. *Biodiversity and Conservation*, 15(8), pp.2415–2438.
- van Heezik, Y. M., K. J. M. Dickinson, and Freeman, C. (2012). Closing the gap: communicating to change gardening practices in support of native biodiversity in urban private gardens. *Ecology and Society*, 17(1), pp.34-43.

● Project 3.4: Optimal conservation prescriptions for agricultural land

Working with: Nature Based Solutions Team

Field Season: tbc

Agricultural land has great potential to be restored into valuable space for wildlife whilst still providing benefits to the local economy (Newton et al., 2021). The Wildlife Trusts aims to restore 30% of land into good management for nature by 2030, and agricultural land is likely to be a key component of this. Restoration projects are essential to halt environmental degradation and biodiversity loss, and are also vital for optimising a holistic ecosystem service output from former agricultural land (Rey Benayas and Bullock, 2012). It is acknowledged that further research is needed to ascertain the functionality and ecological stability of restored land beyond elevated species richness (Walker et al., 2004).

Surrey Wildlife Trust began management of three ex-agricultural sites in spring 2021, which are designed as SANGs (Suitable Alternative Natural Greenspaces) and are all in need of restoration. Baseline surveys were conducted prior to intervention and the initial improvements

are beginning to be appreciated. The aim of this project would be to assess the value of different management prescriptions (grazing, seed-sowing, mowing regimes, rewilding, etc.) in the context of reclaimed agricultural land, and to recommend an optimal management template for similar sites in future.

This would be a field-based research project, involving botanical and faunal surveys of the three sites. Assistance and training would be provided for species ID and surveying.

Key references:

- Newton, A.C., Evans, P.M., Watson, S.C.L., Ridding, L.E., Brand, S., McCracken, M., Gosal, A.S. and Bullock, James.M. (2021). Ecological restoration of agricultural land can improve its contribution to economic development. *PLOS ONE*, 6(3), p.e0247850.
- Rey Benayas, J.M. and Bullock, J.M. (2012). Restoration of Biodiversity and Ecosystem Services on Agricultural Land. *Ecosystems*, 15(6), pp.883–899.
- Walker, K.J., Stevens, P.A., Stevens, D.P., Mountford, J.Owen., Manchester, S.J. and Pywell, R.F. (2004). The restoration and re-creation of species-rich lowland grassland on land formerly managed for intensive agriculture in the UK. *Biological Conservation*, 119(1), pp.1–18.

● Project 3.5: The perception and value of conservation grazing regimes

Working with: Nature Based Solutions Team

Field Season: tbc

Conservation grazing is well established as a management practice for a variety of important habitats, and has been shown to promote both plant and animal diversity (Small, 2010). A plethora of research has provided evidence that grazing, in most cases, has a better biodiversity outcome than mowing or manual cutting (Talle et al., 2016). Varied grazing regimes have been implemented across the county, and there is evidence that they result in differing species compositions for both plants and invertebrates (Lyons et al., 2017). Aside from biodiversity benefits, the use of livestock on nature reserves has been seen to contribute to positive public relations, but this particular area requires further research (Harvey, 2002).

Surrey Wildlife Trust uses a variety of grazing animals across its sites and has achieved excellent results from this – to the benefit of many rare species, such as the Small Blue and Adonis Blue butterflies and the Straw Belle moth. As above, there is a clear role for research into the outcomes of differing grazing regimes. Much of our grazing is undertaken on public facing

reserves, which creates an additional dimension of public understanding of conservation practice. This project aims to review this in the context of Surrey, but crucially to also include the sociological effects such as public perception of and engagement with conservation work.

This project would be largely ecologically field-based but would also include a sociological approach. Fieldwork would involve botanical surveys, in addition to data gathered from questionnaires, interviews and focus groups within relevant demographics. Assistance would be provided in any ecological surveying and species identification.

