Vanishing Viper 2019: A European approach to developing an adder conservation strategy

Brambell Building, Bangor University, Deiniol Road, Bangor, LL57 2UW

Session 1: Adder conservation – what are the concerns? Chair: Natasha Savage, NWWARG

Is the Adder Vanishing, should we be concerned and what is needed to safeguard populations?

Nigel Hand, Central Ecology, Trustee ARG UK), www.centralecology.co.uk

Nigel Hand has been involved in adder conservation for over 20 years and has radio tracked populations for the last eight years across central and southern England. His adder telemetry has provided mapped movements and helped close study off individual adder behaviour, all of which improves focussed adder management.

Despite a growing public awareness of the importance of biodiversity and wildlife habitats the adder still faces threats to its habitat and conservation and many Midland sites, even those considered to be the most robust, have seen declines. Is there enough initiative and concern for the species in the UK in conservation management and what measures are needed to improve the situation for the adder.

Adder conservation priorities: feedback from the Vanishing Viper 2016

Richard A. Griffiths[1], Louise Masters[1], Lawrence Hills[1] and Steve Langham[2]

[1]Durrell Institute of Conservation and Ecology, University of Kent, [2]Surrey Amphibian and Reptile Group

The 'Vanishing Viper' conference held at Cheddar on 8-9 October 2016 provided an opportunity to collate and synthesise expert knowledge on adder conservation. Following a series of formal talks on all aspects of adder conservation, a workshop session captured the issues raised at the meeting using a mind-mapping exercise. Thirty eight specific conservation issues relating to adders were distilled from the mind-map and categorised into eight general topics: legislation and policy; surveillance; research and ecology; resources; habitat management; development mitigation; public relations; information management. An expert panel was convened at the meeting to address the issues. The issues were circulated to the panel in the form of an online questionnaire, and the panel were asked to score each issue on a Likert scale of 1-5 for 'How important is this issue?' and 'How well is this being done now?' (i.e. current delivery of the issue). The vast majority of conservation issues identified were ranked as 'important', but none were regarded as being tackled well. The most important issues related to surveillance, minimising habitat fragmentation, educating land managers and understanding habitat requirements. There remain significant challenges in assessing species status and habitats, ensuring effective data flow and data management, dealing with

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negative publicity and conflicting conservation interests. On the positive side, opportunities exist to capitalize on citizen scientists and develop productive partnerships between different stakeholders.

One example of this is based in Kent, where a 15-year collaboration between the Forestry Commission, volunteers, ecologists and statisticians is starting to produce improved analytical tools for surveillance data that can also reveal potential drivers of population decline in relation to habitat and climate change. Equally, there may be potential to develop engaging conservation narratives for a public that is inherently – if not always positively – fascinated by snakes.

How robust are adder populations in the UK? A genetic analysis
Sarah Ball, Institute of Zoology

Genetic factors are often overlooked in conservation planning, despite their clear importance in small, isolated populations. We used microsatellite markers to investigate the genetics of the adder (*Vipera berus)* in the UK, focusing especially on the West Midlands area, where local conservation groups have flagged declining numbers of adders. Study populations show no loss of heterozygosity, with comparable genetic diversity across sites, in line with published levels for mainland Europe, even for small sites with high risk of decline. However, levels of pairwise relatedness and maximum likelihood-based inferred sibships suggest a high proportion of individuals in the sampled populations to be related at the half-sib level, with rare inferred full-sib dyads. This is consistent with the polyandrous breeding system in the adder, which may offset the risk of inbreeding in species of low fecundity and vagility. Genetic networks with higher numbers of inferred full-sib dyads and dominance by individual parents are apparent in some declining populations. These results suggest that reliance on standard indicators of inbreeding and diversity may mask demographic factors that make small adder populations vulnerable to extinction. We stress the importance of an integrated genetic and demographic approach in adder conservation.

