

## The Vanishing Viper: Priorities for adder conservation

Draycott Village Hall, Cheddar, Somerset, BS27 3UE

Sat 8th - Sun 9th October 2016

### Session 1: Strategic challenges and solutions for adder conservation

**Strategic challenges and solutions for adder conservation, Jim Foster, Amphibian and Reptile Conservation, Witley Centre, Witley, Godalming, Surrey GU8 5QA. Email: [jim.foster@arc-trust.org](mailto:jim.foster@arc-trust.org)**

Concerns about the status of the adder *Vipera berus* in Great Britain have been growing over the last two decades. Reports of severe declines and even county-level extinctions are especially alarming, yet the species remains widespread and there are stable or increasing populations in most regions. A similar picture of patchy status emerges from parts of the continent with broadly comparable landscapes. On balance, in the UK the limited evidence indicates that this patchy picture is weighted toward declines. A single prevalent cause for declines is unlikely, with a range of factors apparently contributing to reduction in conservation status in a non-uniform manner. Commonly reported factors include habitat management creating unfavourable conditions, vegetation succession due to a lack of habitat management, and human disturbance. Whilst those issues can be addressed locally, a strategic approach to adder conservation would increase the chances of making gains across a broader area. In this presentation I set out some fundamental challenges facing adder conservation: creating and maintaining suitable habitat for a mid-successional species; setting target population levels alongside other site objectives; vulnerability of small, isolated populations; improving evidence for status and drivers of change; and inadequate awareness of the adder's status and requirements among conservation managers. A national Species Action Plan and a range of guidance documents exist, but seeing real gains will require greater adoption by key stakeholders, resources for implementation, and a significantly improved biodiversity infrastructure. Changes to the key processes driving land management, such as agri-environment schemes, forestry and SSSI regulation, could result in gains for adders, especially if they are more outcome-focused. A useful short-term approach could be to target effort toward improving the condition of certain habitat types thought to disproportionately harbour declining adder populations. Improving national surveillance, as envisaged by ARC, should be a significant help since this would assist with assessing progress towards targets, diagnosing factors affecting status, and raising the profile of adders among decision makers. The substantial interest from herpetologists, as evidenced by this conference, bodes well for future efforts in adder conservation.

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**National status and trends of adders in Britain: what do we know? John Baker (ARG UK), Angela Julian (ARG UK) & Jim Foster (Amphibian and Reptile Conservation), email: [info@arguk.org](mailto:info@arguk.org).**

A questionnaire survey was carried out to gather informed opinion on adder status. The questions repeated two previous lines of work. The first investigated status at a regional level and changes in status since 1990 (following two studies carried out by the Nature Conservancy Council covering periods prior to 1980 and the following decade). The second part of the survey asked about population status and trends at specific sites, known well to respondents, also repeating a previous questionnaire (carried out by English Nature and Froglife in 2002/2003). The responses indicate a continuing decline in adder status. However, there were differences between the current and previous survey methods. The latter were carried out through targeted correspondence, the current survey was eb-based. The current survey drew fewer responses, which limits the strength and extent of conclusions drawn. Nevertheless, there are also indications of the reliability of data reported.

## **Session 2: Insights from survey and research**

**Long-term monitoring of *Vipera berus*: an opportunity to generate site-specific evidence on the impacts of environmental variables, Rick Hodges and Clifford Seabrook, Kent Reptile and Amphibian Group (KRAG), email: [info@kentarg.org](mailto:info@kentarg.org)**

Long-term population monitoring projects for the northern viper (*Vipera berus*), at specific sites, have the potential to generate evidence about the impact of factors such as habitat management and climate on reproductive success and mortality. By demonstrating population changes over time they can also contribute to an assessment of conservation status. Since 2008, one such a project has been implemented on a 10ha chalk grassland nature reserve in west Kent, and is planned to continue for many years to come. The monitoring methodology involves recording the vipers along a standard route through the reserve and from beneath paired refuges of corrugated iron and roofing felt placed along the route. Refuges have been deployed at 4 pairs/ha and 60 to 70 monitoring visits to the site are made annually. Individual vipers are recognised by their head-scale and neck patterns and currently 483 individuals are known. Of these 7% were recorded within 12 months of birth and subsequently reached adulthood. Some preliminary results on population fluctuations and individual behaviour will be presented as examples of what long-term monitoring can achieve. For the future, some standardisation of monitoring procedures may help to increase comparability between study sites and some thought is required about how in-depth studies of this kind could help with the interpretation or more extensive, but necessarily more superficial, surveys.