Key references:

- Harvey, P. (2002). *Grazing in the urban environment : An economic and social appraisal of conservation grazing schemes*. Masters, Sheffield Hallam University (United Kingdom).
- Lyons, A., Ashton, P.A., Powell, I. and Oxbrough, A. (2017). Impacts of contrasting conservation grazing management on plants and carabid beetles in upland calcareous grasslands. *Agriculture, Ecosystems & Environment*, 244, pp.22–31.
- Small, R. W. (2010). Conservation grazing: delivering habitat management for conservation with livestock. *Journal of the Royal Agricultural Society of England*, 171, pp.38-44.
- Tälle, M., Deák, B., Poschlod, P., Valkó, O., Westerberg, L. and Milberg, P. (2016). Grazing vs. mowing: A meta-analysis of biodiversity benefits for grassland management. *Agriculture, Ecosystems & Environment*, 222, pp.200–212.

● Project 3.6: Monitoring the Effectiveness of Wetland Restoration

Working with: Wetlands Manager

Field Season: Summer

Restoration of degraded wetland and river habitats is internationally recognised as an important way to enhance biodiversity and ecosystem services (Peh et al., 2014). Such restorations also provide improvements in landscape character and opportunities for citizen science and community involvement, alongside accomplishing policy targets (Smith et al., 2014; Prior, 2016). Much research has been assembled surrounding the effectiveness of different restoration interventions, and there is a clear role for additional data in providing further evidence to strengthen restoration efforts (Smith et al., 2013).

This has been at the forefront of Surrey Wildlife Trust's work in recent years with around 30 habitat creation and restoration projects delivered. Despite this momentum, the Trust has been challenged to effectively monitor the outcomes of its efforts. Much of the restoration works carried out are supported by best practice guidelines,

which focus on improving habitat primarily for fish species. A research project would provide the opportunity to robustly monitor our projects and delivery methods and provide us with quantified evidence regarding the benefits of our interventions.

The majority of the project would involve fieldwork, focused on ecological surveys targeting priority species across a variety of comparable wetland restoration sites. These have been restored over a number of years and provide an ideal portfolio of case-studies to investigate the temporal impacts and longevity of restoration interventions. Work would contribute to a larger project suite, split by species groups, offering a unique research question for a variety of students to partake. The options for the focus of a single project are macrophytes, invertebrates or amphibians.

Key references:

- Peh, K.S.-H., Balmford, A., Field, R.H., Lamb, A., Birch, J.C., Bradbury, R.B., Brown, C., Butchart, S.H.M., Lester, M., Morrison, R., Sedgwick, I., Soans, C., Stattersfield, A.J., Stroh, P.A., Swetnam, R.D., Thomas, D.H.L., Walpole, M., Warrington, S. and Hughes, F.M.R. (2014). Benefits and costs of ecological restoration: Rapid assessment of changing ecosystem service values at a U.K. wetland. *Ecology and Evolution*, 4(20), pp.3875–3886.
- Prior, J. (2016). Urban river design and aesthetics: a river restoration case study from the UK, *Journal of Urban Design*, 21(4), pp.512-529.
- Smith, B., Clifford, N.J. and Mant, J. (2013). Analysis of UK river restoration using broad-scale data sets. *Water and Environment Journal*, 28(4), pp.490–501.
- Smith, B., Clifford, N.J. and Mant, J. (2014). The changing nature of river restoration. *Wiley Interdisciplinary Reviews: Water*, 1(3), pp.249–261.

● Project 3.7: The impact of grazing pigs on ancient woodland flora

Working with: SWT Ecology Services

Field Season: Spring–Autumn

Conservation grazing traditionally employs cattle, sheep and goats to control the growth of scrub and undesirable grasses in open habitats. Alongside these animals, domestic pigs were also used historically for habitat creation and management of wood pasture (Jørgensen, 2013). There is evidence that their unique feeding strategy differs quite markedly from cattle and sheep, and thus encourages a different biodiversity (Beinlich and Poschlod, 2002). It was also shown that they are not harmful to understorey vegetation and can graze successfully without significantly changing ground and herb layer flora (Donahue, 2019).

Chinthurst Hill is a steeply wooded hill with open grassland and scrub, which has been grazed with pigs with the aim of reducing dominance of Bracken. A baseline botanical survey was undertaken in 2012 (SWT Ecology Services, 2012) before pigs were used to graze compartments across the slopes between 2013 and 2016. Botanical monitoring surveys were undertaken in 2014 and again in 2015 including quadrat information and fixed photography. Up-to-date botanical monitoring is required to re-examine the effects of pig grazing on the woodland flora, in particular the Bluebell population.

