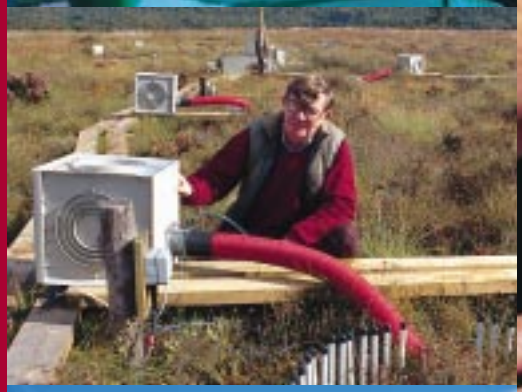
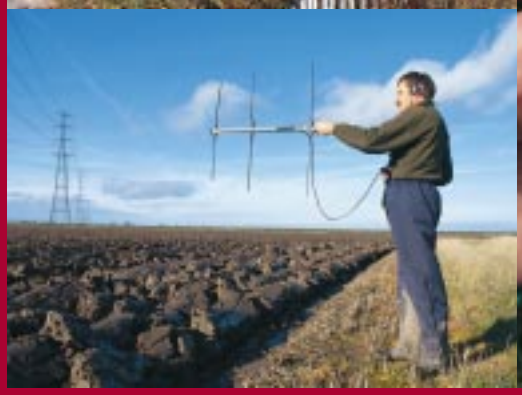
ENGLISH NATURE

Report Number
546

# Status of the adder *Vipera berus* and slow-worm *Anguis fragilis* in England

English Nature Research Reports





working today
for nature tomorrow

English Nature Research Reports

**Number 546**

# Status of the adder *Vipera berus* and slow-worm *Anguis fragilis* in England

John Baker
James Suckling
Ruth Carey

You may reproduce as many additional copies of
this report as you like, provided such copies stipulate that
copyright remains with English Nature,
Northminster House, Peterborough PE1 1UA

ISSN 0967-876X
© Copyright English Nature 2004

## English Nature cover note

This report is the result of a project designed jointly by Froglife and English Nature. The lead researcher was John Baker at Froglife and the English Nature project officer was Jim Foster. The views in this report are the authors' own and do not necessarily represent those of English Nature. For further information on adder and slow-worm conservation, please contact:

Froglife
Mansion House
27-28 Market Place
Halesworth
Suffolk IP19 8AY.
Tel: 01986 873733
Website: www.froglife.org

English Nature
Northminster House
Peterborough PE1 1UA.
Tel: 01733 455000
Website: www.english-nature.org.uk

## Acknowledgements

Froglife wishes to acknowledge the financial support of English Nature. Froglife would also like to thank Jim Foster, Tom Langton, Tony Phelps, Dr. Renata Platenberg and Alan Shepherd for their help in devising the questionnaire survey and Nick Smith for helpful advice. Will Atkins kindly provided details of his 2002 adder questionnaire results. Arnie Cooke and Richard Griffiths provided helpful comments on a draft of the report.

Froglife is especially grateful to everyone who responded to, or distributed, the survey questionnaire: Alan Albery, Giles Alder, David Alred, Liz Appleton, David Aspinall, Will Atkins, Tony Auckland, Jon Austin, Steve Ayres, Helen Baczkowska, Norman Baldock, Trevor Beebee, Richard Berridge, Kenneth Blackwell, Paul Bown, Bill Boyd, Martin Boyle, Naomi Brookes, Lisa Brunwin, John Buckler, Steve Butcher, John Butter, Lindsey Butterfield, Colin Carpenter, P. Childs, John Clarke, Jan Clemons, Audrey Compton, Terry Coult, Edward Cox, Jon Cranfield, Joe Davis, Bill Deakin, Jonty Denton, John Dunbavin, Bob Eeles, Richard Elston, Clive Flindall, Patricia Francis, Rob Free, Alf Gapper, Dr. A.M. George, David George, Leigh Gillett, David Green, Stephanie Greshon, Shaun Hackett, Martin Hammond, P.J. Hancocks, Martin Hartup, Ian Hawkins, John Heathcote, Paul Hewitt, Howard Hillier, Sue Holland, Richard Hughes, Mike Hurle, Colin Jewitt, Beryl Jones, Phyl King, Richard King, Brian Laney, Tom Langton, Vanessa Lavender, Sir Christopher Lever, Derek Lord, Steve Lowe, P. Luke, Alison Maddock, Nicholas Meade, Graham Megson, Doug Napier, Mark Nisbett, David Northcote-Wright, John Osborne,Tim Palmer, Alice Parfitt, Jackie Patrick, Tony Phelps, Briar Philips, Philip Powley, Ali Rasey, Mark Rawlins, A. Rothery, Thomas Seymour, Rachel Sharp, Sylvia Sheldon, Dave Showler, Alf Simpson, Christopher Slack, Rob Smith, Linda Smith, Paul St. Pierre, John Steele, Kevin Sunderland, Des Sussex, Jane Sweetman, Dave Taylor, Michael Taylor, John Tompkins, Eric Whitaker, Leslie Williams, Doug Woods, Mark Woods and Maurice Young.