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**How do we turn surveys into an assessment of conservation status? Steve Langham , Surrey  
Amphibian and Reptile Group (SARG)**

Without an objective, evidence-based and common approach to determining how well adders are doing at site, regional or national level; all we are left with are disparate and subjective methods that are little better than personal opinion. The community undertakes surveys, but how useful are these surveys for determining status? Common survey results are dots on maps, detectability and peak counts. Presence can be deduced, but absence is more difficult. This short presentation illustrates how some of the more common survey metrics can be misleading, and how we could turn survey data into a true indication of adder conservation status.

**Using radio telemetry to unlock the secret life of the adder, Nigel Hand, Central Ecology,  
Herefordshire Amphibian and Reptile Team (HART)**

Adders are observed and recorded when newly emergent at known hibernacula locations, but following single snakes long term is extremely difficult when using observational survey techniques. After 6 years of perfecting external radio tag attachment Nigel has followed over 50 adders on sites within central and southern England. Sites varying from grazed common lands to forestry plantations and hillside ranges. With volunteer help he has provided valuable information for conservation bodies including the Wildlife trusts, National Trust, Forestry Commission and Malvern Hills Conservators.

This presentation will reveal movement and behaviour information from these studies . The findings invaluable to those managing sites with adders and for those studying adder ecology.

**How did adders become extinct in Warwickshire, Jan Clemons, Chair, Warwickshire Amphibian  
and Reptile Team (WART)**

Back in 2004 WART (Warwickshire Amphibian and Reptile Team) became the lead partner for the adder in the Warwickshire, Coventry and Solihull Local Biodiversity Action Plan. As the adder was already rare in the Midlands it was consequently listed as a priority species in this local Biodiversity Action plan. Our first step was to determine the current distribution and status in the region. We started with the 24 sites where adders had been recorded and went back to these sites to have another look. Half the sites had gone and on several other sites only grass snakes were found. One adder site which happens to be the best reptile assemblage site in the county has been monitored for 12 years and still only common lizards, slow worms and grass snakes have been encountered. We still remain hopeful they are out there and we do try and follow up leads when we can using records sent to the local Biological Recording Centre and NARRS but validation is difficult without photographic evidence.

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So where have all the adders gone and more importantly how can we be confident that they are extinct in Warwickshire? In this talk we will explore this issue and highlight possible reasons why this has happened, if only to prevent it happening elsewhere before it is too late.

### **Session 3: Managing landscapes sympathetically for adders – the opportunities and challenges for land managers**

#### **Competing Priorities – Managing Quantock Common for all, Iain Porter, Development Officer, Quantock Hills AONB Service.**

Quantock Common, in the Quantock Hills consists of 2,500Ha of semi-natural habitat, primarily dry and wet dwarf-shrub heath and acidic flushes. There are also considerable areas of sessile oak woodland and scrub. Active management of this extensive common reduced after the Second World War as pressure for management of more productive agricultural land intensified. A number of commoners still grazed the common but other forms of management such as coppicing, swaling etc ceased.

Following the Foot and Mouth outbreak of 2001 there was concern from the Commoners, English Nature and the Quantock Hills AONB Service that the traditional management of the Common would cease leading to loss of the heath habitat. In 2002 the Quantock Commoners Association entered into a 10-year Countryside Stewardship Scheme over 1,300Ha of the common. The priorities included rhododendron control, bracken control swaling and hefting of stock.

We were aware of a lack of knowledge of adders across the Quantock Hills compared to other fauna such as heathland birds or deer. In 2008 the AONB Service was fortunately approached by a local researcher who wished to start investigating the populations and distributions of adders across the Quantock Hills. This monitoring carried on until 2010 and highlighted some important areas on Quantock Common for adders. In 2011 the AONB Service partnered with RAGS to continue the monitoring of Quantock Common with the aim of understanding the distribution of adders and using this information to inform future management.

In 2014 the monitoring effort had a direct impact on the Moorland Implementation Plan produced for the new Higher Level Stewardship Scheme. It targeted the no burn zones and also introduced measures such as 'patchy' or 'cut' burn patterns to increase connectivity of habitat. The monitoring continues and the burning plan is amended annually to include the latest monitoring data. The no burn areas will continue to be monitored and where necessary alternative vegetation management will occur.