This project would comprise field work and desk-based work. Previous reports will be available, training and assistance would be provided.

Key references:

- Beinlich, B., Poschlod, P. (2002). Low intensity pig pastures as an alternative approach to habitat management. In: Redecker, B., Härdtle, W., Finck, P., Riecken, U., Schröder, E. (eds) *Pasture Landscapes and Nature Conservation*. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-55953-2_16
- Donahue, D. (2019). Assessing the Ecological Consequences of Domestic Pig Grazing on the Understorey Vegetation of an Oak Woodland. [scholarsbank.uoregon.edu](http://hdl.handle.net/1794/24508). [online] Available at: <http://hdl.handle.net/1794/24508> [Accessed 26 Jul. 2022].
- Jørgensen, D. (2013). Pigs and Pollards: Medieval Insights for UK Wood Pasture Restoration. *Sustainability*, 5(2), pp.387–399. doi:10.3390/su5020387.
- SWT Ecology Services (2012) Survey and Monitoring at Chinthurst Hill, 2255. SWT Ecology Services

● Project 3.8: Ash Dieback

Working with: Research & Monitoring Team

Field Season: N/A

Ash Dieback is one of many examples where non-native pathogens have devastated native tree populations (Potter et al., 2011). In the last 20 years *Hymenoscyphus pseudoalbidus*, a fungus native to Asia, has caused widespread death of Ash *Fraxinus excelsior* populations across Europe (Kjaer et al., 2012). In the past 5 years, the arrival of the pathogen in the UK has affected our native Ash populations, which support 953 associated species with no single alternative native tree species (Mitchell et al., 2014). The management of Ash Dieback has been the focus of much media attention and remains a contentious issue for many conservation organisations.

In Surrey, we need to monitor the short, mid and long-term ecological changes in our woodland reserves as a result of Ash Dieback. Comparisons of the responses in vegetation communities and of potential replacement keystone species,

both within and beyond affected areas; and to inform the limits of any public access safety management zones; will all be worthwhile. Such research will also need to be vigilant for any evidence of disease-resistance in individual/local populations of Ash trees.

The project will involve a mix of field and desk-based work, including ecological surveys of reserves in different stages of Ash Dieback. The data would be analysed using statistical software and mapped using GIS. Support would be provided for survey work and species identification.



Key references:

- Kjaer, E.D., McKinney, L.V., Nielsen, L.R., Hansen, L.N. and Hansen, J.K. (2011). Adaptive potential of ash (*Fraxinus excelsior*) populations against the novel emerging pathogen *Hymenoscyphus pseudoalbidus*. *Evolutionary Applications*, 5(3), pp.219–228.
- Mitchell, R.J., Beaton, J.K., Bellamy, P.E., Broome, A., Chetcuti, J., Eaton, S., Ellis, C.J., Gimona, A., Harmer, R., Hester, A.J., Hewison, R.L., Hodgetts, N.G., Iason, G.R., Kerr, G., Littlewood, N.A., Newey, S., Potts, J.M., Pozsgai, G., Ray, D. and Sim, D.A. (2014). Ash dieback in the UK: A review of the ecological and conservation implications and potential management options. *Biological Conservation*, 175, pp.95–109.
- Potter, C., Harwood, T., Knight, J. and Tomlinson, I. (2011). Learning from history, predicting the future: the UK Dutch elm disease outbreak in relation to contemporary tree disease threats. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 366(1573), pp.1966–1974.

Theme 4

Technology & Conservation

● Project 4.1: The potential for exploration of lowland British landscapes through VR and gaming

Working with: Research & Monitoring Team

Field Season: N/A

There is increasing recognition of the possibilities for digital media, gaming and augmented reality experiences to engage people with nature conservation and the natural world (Fisher et al., 2021). Whilst a perceived concern of environmentalists is for technology to have significantly contributed to 'Nature Deficit Disorder', emerging evidence is showing that 'Nature 2.0' can be utilised to inform, engage and motivate consumers (Fletcher, 2017). In particular, for people with accessibility issues or without local greenspaces, these methods may be the easiest ways to engage with the natural world (Li et al., 2021).