## Summary and conclusions

Concern about the status of two widespread reptiles, the adder *Vipera berus* and slow-worm *Anguis fragilis*, prompted an investigation of their status in England. A questionnaire survey was widely circulated to gather data, ideally long-term, pertinent to sites known well to observers. Responses were received for 249 sites. More than half of the sites were nature reserves or other similarly designated sites. Most of the population information reported (68 per cent of sites) was based on non-systematic surveys. However, although non-systematically collected data tended to result in a greater proportion of populations not being scored for size (in the case of the adder) and status (for both the adder and slow-worm), where size and status were estimated, the data did not differ from those collected by systematic techniques, except in the case of the slow-worm for which non-systematic techniques yielded a smaller proportion of population decreases. A great deal of information was based on long-term knowledge of sites; more than a quarter of the sites had been known to the reporters for more than 15 years and almost half of them had been visited on more than 50 occasions.

Although many populations were regarded as being stable, there is evidence of declines in status nationally in adders but not slow-worms. The Midlands is a region of particular concern as the adder is in greater decline here than elsewhere and, to a lesser extent, slow-worm population declines are also evident. Many of the populations reported on were relatively small. A third of adder and almost a quarter of slow-worm populations were reported to consist of fewer than 10 adults. There were more decreases and fewer stable adder populations among small (fewer than 10 adults) populations, while the converse was true for the largest populations (more than 50 adults).

Habitat management was the factor most frequently regarded as affecting adder and slow-worm populations. In spite of reports of individual sites being harmed, habitat management or creation was regarded as a positive factor at more than 40 per cent of adder and more than 50 per cent of slow-worm sites. The most frequently reported negative factor was public pressure (disturbance), affecting both species. Persecution was also reported to negatively affect adder populations, whereas building development and predation adversely affected slow-worms.

Just over one third of all sites were isolated. On isolated sites adders showed more population decreases and fewer stable populations. There was no detectable effect of site isolation for slow-worms. Site size also seemed to have some effects on population status. In both the adder and slow-worm, population decreases were more frequent on small (up to 5ha) sites, and in the adder population stability was more frequent on large (more than 5ha) rather than small sites.

Although this report gathers and quantifies otherwise disparate information about adder and slow-worm populations and the sites that they inhabit, it does not provide a fully representative picture of national status. The information in this report is biased towards sites with protected status or those that are managed for nature conservation. The status of both adders and slow-worms on such sites was found to be more favourable than on non-designated sites. Hence, the true national status of adders and slow-worms may be even less favourable than the reported information suggests.

Relatively few data pertinent to brownfield sites – a key habitat for slow-worms – were received during the current study. Hence, the questionnaire was inconclusive with regard to slow-worm status on these potentially threatened sites.

Further conservation measures for adders and greater research into slow-worm status, particularly in brownfield habitats, is recommended.

## Contents

# 1. Introduction

The adder *Vipera berus* and slow-worm *Anguis fragilis* are widely distributed throughout Britain and are often regarded as common species (Swan & Oldham 1993; Arnold 1995). However, there is regional variation in local abundance (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1993) and population declines have been reported for both species (Cooke & Arnold 1982; Cooke & Scorgie 1983; Hilton-Brown & Oldham 1993).