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**Managing common land for adders – experiences from Greenham Common and beyond, Alex Cruickshank, Senior Land Manager, Berkshire, Berks, Bucks and Oxon Wildlife Trust (BBOWT)**

Managing land for nature conservation is often like riding a bike – it’s all about balance and control. Designation as Common Land can significantly reduce the amount of control that managers have over a piece of land and it adds more factors to balance when considering the functions that the land has to fulfil. The infamous Greenham Common is now a public open space, a nature reserve and a registered Common. Managed by the local Wildlife Trust for the past 3 years, it is home to one of the largest population of adders in Berkshire. But the Wildlife Trust have to negotiate for control over the management of the land with a range of stakeholders, and have to juggle the needs of adders with site users and other wildlife.

Alex will introduce you to Greenham Common, and will explain the complexities of managing Common Land for adders, as well as proposing some solutions.

**Managing ARC’s reserves for adders, and advising other land managers, Gary Powell, Senior Reserves Manager, Amphibian and Reptile Conservation**

Adders present a number of challenges for land managers, the greatest of which is ensuring that the correct type and level of habitat management work can be planned and implemented. ARC manages c 80 nature reserves of varying sizes, many of them home to adders. Attempting to improve on what we have seen in the past, we operate a system of early spring emergence surveys and from this are able to map distribution within sites; which in turn informs our management needs and allows us to direct our actions towards more sensitive habitat work. We aim locally to encourage the move away from sometimes detrimental ‘generic’ management towards more sensitive maintenance and enhancement of habitat for adders by training other organisations and land managers in adder ecology and habitat requirements. This also provides opportunities for sharing experience and knowledge and allows us to reflect on the constraints that we all face as managers of wildlife reserves; that we must attempt to cater to the habitat requirements of multiple taxa and find a balanced approach.

**Management on Hounslow Heath LNR 2000 to 2016: A description of site management on Hounslow Heath Local Nature Reserve from the translocation of adders on to the site in 2000 through to the present day, Christopher Slack, Carillion Plc**

The presentation will discuss changes in management regime, approach and public pressures over the 16 year period. It will look at the expansion of the population since its introduction and the effects of varying disturbance on this expansion.

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Hounslow Heath and the adjacent golf course are 124 hectares of mixed neutral grassland, scrub, heathland, acidic grassland and broad-leaved woodland. It is adjacent to two corridors one formed by the London-Staines railway line and one by the River Crane which run to the south and east of the site respectively. The site lies in the suburbs of west London a mile from Heathrow Airport and with a population of some 40,000 people within 1km of the site. The principal site users are dog walkers and people using the site for recreational walking although there is a main path through the site which people use to avoid the busy surrounding roads when getting to work.

The site is managed by a mixture of a small permanent countryside team which operate throughout the borough of Hounslow and 2 main volunteer groups who are on site 2 days a week. The main management element is the cutting and removal of grass and scrub through mechanised and hand tool means undertaken during the autumn and winter months. Up to 20 hectares of the site both neutral grassland and heathland are enclosed and have been grazed by cattle since 2001. There has been 25 years of heathland restoration undertaken on the site which has seen several areas on the western half of the site scraped down to gravel subsoils and reseeded with heathland species.

Forty two Adders were introduced in 2000 on a north facing heathy edge of a deciduous woodland block. From there the adders spread due north to occupy the north western areas of open habitat some 20 hectares by 2010, following this they expanded to the west on to more neutral habitats. During this time the site was managed holistically to encourage heathland, species rich acidic and neutral grasslands and diverse scrub habitats. Due regard was given to adders in terms of work timing and location of hibernacula which were surveyed each year.

During the 16 year period there were many small and one severe fire in 2003 which burnt a third of the site close to the introduction area. Other issues which may have affected the snakes included dog walking which has increased slightly and the general increase in public usage to over 200,000 visitors per year today. Signage on adders is displayed on the site notice boards to inform people of their presence as a public safety issue.

The adder population has expanded from 42 to an estimated 5 times that number today with a very broad age structure. They now inhabit nearly all of the main LNR reserve some 81 hectares.

**Impact of a change of management on the main Peak District adder population and the effect of current & historic English upland management on the distribution of adders, Chris Monk (Derbyshire ARG)**

The Eastern Moors Estate of the Peak District holds the main population of the adder in the Peak District and is owned by the National Park Authority who formerly managed it after acquiring the land in the late 1970s. Their management could probably be best characterised as mostly benign

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neglect with sheep grazing but all this changed when it was leased for management to the joint RSPB/National Trust Eastern Moors Partnership in late 2010.