Session 2: Managing sites sympathetically for adders: overcoming the challenges, Chair: Chris Monk (ARG UK)

Do Adders have a future in the Wyre? Meeting the challenges: Changing management practices in the Wyre Forest and Wye Valley National Nature Reserves
Tom Simpson, Reserves Manager, Wyre Forest and Wye Valley National Nature Reserves, Natural England

In this presentation I aim to answer the important question - Do Adders have a future in the Wyre?

We take a proactive approach to managing for reptiles, and particularly adders, in the Wyre Forest and Wye Valley National Nature Reserves. In the presentation, I will be focussing on the management of adder populations and habitat across the Wyre forest NNR and Moccas Hill Wood, a newly created wood pasture site. I will consider how different factors affect adder populations in the

forest, notably the impacts of habitat 'mismanagement' and public pressure, and how we are using past records and studies to inform future management across the Wyre. Positive management includes creation of open space and corridors to link populations and the viability of these populations, and we will be monitoring the impact of these practices. Another area of interest is whether Moccas Hill Wood, could be a suitable location for translocation, and I will discuss how we can achieve this.

Strategies for managing coastal sites for adders in Wales

Geraint Jones, Farm Conservation Officer, Pembrokeshire Coast National Park Authority (PCNPA)

The Pembrokeshire Coast National Park is the UK's only primarily lowland, coastal National Park. Remaining semi-natural habitats comprise approximately a third of its 615 sq. km land area. During the latter part of the last century, PCNPA recognised that management neglect and abandonment of coastal, terrestrial habitats was having a detrimental impact on biodiversity in those areas.

A successful bid for EU EAGGF 5b funding enabled the Park Authority to launch a three year project entitled **Gwarchod y Godiroedd/Conserving the Coastal Slopes** in 1999. A key aim of the scheme was to address the decline in traditional farming practices (primarily grazing) along the 420 km coastline which had resulted in the decline in its internationally important coastal wildlife. This included coastal heath, flower-rich maritime grassland together with a host of species that depend on them.

Due to the scheme's success, its work was mainstreamed into PCNPA's core funded work programme and expanded to the whole of the National Park and other habitats in Pembrokeshire under the **Gwarchod y Parc/Conserving the Park** scheme which has run since 2002.
Under-grazing is a key problem facing many habitats today. Indeed, it can be argued that agricultural abandonment is the main threat facing most of the remaining semi-natural resource in Pembrokeshire particularly common land. It has threefold consequences – a decrease in grazing viability, a consequent reduction in recognised biodiversity value and increased fuel loading resulting in a heightened risk of highly damaging and dangerous wildfires.

Re-establishing sustainable grazing regimes following the cessation of management particularly on extensive sites is challenging. The work includes rebuilding grazing infrastructure with capital expenditure (fencing, cattlegrids, water troughs etc.), the modification of vegetation to allow the re-introduction of livestock (cutting, harvesting, burning etc.) and the sourcing of appropriate grazing animals.

The work has resulted in the creation of the Pembrokeshire Grazing Network (PGN) to assist with sourcing appropriate livestock for conservation grazing operations and the Pembrokeshire Wildfire

Group (PWG) – a partnership of farmers and graziers, relevant public bodies such as Mid and West Wales Fire and Rescue Service and conservation bodies. This latter group has focussed on driving down incidents of wildfires and working with farmers and graziers to ensure controlled vegetation burning is carried out in an appropriate manner in accordance with the Heather and Grass Burning Regulations and Code of Practice.

Implementing management interventions (especially controlled burning) in an informed and sensitive way is critically important. From the reptile and amphibian perspective, PWG has been very fortunate in having had the proactive and positive input of ARG through the work of Sam Langdon and Mark Barber. One exciting innovation has been the development of an adder hibernacula location prediction system. The challenge will be to incorporate this information into management planning tools and apply it at a landscape scale.

Challenges and issues that face modern conservation

Kevin James, Mid-Lincolnshire Warden, Lincolnshire Wildlife Trust, midlincs@lincstrust.co.uk

Many of our nature reserves are far too small and are isolated across a fragmented landscape. This isolation, coupled with the uncertainty of climate change, could be regarded as the biggest threat we face to species extinction.