The most recent published examination of the status of the adder and slow-worm in Britain summarises regional variation in abundance within England (Hilton-Brown and Oldham 1991). Although both species were reported as common in the South West, they were regarded as widespread but not common in the South and South East, and scarce in East Anglia and the East Midlands. The adder was also widespread, but not common in the North East, where the slow-worm was scarce. In the North West the adder was reported to be scarce and the slow-worm absent or rare.

There have been indications of declines in both the adder and the slow-worm over the latter half of the last century, particularly within certain areas. A comparison of distribution prior to 1960 with that from 1960 to 1973 indicates declines across Britain (Cooke and Arnold 1982). Questionnaire surveys found the adder in decline in the South, South East and East Anglia during the 1970s (Cooke and Scorgie 1983) and in all regions except the West Midlands and South West during the 1980s (Hilton-Brown and Oldham 1991). The low index of population change for the West Midlands is likely to be a reflection of the naturally low abundance of the adder in the Midlands (Taylor 1963; Swan and Oldham 1993) rather than an indication of healthy population status. Questionnaire surveys in Scotland have also found evidence of a decline in abundance of the adder (Reading *et al* 1994) and a small-scale questionnaire survey in 2002 indicated worrying recent declines and levels of scarcity among English adder populations (Atkins, unpubl. data) Declines in slow-worms in all regions of England, where it occurs, over the 1970s (Cooke and Scorgie 1983) may have abated during the 1980s (Hilton-Brown and Oldham 1991).

Population declines of all native, widespread reptiles (the common lizard *Lacerta vivipara* and the grass snake *Natrix natrix* in addition to the slow-worm and adder) have been attributed primarily to habitat loss (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991). In the case of the adder, changes in land use mediated through agriculture and forestry are regarded as factors causing decreases in abundance in England and Scotland (Atkins, unpubl. data; Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991; Reading *et al* 1994). Deliberate killing of adders (Langton 1986; Wild & Entwistle 1997; Edgar 2002) and slow-worms (Langton 1986) by humans is also regarded as a threat to some populations, although the impact of such killing has not been quantified. Moreover, attitudes towards snakes appear to have become more positive in recent decades and deliberate killing seems to be less frequent than in the past (Edgar 2002).

For slow-worms, urban development has been identified as a particular threat (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991). This has been reiterated by recent concerns about the species' occurrence on land threatened by building development (Foster 1997; Platenberg 1999). The slow-worm is often found on brownfield sites (land that has been developed but which has since fallen into disuse). However in recent years such sites have been specifically targetted for development due to changes in planning policy (Defra 2003), a

trend which is likely to continue. As a fossorial species the slow-worm is easily overlooked and it seems likely that populations are lost or damaged without anyone recording the fact.

A controversial issue within herpetofaunal conservation is that of the impact of land management, both for conservation and other purposes. Natural succession on unmanaged sites can diminish the habitat suitability for native reptiles, including the adder, which require open, sunny areas (Wild & Entwistle 1997; Inns, 2003). However, land management can also harm reptile populations. For example adders have been eradicated from upland moorland by overgrazing and burning (Offer *et al* 2003). Habitat management for conservation purposes has also harmed reptile populations. Mowing and scarifying a meadow has coincided with the disappearance of an adder population (Sheldon unpubl.), grazing has eliminated reptile populations on chalk grassland (Offer *et al* 2003) and heathland management practices have damaged sites, or feature of sites, of importance to reptiles (Phelps unpubl.). The full impact of such activities has rarely been monitored, but is clearly an area of concern. The current questionnaire sought to gather information on the factors perceived to be affecting adder and slow-worm populations to determine their national significance.

There has been a long history of herpetofaunal recording in England (Arnold 1995), including several assessments of population changes (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991) and the National Common Reptile Survey (Swan and Oldham 1993). However, there is no national monitoring scheme to evaluate population trends. Previous status assessments (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991) have involved the circulation of questionnaires to knowledgeable persons who were invited to score species' status, based on their own observations, on a vice-county basis. The approach of the current project differs in that it sought to evaluate status by collating and analysing information, especially long-term data, from specific sites. Such data may allow a less subjective evaluation of national status. It was suspected that such data may be held by voluntary Amphibian and Reptile Groups, local records centres, individual herpetologists, wildlife consultancies and reserve managers from the non-governmental and statutory sectors. The current report draws together information from these sources regarding the habitats and perceived population status of adders and slow-worms for specific sites throughout England. Pooling these data provides an overview of national status and allows an examination of the factors perceived to be driving population changes and of the relationship between several habitat parameters (site status, size and isolation) and population size and population status.