Management then changed to follow the standard prescription of cattle grazing, the sheep were removed and habitat work was prioritised for birds and flora some of which has had adverse effects on the adders. Increasing public use of the site has also been another priority for the Partnership. Work to protect the adders has up to now been retrospective to try and correct damage that has happened since 2010, though we are promised that pro-active management for adders is now a priority for the next year.

Outside the Estate adders are very rare and only scattered peripheral populations seem to exist all the way north along the spine of upland England and this relates to other management regimes, which are briefly discussed.

**Workshop: Public interactions with adders – what messages should we be broadcasting, Facilitated by Pete Hill & Mark Barber, Amphibian and Reptile Conservation (ARC).**

Are public interactions with adders having an effect on their conservation at a national and local level? What can we do about photographers disturbing adders? How should we deal with the media and adder bites? Should guided walks on open access sites involve adder hibernacula? How can we encourage increased recording without increasing disturbance? You tell us!

**Session 5: Site protection, regulation and policy issues**

**How does the law protect adders? Tony Gent, CEO, Amphibian and Reptile Conservation (ARC).**

Although protected against sale through the original enactment of the Wildlife & Countryside Act in 1981, the adder was the last British reptile species to receive protection against intentional killing or injuring with opposition to the protection of a venomous snake delaying this until 1992. International legislation provides limited protection – with the listing on Appendix III of the Bern Convention merely requiring measures to be put in place to regulate trade. While the Wildlife & Countryside Act still provides the basis for legislative protection of the adder, the delivery of legislation, policy and funding measures is increasingly devolved in the different countries of Great Britain.

Adders do receive some additional conservation support through other legislation and policy mechanisms, notably through site designation (Sites of Special Scientific Interest). However it is recognised that very few sites are designated for their reptile interests and that conservation objectives on these sites often do not adequately address the needs of this species and so the benefits from site protection for adders are mostly coincidental. The adder, though, is identified as a

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conservation priority species through separate legislation in England, Scotland and Wales and this legislation, which also places Statutory Duties are placed on Government and Governmental agencies, should provide a valuable framework for achieving conservation actions. Biodiversity conservation, including protecting individual animals and safeguarding areas of habitat, can be taken forward through land use planning policy and legislation and these too offer scope for making both short term and long terms gains for the species.

However despite these measures adders still appear to be declining. Legislation can be hard to interpret and enforce, and biodiversity policy measures are often poorly implemented. Where biodiversity conservation is happening, adders do not always benefit and indeed seems sometimes to be adversely impacted by ‘conservation management’ work. Are stronger legislative protection measures called for? Might improvements in policy wording and application help? Are non-legislative and non-binding measures such as the development of best practice or through funding incentives more likely to be successful? This talk will explore what approaches in today’s political and economic climate might achieve the best outcomes for conserving this charismatic, but often unpopular, species.

**What is Natural England Doing About Adder Declines? Paul Edgar, Senior Environmental Specialist (Amphibians & Reptiles), Natural England**

Along with many others in the conservation community, Natural England is concerned about the increasingly serious declines being reported for a number of formerly widespread species. Contrary to popular opinion, this concern extends to the plight of the adder in many parts of England! A brief summary is given here about the work that Natural England is undertaking to help investigate and address adder declines (as well as the things we can no longer do). The talk is divided into the following areas:

- Policy/Legislation
- Protected Sites
- Wider Countryside Management
- Species Conservation
- Improving Evidence

It is clear that a major collaborative effort by the statutory agencies, NGOs, research bodies and the voluntary sector will be needed improve the conservation status of the adder. Despite ongoing structural changes and budget constraints, both of which seem likely to continue for some years, Natural England is determined to support such efforts in any way it can.

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**Site protection, regulation and policy issues – the experience in Wales, Liz Howe, Natural Resources Wales (NRW)**

Despite the fact that there are just over 1000 SSSI in Wales, only 1 of them has adder as a feature and then as part of a reptile assemblage. The SSSI guidelines had no provision for adder as an individually qualifying feature and assemblages could only be notified if there was strong evidence that a particular site held the best populations of reptiles. Clearly, there is a gap here that needs filling.

Protection of adders through other mechanisms has mainly been through s42 and now s7 priority listing that places the biodiversity duty on local authorities and public bodies to take account of biodiversity in their activities. S6 of the new Environment Wales Act 2016 strengthens this and we hope that new guidance will be produced to explain the new Biodiversity Duty.