The Wildlife Trusts take a holistic approach to conservation, where all species deserve a place and are given opportunity to thrive. This can result in many target species on each reserve, identified by a range of conservation and funding parties. Each reserve can have a complex mosaic of habitats to accommodate this variety of species and any conservation management carried out to benefit one group of taxa, may impact on another. Consideration is always needed when practical management is carried out but can often result in conflict, offending an individual or one of the many specialist groups.

Funding driven conservation is certainly not the best way to attain a sustainable future for conservation but as a charity there is little that can be done to avoid it. Funding The Wildlife Trusts' work has always been through membership, donations, and legacies and most significantly through the Agri- Environment Schemes. Unfortunately, these schemes are directed at farms and not for the benefit of conservation organisation, which has resulted in many Trusts unable to enter the schemes and in some cases having to consider habitat destruction, in order to fit into the scheme criteria. The advice that The Wildlife Trust receives from both government and non-government agencies may also hinder rather than help. Advice can often be subjective, reflecting the individual's background or past ideologies, rather than informed by scientific fact or through sufficient consultation with The Wildlife Trusts.

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Nature reserves are also subject to intense outside pressure from development, tourism and recreation. This will depend on location and can be particularly relevant to urban fringe sites. There is little space left on many reserves for wildlife of all species to find sanctuary from the "keen naturalist", especially the digital photographer and with photos ultimately being uploaded to social media sites, detailing dates, secret locations and best times to see their quarry, a steady stream of photographers soon follow.

External and internal pressure, a lack of understanding from policy makers coupled with a changing climate and isolation, will push many species to the edge. Without all stakeholders coming together to create a sustainably managed and connected landscape, it may already be too late for many iconic species.

Session 3: The Northern European Perspective, Chair: Wolfgang Wüster

The adder in Germany. Or: When the truth hurts, there is little hope for conservation?
Ina Blanke, Independent consultant, www.reptilien-brauchen-freunde.de, Lehrte/Germany

In Germany, the Adder (*Vipera berus*) is rare. The current distribution centres are the Alps and Alpine foothills, the coastal area of the Baltic Sea, mountain ranges (especially in the Eastern Part of the country. Within this range, moorland (raised and lowland bogs) and heathlands are very important habitats. Most regions of Germany naturally are not inhabited by adders. In others, the adder disappeared along with its habitats, especially with the losses of the former huge moor complexes in the last two centuries. Indeed, commercial peat extraction is still going on in some areas, as long term contracts are still in place. Another major problem is the general dehydration of moors (due to peat extraction, agriculture and droughts in the last years).

Other concerns are the "exploding" populations of Wild boar (*Sus scrofa*), changes in forestry management and very probably also the climate change. Most of the adder populations live in nature reserves; thus their management is critical for the conservation of adders. Here improvements towards more reptile sympathetic conservation measure are urgently needed. After several years of discussion, a handbook for "reptile friendly management" should be printed soon. Hopefully not too late ….

A long-term (2000-2018) study of a large adder population in northern Belgium: demography and implications for conservation
Dirk Bauwens & Katja Claus, University of Antwerp

We present results of a long-term (2000-2018) citizen science study of the adder population at the military exercise zone "Groot Schietveld" (ca. 1570 ha; province of Antwerp, Belgium). This is a lowland area covered by a mosaic of heathlands, moorland ponds, woodlands and pastures. It is

entirely surrounded by agricultural land and residential areas that are totally unfavourable for adders. Adders are found over the entire military domain, but we concentrated our searches on 16 study plots (1 – 8 ha each; total search area: 46.5 ha). We used standard capture-mark-recapture methods to build an extensive data-set containing ca. 7300 records of ca. 3500 individual adders. Adders are very abundant in the domain: on average about 800 adult adders were estimated to be present per year in our search areas and numbers increased slightly over the study period; total population size is in the order of several thousand snakes. Adders undertake seasonal migrations between so-called "winter" and "feeding" (or summer) habitats. Adults are most easily observed in the "winter" habitats in heathland areas, while the immature adders spend most of their time in the feeding habitats that are located near, but outside of the heathland areas. Adult adders mainly forage and build up fat reserves in the summer areas, where the food supply is higher than in the nutrient-poor heathlands.