Although all four of our widespread reptiles are believed to have experienced recent population declines, the current project focused on just two of these species. The adder was selected because declines appear to be particularly acute for this species; the slow-worm was of interest due to recent concerns about the loss of populations on brownfield sites.

The Wildlife and Countryside Act 1981 (as amended) affords the adder and slow-worm (and the other widespread reptiles) protection against intentional killing and injuring (and trade controls), but no specific habitat protection. Neither the adder nor the slow-worm are listed as Biodiversity Action Plan (BAP) species within the national biodiversity action planning process (UK Biodiversity Action Plan Steering Group 1995). The current survey questionnaire collects information to feed into the National Biodiversity Action Plan review, due to take place in 2005.

# 2. Methods

The following herpetologists with experience of working with adders and slow-worms were consulted during the design of the survey: Keith Corbett (The Herpetological Conservation Trust), Jim Foster (English Nature), Tony Gent (The Herpetological Conservation Trust), Tom Langton (Froglife), Tony Phelps (Reptile Research and Imagery), Renata Platenberg (US Geological Survey), Anne Riddell (Wildwood Trust) and Alan Shepherd (Worcestershire Wildlife Trust).

Information was collected in a two-stage questionnaire. The first stage consisted of the distribution of an introductory letter (Appendix 1), Preliminary Questionnaire (Appendix 2) and a copy of Froglife Advice Sheet 2 'Snakes Need Friends' (Appendix 3). The latter is an advisory/educational publication produced by Froglife to provide information about native snakes and slow-worms, including information on identification and habitat management. The mailing included a postage-paid envelope to encourage the return of completed forms. This initial mailing was intended to inform potentially interested persons of the survey and to request preliminary information on which to base the second stage of the study. The preliminary questionnaire requested information on sites known well to observers and ideally over the previous 10 or 20 years. At this stage the details requested were the county in which the site occurs and the year from which the site had been known. The mailing was posted (December 6, 2002) to 1,152 addresses in England, from Froglife's database of contacts. These addresses included:

- Amphibian and Reptile Groups,
- Biodiversity Officers,
- English Nature Local Teams,
- Wildlife Trusts,
- Environment Agency Regional Officers,
- members of the public who have contacted Froglife with regard to herpetofaunal issues.

The preliminary questionnaire was promoted through Froglife's website (Appendix 4), from where forms were made available, and independently in British Wildlife (Inns 2003).

Initially it was envisaged that sites would be selected from responses to the Preliminary Questionnaire to ensure that data were collected over a geographic spread representative of England as a whole. However, in practice this entailed distributing the second questionnaire to all of the preliminary respondents. This Status Questionnaire (Appendix 5) requested more detailed information about known sites and their adder and slow-worm populations.

To evaluate the nature of the data on population size and status the questionnaire included a section on the methods used by contributors, so that the proportion of non-systematic as opposed to systematic observations could be determined. In assessing population size the respondents were specifically asked to estimate population size, rather than to report how many animals they had seen. Respondents were also given the opportunity to indicate if population status and size could not be determined.

# 3. Results

## 3.1 Response to questionnaires

One hundred and six respondents to the Preliminary Questionnaire provided initial data on 471 sites. Eighty-seven respondents completed and returned the site questionnaires, covering 249 sites (at six sites data from duplicate responses were not utilised in favour of observations made over longer time periods; at a further three sites multiple responses were combined into single site records). Thirty of the respondents were not from the original mailing list. Some of these may have learned about the survey through Froglife's website, other publicity (Inns 2003) or indirectly through Froglife's initial mailing. Hence, it is not possible to determine the exact response rate to the questionnaire survey although the figure lies between 5 and 7.5 per cent.