Generally, development schemes include reptile surveys and project plans generally include provision for capture and translocation of animals. However, as this is out of the scope of protected species licensing, the ability to control and enforce conditions are somewhat limited. It would be useful to discuss how this situation could be improved.

**Session 6: Mitigating development impacts**

**IUCN Guidelines and adder translocation, Richard A. Griffiths and Gemma Harding, Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, Canterbury, Kent, CT2 7NR, UK: email R.A.Griffiths@kent.ac.uk**

IUCN guidelines for conservation translocations have existed for nearly 30 years. The most recent version was published in 2013, and recommends that mitigation proposals should follow the same process of design, feasibility, monitoring and adaptive management laid down for conservation projects. However, these guidelines are rarely utilised for translocations carried out for development mitigation. As a result, reptile translocations in the UK may lead to poor conservation outcomes. In order to deliver conservation outcomes rather than just mitigation outcomes, we present ten criteria distilled from existing guidelines and recommend that these as a framework for carrying out adder translocations.

**Mitigation for Adder *Vipera berus*, Jonathan Cranfield, Herpetologic Ltd**

A project case study, from the East of England, will be used to illustrate successful mitigation methods which helped conserve and protect adder populations found within flood alleviation works on the Norfolk Broads. Survey outcomes, mitigation strategies, follow up management and monitoring will all be detailed to inform other projects across the UK.

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**Adders and Development: A case study from Essex, Darryn J. Nash, Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, Canterbury, Kent, CT2 7NR, UK**

Although translocation of reptiles from development sites is frequently carried out as part of mitigation, the fate of translocated animals is poorly understood. In 2014, planning permission was granted for the redevelopment of a golf course in Essex. Surveys identified a large population of adders within the footprint of the development. The adders were translocated 600 m from the north of the golf course to the south, where a receptor site had been prepared. Of the translocated adders, eight were fitted with radio tags and tracked for a period of 10 days in April. In August, a second round of tracking was undertaken involving both translocated and resident adders at the receptor site. In each case, daily movements and multiple range analyses were calculated. Male adders, on average, exhibited greater daily and unidirectional movements and maintained larger home ranges than resident conspecifics. Two of the males appeared to make extensive movements back to the donor site. Translocated female adders remained largely *in situ* and did not differ in movements or home ranges from resident females. Implications for mitigation are discussed.

**Reptile Mitigation in Peatland Habitat in Kintyre: Is prevention better than the cure? Ian Bradley, Ecological Clerk of Works (presenting), Chris Cathrine, Director, Caledonian Conservation.**

Caledonian Conservation Ltd was contracted by Renewable Energy Systems Limited (RES) to design and undertake ecological mitigation for an underground powerline project in Kintyre, Argyll & Bute, Scotland. Once complete, the powerline will connect Freasdail Wind Farm (also currently under construction) to the National Grid. The site crosses over 10km of remote peatland habitat, where adders and common lizards were known to occur. It was considered that installation of exclusion fencing would have significant negative impacts on reptiles and other wildlife, and so alternative approaches were developed, relying on careful siting of the route and supervision by an Ecological Clerk of Works (ECoW) with reptile expertise. Works began in April 2016 and are due to be completed in October. The mitigation approaches will be discussed in detail, as well as results to date, challenges and lessons learned.

**Conservation status of the Adder in London 2016, Will Atkins, LEHART**

Historic records indicate that adders occurred in London and Greater London, but their range was considerably decreased by the 1950s, with the prospect of local extinction if no remedial actions were undertaken. The Hounslow Heath translocation provided an opportunity to reintroduce adders to this area, and LEHART have been closely involved in the monitoring of this. The factors contributing to the success of the project are reviewed, together with some of the challenges faced.

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### Adder Translocation Case-study, Hounslow Heath, Gareth Matthes, GPM Ecology

The case study concerns an adder translocation from Queenwood Farm to Hounslow Heath in 2000. The three key stages of the translocation are discussed: how the receptor site was selected; then how we undertook the release; and finally how we monitored the site post release, and measured the success of the translocation.

In order to be considered suitable the receptor site had to fulfil the following criteria including: whether the site was big enough to support an adder population; was it safe from development; were the appropriate permissions in place; was the land-owner sympathetic; was it in close proximity to the donor site (ideally within same river catchment); and was there sufficient suitable habitat to support the incoming population.

Following the release, the translocated animals were monitored using three criteria: persistence of suitable habitat, presence/absence of adders, and the population status of the animals. Finally the presentation will review the entire process, and highlight the main considerations necessary for success, as well as some of the obstacles to overcome.