The population's demography was studied by using state-of-the-art analytical procedures that yielded reliable estimates of age-dependent yearly capture and survival probabilities and fecundities. Yearly capture probabilities were very low for the immature snakes and non-reproducing females and highest in the older males and breeding females. We found no evidence for age-dependent differences in yearly survival rates or between reproducing and non-reproducing females. Most females reproduced for the first time when they were 4 years or older. The reproductive cycle was most often biennial or triennial, but females produced on average only ca. 1.3 litters during their reproductive lifetime. A matrix population-model indicated that the rate of population growth was most sensitive to changes in the survival rates of the immature adders. Hence, a sufficiently high survival probability of the immature snakes is essential for the preservation of adder populations.

Add conservation projects usually focus on the (heathland) habitats where adult snakes are most easily observed, with special attention to the hibernation dens and the basking spots of the (male) adults. While we strongly encourage the continuation of these efforts, the results of our demographic study dictates that attention should also be given to the survival of the immature adders. We therefore argue that protection of the often neglected (or even unknown) summer habitats, and of the migration routes towards them, will be critical to the success of adder conservation schemes.

Approaches to conserving adders in the Netherlands

Rolf van Leeningen, RAVON, Netherlands

RAVON is a professional organization concerned with the conservation of reptiles, amphibians and fish. Volunteers play a large role and among other things they have been involved with monitoring of reptiles in the Netherlands since 1994. They walk a number of set transects each year and count all the reptiles that they see. In time, this makes sound statements possible about nationwide changes

in the population of species. The population trend for the common adder in The Netherlands has been stable of the past 10 years.

Currently there are two core areas of occurrence for adders within the Netherlands. These are distinguishable based on their distribution within 5 x 5 km squares. Adders are still observed in 148 5 x 5 km squares, but have also disappeared from 39.

The Working group Adder research Netherlands (WAN) plays an important role in researching adders in the Netherlands. Together with volunteers, adder population research is being done in 21 different areas. An important tool to manage all the data is the snakeportal web application. Every research is a project and only the project researchers have access to their data. Photos for the individual recognition of adders (or other snake species) can be visually compared in the Snake Portal and an algorithm shows only potentially relevant matches. Results are immediately and automatically available by maps and tables. This kind of websites increase the involvement and motivation of volunteers (and professionals).

Research on the Hijkerveld, which is one the population studies of the WAN, has shown that adders make use of different types of habitat in different seasons. Heath is the main habitat type in which adders are found but a certain number are found in other habitat types during the summer. These habitats may hold more food and provide more moisture. In the coming years more research will be done in order to find more areas to where snakes migrate, and the habitat that they hold. This information is important as it can give park wardens recommendations on (future) management. Declining habitat has become a serious threat to adders in the Netherlands. Therefore, in the east of the Netherlands a project was started around ten years ago to increase, connect and restore habitat for adders. The target species in this project is the adder, however, many other species are incidentally supported, including birds, plants, and butterflies. A plan has been made for all the different areas with adders, to increase the habitat quality and potentially their distribution, but also on how different areas can be connected with one another. Part of the plan has already been implemented and the number of observations have markedly increased. Problems have also arisen such as keeping wildlife corridors sufficiently open as much as possible from vegetation.

Conserving adders in Hauts-de-France : a regional action plan.