The typical environments explored by these experiences are typically the more 'exciting' global biomes, such as tropical rainforests, deserts and coral reefs. There are few UK-focused digital experiences, and UK native species are not commonly used within media depicting real, rather than imagined wildlife. The Wildlife Trust of South & West Wales has developed several WILD VR experiences centred around Welsh landscapes as engagement tools. Something similar might be achieved for Surrey, exploring our key landscapes through similar methods such as filming with 360° cameras and considering the potential for the gamification of these experiences.

This study would involve the planning and creation of a VR experience, and would ideally survey a participatory group to investigate the outcomes of the experience in comparison to an actual outdoors nature walk. Assistance in filming would be provided by the digital communications team.

Key references:

- Fisher, J.C., Yoh, N., Kubo, T. and Rundle, D. (2021). Could Nintendo's Animal Crossing be a tool for conservation messaging? *People and Nature*, 3(6), pp.1218–1228. doi:10.1002/pan3.10240.
- Fletcher, R. (2017). Gaming conservation: Nature 2.0 confronts nature-deficit disorder. *Geoforum*, 79, pp.153–162. doi:10.1016/j.geoforum.2016.02.009.
- Li, H., Zhang, X., Wang, H., Yang, Z., Liu, H., Cao, Y. and Zhang, G. (2021). Access to Nature via Virtual Reality: A Mini-Review. *Frontiers in Psychology*, 12. doi:10.3389/fpsyg.2021.725288.



● Project 4.2: Novel uses of UAVs for Invertebrate Monitoring

Working with: Research & Monitoring Team

Field Season: Spring–Autumn

Unmanned Aerial Vehicles (drones) are rapidly becoming a staple of environmental monitoring methods. Whilst most UAV monitoring is achieved by sensors, there has been recent experimentation using UAVs to physically collect invertebrate samples, by attaching sweep nets to the drones (Ryu et al., 2022). These pilot studies found that the method was successful in showing a degree of representativeness similar to the traditional (manual) approach, as well as providing additional benefits of being minimally invasive and time efficient (Löcken et al., 2020).

Surrey Wildlife Trust manages multiple open habitats where this kind of monitoring could be trialled. In particular, chalk grassland reserves would be ideal for this approach due to their open nature and herbaceous vegetation, as well as the importance of these sites for invertebrates. In the published studies, the applications are largely related to pest-control in agriculture and have been conducted in the US (e.g. Neufeld et al., 2019). This novel application of "Drone Netting" for conservation-based investigations could be valuable to the Trust for accelerating the monitoring of site habitat condition.

The project would involve field work, accompanying the SWT UAV operator in conducting a number of surveys across different reserves. The 'catch' of the surveys would then require identification; specialist assistance can be provided for this. Statistical analysis would also be necessary.

Key references:

- Löcken, H., Fischer, O.W., Selz, J. and Boppré, M. (2020). 'Drone-Netting' for Sampling Live Insects. *Journal of Insect Science*, 20(5). doi:10.1093/jisesa/ieaa086.
- Neufeld, J., J. Ryu, and J. Barbour. (2019). Development of a UAS-based insect scouting method. *J of the NACAA*. 12(2): pp.1-5.
- Ryu, J.H., Clements, J. and Neufeld, J. (2022). Low-Cost Live Insect Scouting Drone: iDrone Bee. *Journal of Insect Science*, 22(4). doi:10.1093/jisesa/ieac036.

● Project 4.3: Modelling Adder meta-population linkages with GIS

Working with: Research & Monitoring Team, SARG

Field Season: N/A

Adders have experienced large population declines across the UK (See Project 1.5), largely driven by habitat destruction and degradation and it is estimated that their range has reduced by 39% in recent times (Gleed-Owen and Langham, 2012). Remaining priority heathland habitat remains largely fragmented, such that establishing corridors between these patches is vital for the conservation of remaining Adder populations. Barriers to dispersal across the landscape lead to Adder populations to become isolated and vulnerable to genetic separation (Worthington-Hill, 2016).

In Surrey, Surrey Amphibian and Reptile Group (SARG) has identified several Adder metapopulations from many years of surveying these reptiles. Surrey's Adder population remains strong and we have a national responsibility for the species, but it is still declining (Langham, 2018). It has been observed that Adders are reluctant to cross certain features, even with the introduction of solutions aimed at facilitating their movement. A better understanding of just how fragmented the landscape is for Adders is desirable if we are to continue to champion their conservation.