## 3.2 Distribution of returned questionnaires

The distribution of the sites over counties of England is given in Table 1. The counties are grouped according to the Nature Conservancy Council regions used in previous status questionnaire surveys (Cooke & Scorgie 1983; Hilton-Brown & Oldham 1991), for sake of comparison. 172 of the sites supported adders, 187 supported slow-worms.

Not all sections of the returned site questionnaires were completed. The number of sites for which particular information was provided is given in the following tables as n values. In some of the tables responses could cover more than one category. For example in Table 2 a site could be known to a respondent through site/population monitoring and through site management. Hence the sum of the values given in all of the categories exceeds the number of sites for which information was reported.

The coverage of sites is broadly consistent with variations in population status reported by Hilton-Brown and Oldham (1991), as summarised in the Introduction.

**Table 1.** Sites covered by returned questionnaires. Both species occur on some sites.

| | | Adder | Slow-worm | Total |
|---|---|---|---|---|
| **South West** | Avon | 0 | 1 | 1 |
| | Cornwall | 7 | 6 | 7 |
| | Devon | 7 | 6 | 8 |
| | Dorset | 14 | 15 | 15 |
| | Somerset | 17 | 14 | 20 |
| Regional total | | 45 | 42 | 51 |
| **South** | Berkshire | 11 | 10 | 14 |
| | Buckinghamshire | 1 | 4 | 4 |
| | Hampshire | 7 | 11 | 11 |
| | Oxfordshire | 1 | 7 | 7 |
| | Wiltshire | 5 | 7 | 7 |
| Regional total | | 25 | 39 | 43 |
| **South East** | Kent | 1 | 7 | 8 |
| | London | 2 | 8 | 8 |
| | Surrey | 3 | 6 | 6 |
| | Sussex | 13 | 12 | 20 |
| Regional total | | 19 | 33 | 42 |
| **West Midlands** | Cheshire | 1 | 2 | 2 |
| | Derbyshire | 0 | 0 | 0 |
| | Gloucestershire | 1 | 0 | 1 |
| | Herefordshire | 4 | 7 | 8 |
| | Shropshire | 8 | 7 | 8 |
| | Staffordshire | 0 | 0 | 0 |
| | West Midlands | 0 | 1 | 1 |
| | Warwickshire | 2 | 1 | 2 |
| | Worcestershire | 3 | 5 | 5 |
| Regional total | | 19 | 23 | 27 |
| **East Midlands** | Bedfordshire | 0 | 1 | 1 |
| | Cambridgeshire | 0 | 0 | 0 |
| | Leicestershire | 0 | 0 | 0 |
| | Northamptonshire | 6 | 7 | 7 |
| | Nottinghamshire | 6 | 4 | 10 |
| | Rutland | 0 | 0 | 0 |
| Regional total | | 12 | 12 | 18 |
| **East Anglia** | Essex | 5 | 9 | 11 |
| | Norfolk | 8 | 6 | 11 |
| | Suffolk | 3 | 5 | 6 |
| Regional total | | 16 | 20 | 28 |
| **North West** | Cumbria | 8 | 4 | 9 |
| | Greater Manchester | 0 | 0 | 0 |
| | Lancashire | 0 | 0 | 0 |
| | West Yorkshire | 1 | 1 | 1 |
| Regional total | | 9 | 5 | 10 |
| **North East** | Cleveland | 1 | 0 | 1 |
| | Durham | 3 | 1 | 3 |
| | East Yorkshire | 1 | 0 | 1 |
| | Humberside | 1 | 0 | 1 |
| | North Yorkshire | 15 | 8 | 17 |
| | Northumberland | 6 | 3 | 7 |
| Regional total | | 27 | 12 | 30 |
| National total | | 172 | 187 | 249 |

## 3.3 Nature of observations

Most sites were known to the respondents as a consequence of monitoring/survey, rather than incidentally to other activities (Table 2). Less than one quarter of sites (56/249 [22 per cent]) were indirectly or directly associated with building development (defence from development/land use change or capture/release projects [assuming that most are development-related] or survey related to building development). Only 4 per cent of sites reported on were directly related to building development.