Gaëtan Rey, Conservatoire Espaces Naturels Hauts-de-France, gaetan.rey@espaces-naturels.fr

Since 2012, a regional action plan for the adder has been implemented by Conservatoire d'espaces naturels Nord-Pas-de-Calais with another Non-governmental organization as technical partner (Groupe ornithologique et naturaliste du Nord de la France). The assessment of adders in Hauts-de-France gave the following results : the species is endangered, we greatly lack knowledge of the adder's regional area distribution, the species is ignored in natural sites management and a first

genetic study -carried out in 2010 on 5 populations- indicated they had a poor genetic diversity. We have identified regional issues regarding adder conservation in the long term : conserving existing populations, systematically taking the adder into consideration in the management of natural sites, conserving adders in natural sites managed through grazing. A first action plan already existed from 2012 to 2018. To improve the status of the species, a lot of actions on different topics were made. To appreciate the regional population tendency, we have developed an adder's regional monitoring with the same method as « make your adder count ». We started in 2019 and we expect to have surveyed roughly 15 sites by the end of 2020. Then, we sampled 3 sites in different natural habitats (sand dunes, chalk grasslands and wetlands) on which a long term monitoring of the populations' size by individual head-scale pattern is done every 5 years. The first monitoring took place in 2016 and the second one will take place in 2020-2021. Regarding public perception, we published and distributed different leaflets for childrens and adults. In 2019, we started to organize field trips on adders for the general public. In 2011, we created a regional adder work group made up of technical partners, volunteers, financial partners, and researchers. With this regional group, we organize survey training, field trips to discover populations in new areas, make some cross border exchanges with European programs like INTERREG Liparis (2012-2014) with the Kent Reptile and Amphibian group (KRAG). Every year an annual meeting is organized to take stock of the previous year.
As far as the conservation domain is concerned, we publish technical guidelines, we bring technical assistance to reserve managers to help them take care of adders on their sites. Specific training for professional partners and students have been done as well.
Following administrative change in the region, a new ten-year regional action plan written and presented by Conservatoire d'espaces naturels Hauts-de-France started in 2019 with 3 objectives: To insure the conservation of the populations of adders, to improve regional knowledge of adders, to raise public awareness about adder conservation. They are sub-divided into 9 operational objectives. We are focused on changing the public's perception and on improving the knowledge of the adder's area distribution. Every year, a new localization of the species is identified in our region.
At the national level, a viper national work group was created in 2018 for *Vipera berus* and *Vipera aspis*. This national group is made up of resarchers, volunteers and reserve managers. We have 3 objectives : To develop a national viper monitoring, to develop management measures for vipers and to improve the level of national viper protection. We started our actions in 2019 with a national questionnaire sent to natural reserve managers.

The advantages of using TRIM in calculating population trends

Marnix de Zeeuw, Network Ecological Monitoring, The Netherlands

Statistics Netherlands publishes national trends and indices based on monitoring data from the Network Ecological Monitoring (NEM). A specially developed program for analysing ecological data with many missing values was originally developed some 25 years ago by Statistics Netherlands (Pannekoek and Van Strien, 1991) and was made available as the freeware stand-alone program TRIM (TRends and Indices for Monitoring data). Although the program has had several updates since then, the original programming language has become outdated and requires further development.

That is why TRIM was rebuilt as a package for the freely available and widely used open source statistical program R: RTRIM. RTRIM contains the same methods and models for nature monitoring data as the original versions of TRIM. It can still work with the same input data and produces exactly the same output data, but as a package in R it can easily be integrated in other R programming processes. New in this version is the in-built possibility to combine results from other TRIM runs, e.g. to combine results obtained from the analysis of regions of a country into a single new output with a combined trend, indices and standard errors. Being developed as R-package, TRIM is also made available for further development by the large R-society.

The renewed TRIM is available as RTRIM package on CRAN (Comprehensive R Archive Network). See <https://www.cbs.nl/en-gb/society/nature-and-environment/indices-and-trends%2d%2dtrim%2d%2d> for more information (a manual and two articles in which the method is discussed) about TRIM.