The project would be desktop-based, using GIS and connectivity modelling tools to investigate landscape resistance to Adder movement. Adder

data will be provided by SARG and support would be provided for GIS work by SWT.

Key references:

- Gardner, E., Julian, A., Monk, C. and Baker, J. (2019) Make the adder count: population trends from a citizen science survey of UK adders. *Herpetological Journal*, 29. pp. 57-70. ISSN 0268-0130
- Langham, S. (2018). Surrey Amphibian and Reptile Group - Adder. [online] Available at: <http://surrey-arg.org.uk/SARGWEB.php?app=SpeciesData&Species=adders>.
- Worthington-Hill, J. (2016). Reintroduction of the adder *Vipera berus* to Nottinghamshire: a feasibility study Final Report to People's Trust for Endangered Species. [online] Available at: <https://ptes.org/wp-content/uploads/2016/11/adders-final-report.pdf>



Theme 5

**People &
Wildlife:
monitoring
public
engagement**

● Project 5.1: Landowner relationships with land designations

Working with: Research & Monitoring Team

Field Season: N/A

Non-statutory sites designated for their biodiversity value (collectively known as Local Wildlife Sites) represent an essential second tier system for protecting such sites, that is long established in the UK (Defra, 2006). Private landowners are central to delivering on these sites, and previous research has shown that there is a clear need for engagement with them and understanding of their motivations to meet the aspirations for these sites (Lawrence and Dandy, 2014).

There are 787 such sites, known in Surrey as Sites of Nature Conservation Importance (SNCI), chosen for various criteria such as species rarity and diversity (Surrey Nature Partnership, 2019). These include sites on and around campus, such as Cooper's Hill and the River Thames at Runnymede. These diverse sites are selected by the Surrey Local Sites Partnership, which also has a role in monitoring, promoting and advisory support for site management and strategy. These sites have diverse owners and the Surrey Local Sites Partnership lacks the resource to deliver all its activities, but nevertheless aspires to further engage the owners of these sites. To achieve this, the SLSP/SNP would like to understand site owners' knowledge of the designation and its conservation role, their understanding of the ecological interest of their sites, as well as their emotive feelings towards stewardship.

This project methodology would be to conduct an attitudinal survey of owners of Sites of Nature Conservation Importance in Surrey. Support will be provided in terms of connecting with appropriate landowners.

Key references:

Defra. (2006). Local Sites, Guidance on their Identification, Selection and Management

Lawrence, A. and Dandy, N. (2014). Private landowners' approaches to planting and managing forests in the UK: what's the evidence? Land use policy 36: 351-360

Surrey Nature Partnership. (2019). Policies and Procedures for the Identification & Selection of Sites of Nature Conservation Importance in Surrey & Surrey Local Sites Partnership - Terms of Reference

● Project 5.2: The Ability of Volunteering with the Wildlife Trusts to Deliver Green Social Prescribing

Working with: Education & Engagement Team

&

Field Season: N/A

There has been a large amount of research into the health and wellbeing benefits of our interactions with the natural environment, with significant benefits deriving from as little as two hours a week spent in nature (White et al., 2019). In more recent work, it has become apparent that even simple activities (such as appreciating flower-scent) and relatively low levels of nature connectedness are actually critical for improving health and wellbeing (Richardson et al., 2021). Our levels of nature connectedness have clear and intrinsic links with our hedonic and eudaimonic wellbeing (Pritchard et al., 2020). Very useful research could therefore be conducted into local consumers' propensity to pay for the ecosystem services benefitting health and wellbeing, especially as "green social prescribing" gains momentum amongst healthcare providers (Thomson et al., 2020).

In-depth, Surrey-centric research into this area of beneficial nature engagement would be desirable to better understand the role for green social prescribing in our county. This research would better inform Surrey Wildlife Trust on how to incorporate optimal health and wellbeing outcomes into our engagement provision, similar to the recommendations made in Richardson et al. (2021). A recent pilot study with the Trust as partners examined the experiences of conservation volunteering groups under the lens of green prescribing. The study found that it would certainly be viable to consider the volunteering offer as green prescribing, but that further work was needed to investigate, for example, the before and after impacts of activities.