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## The Vanishing Viper: Priorities for adder conservation

### Poster Presentations

#### **Adders in Epping Forest, Graham Walters, John Pickett, Simon Townson, British Herpetological Society (BHS)**

A significant proportion of Epping Forest consists of open grassland and heathland, where early surveys showed one of the largest populations of adders existed within the Greater London region. The Forest is protected by its own Act of Parliament which was intended to provide a green lung for Londoners 'for all time', while at the same time conserving the 'natural aspect' of the area, posing a difficult but familiar problem for conservationists trying to balance the two demands on land of conservation and leisure. In this study, our surveys from the 1960s to the present time have shown an overall decline in adders, both in the number of sites that hold this species and in the size of populations at these sites. Indeed our most recent observations in 2015/16 indicate a widespread and alarming decline in adders across the forest. While we recognise that providing the conservation requirements of a range of species and biodiversity in restricted areas can often be difficult, we believe that relatively modest changes to the vegetation management of the open areas of Epping Forest would help to restore adder populations.

#### **A problem of scale: habitat management affects thermal regimes and rates of predation on adders, John Worthington-Hill, MSc Applied Ecology and Conservation, University of East Anglia (UEA)**

Due largely to the discontinuation of traditional land management practices, lowland heath has undergone significant loss and fragmentation over the past century. Modern management systems to prevent further loss are typically less diverse in terms of disturbance regimes and fine-scale temporal and spatial variability. As a result, they often involve the extreme and extensive reduction of vegetation structure, a process thought to be implicated in the decline of the adder *Vipera berus*. Thus, we carried out experiments on heaths across lowland England to quantify the effect of habitat structural complexity on adders. We found that the thermal environment was significantly degraded where complex vegetation had been removed. Vegetation structure provided thermal heterogeneity needed for effective thermoregulation and refuge from dangerously high ground temperatures in summer. Adder models were also subject to significantly higher rates of predation in these areas. While very few attacks by natural predators were recorded, the majority of damage to models resulted from trampling by grazing livestock and dog attack, the latter also increased in close proximity to footpaths. Through alteration to the thermal environment and elevated rates of predation, current heathland management regimes are argued to be detrimental for adders. To alleviate these effects, habitat management that is sensitive to the requirements of adders must therefore focus on retaining the structural complexity of vegetation, for example through fine-scale, *Conference supported by*



low-impact scrub control practices. We also highlight the need for measures to prevent threats to adders directly associated with recreational activity. These outcomes are expected to be favourable for a range of other heathland species.

**Investigating the role of Temperature and Vegetation Structure in influencing microhabitat Selection in basking male European Adders (*Vipera berus*), Erin Thomas & Kevin Palmer, Reaseheath College, Nantwich, Cheshire. CW5 6DF, Correspondence: [kevinp@reaseheath.ac.uk](mailto:kevinp@reaseheath.ac.uk)**

Ectothermic organisms, including reptiles, are required to employ thermoregulatory behaviours in order to optimise their physiological and behavioural performance, and maximise individual fitness. Despite the role of temperature in influencing habitat selection by reptiles being well documented within the literature, such studies have largely been constrained to species within North America. Additionally, few studies have attempted to examine the combined role of microhabitat structure and the subsequent thermal experience on habitat selection. Here we explore the relationship between vegetation structure and thermal microclimate of basking microhabitats selected by a declining British species, the European adder (*Vipera berus*). To determine the influence of temperature and vegetation structure on microhabitat selection, we drew comparisons between vegetation percentage cover and sward height between microsites selected by male adders for basking purposes, with that of the general vegetation conditions. Data loggers were used to compare the thermal environment experienced by basking snakes between selected and non-selected microsites. The relationship between the basking site temperature and the core body temperature of basking snakes was also investigated. Results indicate that there are clear differences in the structural attributes of selected sites for basking, when compared to the general vegetation conditions; with percentage cover at the subshrub level primarily influencing selection of a microsite for the purpose of basking. Selected basking sites boasted a significantly greater thermal profile to that of the general vegetation conditions, confirming temperature to be a primary driver for selection. Finally, cloacal temperatures of basking snakes positively correlated with an increasing temperature of the basking site selected, with snakes generally achieving temperatures either corresponding to, or succeeding that of their selected site of basking.

Here, we provide further evidence to support existing literature regarding the driving mechanisms towards the selection of particular microhabitats, and how developing our understanding of such topics central to ecology may assist in the conservation of the species in future.

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