Next Generation Sequencing and adder population demography

Thomas Madsen, Honorary Fellow, School of Biological Sciences, University of Wollongong, Australia

The presentation will cover the following areas:

1. The results from a total genome sequencing of 96 adders in order to document population genetic demography of two isolated adder populations i.e. Smygehuk (a totally isolated mainland population, studied since 1981) and Hallands väderö (a “proper” isolated island population situated off the west coast of Sweden, studied since 1983). I am convinced that the results will generate a lot of discussions concerning the “dogmas” used in conservation genetics!
2. The, sometimes negative, effects of genetic rescue on humans living close to adders.
3. The effects of an extreme climatic event, i.e. the summer of 2018, on the population demography of my “two” adder populations.

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Day 2: Sunday 9th June

Session 4: Engaging volunteers and communities with adder conservation, Chair: Pete Hill, Amphibian and Reptile Conservation

Adders are Amazing!: Novel approaches to engage communities with adder conservation

Sam Langdon, Pembrokeshire Adder Coordinator, ARG UK and John Kelly, Senior Lecturer, University of Chichester

Globally, snake conservation efforts have an enormous barrier to overcome: these animals are widely feared and loathed, sometimes due to genuine human – snake conflicts, but perhaps more frequently due to superstition and physiological preferences towards limbed animals with fur or feathers. The UK's relatively harmless European Adder (*Vipera berus*) strikes fear into the heart of many British people due to it being uniquely venomous amongst our three native snake species, with headline-grabbing bites being regularly reported in the media. This has the effect of further confirming people's fears, leading to an ever-spiralling hatred and misunderstanding of these animals, increased persecution and an apparent reluctance by the general public to conserve the adder.

Whilst monitoring adders and improving their habitats is key to their survival, we believe that improving attitudes and understanding of them is equally so, with persecution reported to be one of the five major causes for adder declines in the UK (Gardner et al., 2019). Finding ways to correct centuries of misunderstanding and superstitious hatred is a significant task, but one that needs to be taken on to improve our chances of conservation success with this species.

Adders are Amazing! is an Amphibian and Reptile Groups of the UK (ARG UK) project which has piloted attitude changing activities with local communities in West Wales, combining scientific engagement with a strong artistic and creative element. All age groups were engaged, with activities in seven schools as well as with older members of the community, through groups such as the U3A, Women's Institute and local craft, wildlife and history groups. As part of this work, attitudes towards adders were assessed in 263 children aged 5-11, before and 3 months following our schools engagement programme. Schools received between 0.5-10 hours of input from the ARG UK project leader and a local artist. The intervention showed a significant improvement in attitudes towards adders, more so in the older children. We have also demonstrated that such engagement activities improved attitudes towards adders, even when participants maintained a dislike of adders, which could reduce persecution activities later in life.

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This talk will showcase some of the most effective engagement activities we developed, and discusses ways in which volunteers can get involved in such activities within their local ARG communities.

Good press for adders: managing the adder-bite media storm,

Wolfgang Wüster, MEFGL, School of Natural Sciences, Bangor University, Bangor, LL57 2UW

Adder conservation requires reconciling the needs of an animal in acute decline with a hostile public perception grounded in fear. This fear is nurtured by often sensationalist press coverage following bites to people or dogs. Addressing these issues requires a realistic assessment of the risk posed by the adder to the public in general, but also of the dangers posed by an actual bite to a person.

In public health terms, the adder poses a negligible risk. For PR purposes, this can be compared to everyday risks the general public can more readily understand – e.g., a member of the public is 10,000 times more likely to choke to death on a piece of food than to die of an adder bite.

However, the risks of an actual bite must not be understated: while the majority are relatively trivial, a large minority of bites give rise to serious illness, and a small proportion are life-threatening. Prevention of negative press also requires reduction of bite numbers through public education on prevention, and through ensuring those willingly interacting with snakes take appropriate precautions. Couching public education in language likely to elicit empathy with adders rather than fear and hostility may play an important role.

Make the Adder Count: population trends from a citizen science survey of UK adders

Emma Gardner, University of Reading/ARG UK.