The project would likely work with volunteer groups across the Trust to help understand if it is providing adequate green prescribing value. Methodology would primarily be sociological in nature, and likely involve questionnaires, interviews and focus groups.

Key references:

Pritchard, A., Richardson, M., Sheffield, D. and McEwan, K. (2019). The Relationship Between Nature Connectedness and Eudaimonic Well-Being: A Meta-analysis. *Journal of Happiness Studies*, 21(3), pp.1145–1167.

Richardson, M., Passmore, H-A., Lumber, R., Thomas, R., & Hunt, A.(2021). Moments, not minutes: The nature-wellbeing relationship. *International Journal of Wellbeing*, 11(1), pp.8-33.

Thomson, L., Morse, N., Elsdon, E. and Chatterjee, H. (2020). Art, nature and mental health: assessing the biopsychosocial effects of a “creative green prescription” museum programme involving horticulture, artmaking and collections. *Perspectives in Public Health*, 140(5), pp.277–285.

White, M.P., Alcock, I., Grellier, J., Wheeler, B.W., Hartig, T., Warber, S.L., Bone, A., Depledge, M.H. and Fleming, L.E. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific Reports*, 9(1).

● Project 5.3: The Impact of Outdoor Learning on Attitudes to Learning

Working with: Education & Engagement Team

Field Season: N/A

Outdoor Learning is a pedagogical approach that can be defined as simply as any lessons conducted in an outdoor setting, such as the school grounds. There is no strict requirement for utilising natural resources or teaching in nature reserves; the simple act of conducting learning in the school grounds has been proven to increase engagement in the subject and enhance wellbeing (Becker et al., 2017). While much research has investigated these benefits, we are yet to understand how it impacts students’ attitudes to learning, and consequently their attainment at school (Mann et al., 2022). This could be a key motivating factor for teachers and decision makers to implement outdoor learning within their schools.

Surrey Wildlife Trust has recently piloted its Wilder Schools programme (Surrey Wildlife Trust, 2022), in which we work with schools and encourage them to utilise their grounds for outdoor learning. The Wildlife Trusts aims to make 1 in 4 people take action for nature and believes that any form of outdoor learning provides the potential for increasing student’s nature connection and therefore the likelihood of pro-environmental behaviours.

This project would be desk-based and involve qualitative methods such as interviews and analysis of data collected by the Wilder Schools project.

Key References

- Becker, C., Lauterbach, G., Spengler, S., Dettweiler, U. and Mess, F. (2017). Effects of Regular Classes in Outdoor Education Settings: A Systematic Review on Students’ Learning, Social and Health Dimensions. *International Journal of Environmental Research and Public Health*, [online] 14(5), p.485.
- Mann, J., Gray, T., Truong, S., Brymer, E., Passy, R., Ho, S., Sahlberg, P., Ward, K., Bentsen, P., Curry, C. and Cowper, R. (2022). Getting Out of the Classroom and Into Nature: A Systematic Review of Nature-Specific Outdoor Learning on School Children’s Learning and Development. *Frontiers in Public Health*, 10.
- Surrey Wildlife Trust (2022). Wilder Schools. [online] Available at: <https://www.surreywildlifetrust.org/what-we-do/outdoor-learning/schools/wilder-schools>



Theme 6

Valuing Nature: Natural Capital & Ecosystem Services

● Project 6.1: How can we quantify the potential that newly created SANGs and other restored landscapes offer to the Nature Recovery Network?

Working with: Nature Based Solutions Team

Field Season: N/A

Suitable Alternative Natural Greenspaces (SANGs) are existing open areas identified for access and other enhancements, aiming to provide additional accessible open space for local residents. This forms a major part of the mitigation strategy to protect the composite Thames Basin Heaths Special Protection Area (SPA) from encroaching housing developments and to minimise the inevitable impacts of an increased local community on the component sites of the SPA (Allinson, 2018). It was necessitated from research showing that over 5 million visitors a year accessed these sites, and that the majority of them were dog walkers, which caused considerable concern regarding disturbance of the ground nesting birds driving the designation (Liley et al., 2005).