**Table 2**. How sites/populations were known to respondents. Percentages in brackets.

| | **Adder** | **Slow-worm** | **All sites** |
|---|---|---|---|
| Site/population monitoring | 123 (72) | 138 (74) | 175 (70) |
| Site management | 61 (35) | 63 (34) | 89 (36) |
| Defence from development/land use change | 10 (6) | 12 (6) | 18 (7) |
| Capture/release project | 23 (13) | 30 (16) | 31 (12) |
| Survey related to building development | 7 (4) | 7 (4) | 9 (4) |
| Other | 13 (8) | 11 (6) | 19 (8) |
| n | 172 | 187 | 249 |

Although most sites were subject to survey or monitoring, only a minority (32 per cent) was monitored systematically (Table 3). More than a single methodology may have been used at a single site. For example, all of the historical records reported were combined with another method.

**Table 3.** Methods used to determine adder and slow-worm population sizes. *Systematic techniques refers to all sites at which either systematic observations or refuge surveys were carried out. **Non-systematic techniques refers to all sites at which neither systematic observations nor refuge surveys were carried out.

| **Method** | **Adder** | **Slow-worm** | **All sites** |
|---|---|---|---|
| Systematic observations | 38 (24) | 40 (23) | 42 (18) |
| Refuge survey | 41 (25) | 60 (33) | 62 (27) |
| Historical records | 12 (7) | 14 (8) | 14 (6) |
| Non-systematic observations | 126 (78) | 128 (72) | 182 (78) |
| Systematic techniques* | 51 (32) | 71 (40) | 74 (32) |
| Non-systematic techniques** | 110 (68) | 106 (60) | 158 (68) |
| n | 161 | 177 | 232 |

Much of the information returned was based on long-term observations (Table 4). Just over a quarter of all sites had been known to the observer for in excess of fifteen years, and almost half of the sites had been visited more than 50 times.

**Table 4.** Number of years in which sites were visited, and number of visits made. Percentages in brackets.

| **Number of years in which site visited** | **n** |
|---|---|
| 1-5 | 64 (26) |
| 6-10 | 67 (27) |
| 11-15 | 48 (20) |
| 16 or more | 65 (27) |
| n | 244 |

| **Number of visits made to site** | **n** |
|---|---|
| 1-10 | 35 (15) |
| 11-20 | 37 (16) |
| 21-50 | 48 (20) |
| More than 50 | 117 (49) |
| n | 237 |

## 3.4 Information about sites

Information on site status is given in Table 5. More than half (131/244 [54 per cent]) of the sites had some kind of nature conservation designation or protected status (nature reserves, including those privately owned, National Nature Reserves [NNR], Site of Special Scientific Interest [SSSI]/candidate Special Areas of Conservation [cSAC]). Over a third were covered by NNR/SSSI/cSAC designation.

**Table 5**. Status of sites. n = number of sites for which information was provided by respondents. Percentages in brackets.

| | Adder | Slow-worm | All sites |
|---|---|---|---|
| Unmanaged land | 24 (14) | 33 (18) | 41 (17) |
| Nature reserve (other) | 55 (32) | 59 (32) | 81 (33) |
| NNR/SSSI/cSAC | 78 (46) | 64 (35) | 89 (36) |
| Public land | 42 (25) | 42 (23) | 53 (22) |
| Private land | 82 (48) | 93 (51) | 122 (50) |
| n | 170 | 182 | 244 |

The estimated sizes of sites were spread fairly evenly over the four categories specified in the status questionnaire (Table 6).

**Table 6.** Size of adder and slow-worm sites. n = number of sites for which information was provided by respondents. Percentages in brackets.

| | Adder | Slow-worm | All sites |
|---|---|---|---|
| Less than 1 ha | 18 (11) | 34 (19) | 46 (19) |
| 1-5 ha | 32 (20) | 45 (25) | 53 (22) |
| 6-50 ha | 52 (32) | 51 (29) | 68 (29) |
| More than 50 ha | 60 (37) | 48 (27) | 70 (30) |
| n | 162 | 178 | 237 |

The habitats associated with the reported sites are given in Table 7. Rough grassland, scrub, deciduous woodland and heathland were the most frequently reported habitats, being found in more than one quarter of sites for both species. Only a small proportion (5 per cent) of sites were brownfield sites. Fifty-eight sites had other habitat associations reported. Among these bog and/or mire was identified as a further specific habitat type and this is included in Table 7. The remaining habitat associations recorded as 'other' tended to provide further information about habitat recorded under the questionnaire's specified categories. An exception to this occurred at two sites where felled woodland and a Victorian fort were reported as the only habitat.