Concern has been growing about the status of UK adder populations, with expert opinion reporting widespread declines. Assessing the true scale of these declines, however, has been hampered by a lack of quantitative data. Make the Adder Count began in 2005 as a national surveillance programme collecting standardised counts of adders lying-out after emerging from hibernation. Volunteer surveyors were asked to make three or more counts each spring of adult adders lying out after emerging from hibernation, and to report the positive and negative factors they considered were affecting their adder sites. Between 2005 and 2016, 181 surveyors provided information on 260 sites. 129 of these sites contributed three or more years' worth of data and these were used to derive average population trends over time.

The data confirmed a significant decline, on average, across sites with small populations; surveyors at these sites typically recorded less than ten individuals and, on average, these small population sites declined by 55% over the 11 year monitoring period. 90% of all the analysed sites fell into this declining small population category. Only 10% of the sites had large populations (where surveyors typically recorded >10 individuals), and on average these showed a 33% increase over the same

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period. If these trends are representative of the UK as a whole, within 15–20 years, adders will become restricted to just a few large population sites, significantly increasing the extinction risk for this priority species in the UK.

Public pressure/disturbance was reported as the most frequent negative factor affecting sites, followed by habitat management and habitat fragmentation. Negative impacts from habitat management were reported almost as frequently as positive impacts, suggesting many management plans do not adequately consider the requirements of adders. The fact that almost half (48%) of the sites reported public pressure as a negative factor suggests that this is an issue which needs urgent attention, to quantify its effects on adders and to identify effective means of reducing this pressure.

Make the Adder Count has shown that spring counts by volunteer surveyors are a viable method for collecting quantitative data on adder population trends. In addition, the dataset demonstrates earlier emergence among males, reveals that adders emerge earlier at more northerly sites and in warmer springs, and provides an invaluable database of hibernacula locations. We hope that the declines shown by Make the Adder Count may motivate landowners and organisations to act to conserve adders and their habitat, that conservation interventions can be developed which address the three key threats identified in the survey, and that Make the Adder Count itself may continue to provide the means to monitor the effectiveness of such interventions.

Session 5: Adder conservation: The way forward: Chair: Angie Julian (ARG UK)

Developing volunteer survey and monitoring effort to drive conservation outcomes - an integrated approach

Steve Langham, Chair SARG, Trustee ARG UK

Citizen science initiatives or a trained cadre of volunteers can be successful in determining the distribution for a species such as the adder either at site level or across wide areas such as counties. But how do we make the leap from ‘dots on maps’ to actually conserving the adder?

This short presentation outlines the approach that SARG has adopted, using features of the ARGWEB software (developed by SARG and freely available to all Amphibian and Reptile Groups). Important habitat features, such as hibernacula and aggregation areas can be found using a combination of IT and process, which has led to the discovery of as many as seven previously unknown hibernacula on a single site visit. This information can be provided to land managers, advising them of sensitive management areas using both 'push' and 'pull' methods. 'Push' being annual reports or a hotlink to a map, and 'pull' through means of data access portals where land managers can view real time data whenever required. Reports show not only which species are present, but also provide a comparison of their reptile populations with regional averages together with basic fitness assessments such as evidence of breeding activity and gender ratios.

In order, to maximise the efficiency of determining the wide area distribution for adder, in-built simple distribution modelling can provide survey targets, and deduce conservation status up to county level, including status trends, which can be an independent check on whether appropriate conservation measures are in place or whether a rethink about the conservation approach is required.

Even with such measures in place, disastrous habitat management can still occur.