The Thames Basin Heaths are a network of internationally designated sites protected for their important populations of multiple rare bird species (Woodlark, Nightjar, Dartford Warbler) as well as many nationally rare reptiles and invertebrates (Natural England, 2014). Surrey Wildlife Trust is responsible for the management of a significant area of these heaths and is now also involved in the restoration of sites for SANGs provision. There is a need for research proving the efficacy of these sites to not only offset footfall on the SPA, but also to support local biodiversity recovery programmes, using the opportunity presented by Biodiversity Net Gain obligations and the role of this in progressing the Nature Recovery Network.

The project could involve a mix of field and desk-based work, conducting ecological surveys of the SANGs sites under different management prescriptions. The project would be expected to output an evidence-based set of recommendations for the role and management of SANGs within a biodiversity, landscape and policy context.

Key references:

- Allinson, E. (2018). The role of suitable alternative natural greenspace strategy in protecting high-value wildlife sites. University of Southampton, Doctoral Thesis, 230pp.
- Liley, D, Jackson, D. & Underhill-Day, J. (2005). Visitor Access Patterns on the Thames Basin Heaths. English Nature Research

Report XX. English Nature, Peterborough

- Natural England. (2014). NE530: NCA Profile:129 Thames Basin Heaths, Natural England.

● Project 6.2: Evaluating different Natural Capital metrics for biodiversity opportunity areas

Working with: Research & Monitoring Team

Field Season: N/A

The term 'Natural Capital' is increasingly part of the vernacular surrounding environmental issues and solutions. It can be defined as the stocks and flows of natural assets, which provide value to people and can be ascribed a monetary value. A conservative estimate of the 2015 value of the UK's natural capital was approximately £761 billion (ONS, 2015). As the concept increases in acceptance and importance within policy, many toolkits have been developed to provide calculated estimates of the value held by an area of land based on the habitats and natural features present (Defra, 2020).

The Surrey Nature Partnership published a National Capital Investment Strategy for the county in 2018 (SyNP, 2018), highlighting the need for a Natural Capital Approach to attract investment in Surrey's natural assets. As part of this ambition, a natural capital account was completed by an environmental economics consultant for the Holmesdale Biodiversity Opportunity Area in 2019. This visioning piece used one method to calculate the current and potential value of the area by 2050, but now that so many metrics exist, it would be useful to evaluate the outputs of each tool in comparison to the consultant's account.

This would be a desk-based project, involving GIS and data works, and using a variety of different natural capital metric and modelling tools such as InVEST, Zonation 5 and EBN. Support would be provided for technical work.

Key references:

- Defra (2020). Enabling a Natural Capital Approach guidance. [online] Available at: <https://www.gov.uk/government/publications/enabling-a-natural-capital-approach-enca-guidance/enabling-a-natural-capital-approach-guidance>.
- ONS (2015). UK natural capital - Office for National Statistics. [online] Available at: <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/ecosystemserviceaccounts1997to2015#:~:text=These%20services%20include%20food%2C%20water>
- Surrey Nature Partnership (2018). Natural Capital Investment Plan for Surrey. [online]. Available at: <https://surreynaturepartnership.files.wordpress.com/2018/03/natural-capital-investment-plan-for-surrey.pdf>

Examples of Ongoing & Completed Projects



The Impact of Demon Shrimp on Surrey's rivers

Philip Murray, Osian Holgate, Katherine Ryan, Georgia Rooney-Anderson (Royal Holloway), Ash Wood and Josie Lawrence (University of Surrey)

Demon Shrimp (*Dikerogammarus haemobaphes*) has now established and spread across much of the UK, since its arrival in September 2012 (Environment Agency, 2012). There is a relatively poor understanding of the impacts associated with *D. haemobaphes* in comparison to the closely related *D. villosus*, which has been extensively studied. There is some evidence to suggest that the species could pose a similar threat to native organisms in freshwater systems

The species was detected by the Environment Agency in 2015 in the River Wey. The project attempted to update the distribution map for Surrey, but surprisingly did not detect the species in any of the samples taken. This suggests that the initial invasion failed and will lead onto further work to confirm the absence via eDNA and additional sampling.