The future for UK adder conservation

Jim Foster, Conservation Director, Amphibian and Reptile Conservation

Amphibian and Reptile Conservation Trust, 655A Christchurch Road, Boscombe, Bournemouth, Dorset BH1 4AP, UK Email: jim.foster@arc-trust.org

The adder *Vipera berus* poses a particular problem for UK conservation. It is widespread yet declining steeply in some areas. It suffers both from a lack of public support and, arguably, an insufficiently prioritised standing among decision-makers. A combination of strategic change and improved conservation practice is urgently needed. Whilst there are some issues that call for an approach that is adder-specific and/or geographically explicit, the significant challenges that adders face are largely shared by a range of other taxa, indicating a wider problem. Solutions are therefore more likely to succeed by concerted structural changes that take into account the particular needs of adders. There are encouraging signs that some of these areas will be improved in the short to medium term: protected site procedures, land management schemes and processes for addressing land use impacts. Among the most complex topics are managing recreational disturbance impacts, and the reconciliation of adder requirements with potentially conflicting conservation objectives. Systemic change for species conservation is being addressed through various initiatives; of special note is the “Back from the Brink” programme, led by a consortium of Natural England and seven wildlife charities, including Amphibian and Reptile Conservation. Delivering effective conservation on the ground requires the scaling up of good practice; recognising resource constraints, this will need to be based on a combination of mainstreaming practice into policy and guidance, whilst making best use of specialist capacity and capability. Mooted changes to biodiversity policy at the start of the next decade could be crucial to the fortunes of UK adders, along with other declining species. A new country-level IUCN Red List assessment should assist with prioritisation of adder conservation, whilst using the emerging Green List approach could bring dividends. Reintroductions are unlikely to play an imminent role in UK adder conservation, except in regions where wholesale extinction has occurred, the reasons for loss are understood and reversible, and where reintroductions would not detract from wider adder conservation efforts. Genetic management may have a role where fragmentation and isolation leads to severely depleted gene flow. The significance of some actual and potential pressures are poorly understood and would benefit from targeted research.

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Articulating outcomes and actions in a nationally agreed plan tied into biodiversity processes should assist with adder conservation.

Poster Abstracts

SPECIES LIMITS IN EUROPEAN VIPERS: AN ASSESSMENT OF THE EVIDENCE

Inês Freitas[1], Sylvain Ursenbacher[2,3], Konrad Mebert[4,5], Oleksandr Zinenko[6], Silke Schweiger[7], Wolfgang Wüster[8], José Carlos Brito[1], Jelka Crnobrnja-Isailović[9,10], Bálint Halpern[11], Soumia Fahd[12], Xavier Santos[1], Juan M. Pleguezuelos[13], Ulrich Joger[14], Nikolay Orlov[15], Edvárd Miszei[16], Olivier Lourdais[17], Marco A. L. Zuffi[18], Alexandru Strugariu[19], Ștefan Remus Zamfirescu[19], Íñigo Martínez-Solano[20], Guillermo Velo-Antón[1], Antigoni Kaliontzopulou[1], Fernando Martínez-Freiría[1]

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The designation of taxonomic units has important implications on the way we study, understand and catalogue biodiversity, as well as on how we allocate resources to develop conservation strategies. Eurasian vipers are a monophyletic group (Serpentes, Viperinae), currently comprising four genera

(*Daboia*, *Macrovipera*, *Montivipera* and *Vipera*), and up to 40 species. This group has a long and complex taxonomic history, during which taxonomic units have been defined and described using a wide variety of methods and criteria. Consequently, considerable controversy still surrounds the validity of some of the currently listed species. In order to advance towards an evidence-based taxonomy of Eurasian vipers, we analysed published mitochondrial and nuclear DNA sequences for this group to identify phylogenetic relationships among and within currently recognized viper species. We also compiled information on external morphology to address the morphological distinctiveness of currently recognized species. Our mtDNA phylogenetic inferences show contrasting levels of divergence across the different species, including instances of para- and polyphyly of species. The nuclear data show extremely low levels of genetic variation, with widespread haplotype sharing among distantly related species, and even among genera, in many widely used genes. Based on our assessment of the information currently available, we provide an assessment of the taxonomic status of described species, and also emphasise the need to integrative taxonomic approaches to achieve the recognition of evidence-based taxonomic units within Eurasian vipers.

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