How best to manage habitat for the Shining Pot-beetle?

Stephen Woodcock (University of Sussex)

The Shining Pot-beetle (*Cryptocephalus nitidulus*) is a UK Biodiversity Action Plan Priority species and is considered to be nationally endangered. The beetle has very poor dispersal

abilities and is associated with transient early-mid succession scrub habitats, such that in the modern landscape it has become very difficult for it to persist and colonise new sites. Indeed, this may be to the extent that a lack of mixing between populations is beginning to cause genetic separation.

C. nitidulus was thought to have been confined wholly to a limited area of the North Downs in Surrey. The project found the beetle at a number of additional sites in the Downs, and in much higher numbers than expected. A number of *C. coryli*, also endangered, specimens were also found. This data is currently being analysed to generate some management recommendations for sites in the North Downs.



Impacts of conservation grazing on reptiles

Gareth Reed (Kingston University)

Conservation grazing has long been used by environmental organisations in the UK to manage a variety of habitats, including heathland. Lowland heathland is an internationally important and protected habitat, and the UK is a key stronghold with 20% of the total European area (English Nature, 2002). The vast majority of practitioners believe that extensive grazing is the most effective management option, but various studies have evidenced a number of negative impacts (Newton et al., 2009). In particular, it has been shown over-grazing can detrimentally impact populations of reptiles, including the highly Smooth Snake *Coronella austriaca* (Reading and Jofré, 2015).

Two of the Trust's reserves are being studied for this project with a focus on Adders, Whitmoor Common and Folly Bog on Brentmoor Heath. The latter represents Surrey's best examples of valley mire on lowland heathland, where botanical interests have traditionally held sway. Historic data is being provided by SARG and will be supplemented by additional surveys this year – specifically within the grazing exclosures on Folly.



Rewilding Private Land: An Analysis of Landholder Perceptions and Attitudes in Surrey

Maelle Jacqmarcq (Imperial College London)

Rewilding is an ambitious and powerful new zeitgeist in conservation, which has generated much attention from the general public as well as the scientific community (Jepson & Schepers, 2016). Over the last decade, several flagship continental rewilding schemes have been implemented and there is now a well-established bank of case studies of the positive impacts rewilding can achieve (Egoh et al., 2021). However, there is a worrying lack of consensus

around exactly what rewilding should entail, and the extent to which it is supported by scientific evidence (Nogués-Bravo et al., 2016). Rewilding has emerged as an unavoidably emotional subject, with media-stoked tensions between stakeholders becoming a necessary element of many rewilding projects (Wynne-Jones et al., 2018).

Within Surrey, there are many large estates which could be key players in rewilding projects across the county. This project interviewed several suggested stakeholders to explore their perceptions and any concern around the topical issues. The study found that landholder valuations of rewilding are significantly influenced by their personal interpretation of the term, with more favourable attitudes expressed towards active forms of rewilding that have a low impact on existing human activities. Uncertainty about rewilding's meaning and external sources of compensatory funding causes rewilding avoidance or delay among some landholders. There was significant concern around the need to balance rewilding goals with food security. Finally, the results illustrate that understanding and valuing of local views is essential to enable a better consideration of practical constraints, whilst helping to reduce polarisation, mistrust, and negative attitudes towards concepts of rewilding.

Afterword

The wider aim of this research is to continue to challenge the conundrum whereby good scientific evidence generated by the academic sector routinely fails to usefully inform biodiversity conservation in practice. Historically, accessibility to research and evidence has been an issue and the majority of conservation actions have remained experience based and heavily reliant on anecdotal knowledge. We believe that evidence and the outcomes of applied ecological research should be freely available and as accessible as possible to land managers and decision makers. The Wildlife Trusts is well placed to act as a conduit for the dissemination of this information through both our own practice and our close ties with partner land managers. We hope that through the work produced by this research prospectus we can positively influence the discourse surrounding conservation actions and their relationship with academia and applied ecology.

Contact and further information

The primary contact for research projects is ben.siggery@surreywt.org.uk, please contact him in the first instance to express interest.

This document will be updated on the Surrey Wildlife Trust website as projects are allocated, which will then be indicated by a “reserved” watermark.

Please check the current version at: surreywildlifetrust.org/research



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