**Table 7.** Types of habitat reported. n = number of sites for which information was provided by respondents. Percentages in brackets.

| Habitat | Adder | Slow-worm | All sites |
|---|---|---|---|
| Rough grassland | 59 (34) | 82 (44) | 104 (42) |
| Scrub | 61 (35) | 78 (42) | 95 (38) |
| Deciduous woodland | 57 (33) | 71 (38) | 90 (36) |
| Heathland | 88 (51) | 58 (31) | 89 (36) |
| Coniferous woodland | 34 (20) | 25 (13) | 41 (16) |
| Garden | 12 (7) | 37 (20) | 39 (16) |
| Farmland – pasture | 18 (10) | 23 (12) | 29 (12) |
| Rail embankment | 17 (10) | 22 (12) | 24 (10) |

| Habitat | Adder | Slow-worm | All sites |
|---|---|---|---|
| Quarry | 18 (10) | 16 (9) | 21 (8) |
| Moor | 20 (12) | 10 (5) | 20 (8) |
| Dune/coastal | 18 (10) | 16 (9) | 19 (8) |
| Road embankment | 8 (5) | 12 (6) | 13 (5) |
| Brownfield | 6 (3) | 11 (6) | 12 (5) |
| Farmland – arable | 7 (4) | 8 (4) | 12 (5) |
| Allotment | 4 (2) | 11 (6) | 11 (4) |
| Bog/mire | 10 (6) | 7 (4) | 10 (4) |
| Churchyard | 3 (2) | 2 (1) | 4 (2) |
| Other (only) | 1 (1) | 2 (1) | 2 (1) |
| n | 172 | 187 | 249 |

## 3.5 Population size and status

Many reporters could not determine the size of populations (40 per cent of adder populations and 57 per cent of slow-worm populations [Table 8]). Where population sizes were estimated there was no significant difference between adders and slow-worms across the three population size categories (chi-square = 3.362, 2 d.f., p = 0.186). At sites where population size was estimated many were judged to be relatively small; a third of adder populations and almost a quarter of slow-worm populations were estimated to contain fewer than 10 adults.

Adders were reported as not reproducing at seven sites and slow-worms at four, one of these being a site shared by both species.

Few population extinctions or new populations were reported: thirteen adder and four slow-worm population extinctions and three new adder and eight new slow-worm populations. The proportion of extinctions to new populations differed between the two species (chi-square = 6.601, 1 d.f., p = 0.010); proportionately more population extinctions were reported for adders than slow-worms. If it is assumed that national population stability should be manifest by new populations being as frequent as population extinctions, then adders significantly deviated from stability, with more extinctions/fewer new populations than would be expected by chance (binomial probability = 0.012), whereas slow-worms did not (binomial probability = 0.248).

**Table 8.** Reported population sizes. n = number of sites for which information was provided. A = percentage of all reports. B = percentage of reports for which population size was estimated (93 adder and 70 slow-worm populations).

| | Adder | | | Slow-worm | | |
|---|---|---|---|---|---|---|
| **Population size** | **n** | **A** | **B** | **n** | **A** | **B** |
| Fewer than 10 adults | 32 | (20) | (33) | 18 | (10) | (23) |
| 11-50 adults | 41 | (25) | (42) | 31 | (17) | (40) |
| More than 50 adults | 24 | (15) | (25) | 28 | (16) | (36) |
| Impossible to determine | 64 | (40) | - | 102 | (57) | - |
| n | 161 | (100) | (100) | 179 | (100) | (100) |

At many sites population status was not known. Population trends (increased/decreased/ stable) were determined for less than two-thirds of the sites where any information pertinent to status was provided (Table 9), equivalent to approximately 60 per cent of all sites for which questionnaires were returned. However, for those populations where trends were reported, most populations were stable. Population status differed between the two species;

population decreases were more frequent for adders than for slow-worms (chi-square = 7.520, 2 d.f., $p < 0.023$). If population status nationally were considered to be stable, then an equal number of population increases and decreases would be expected. For adders there was a significant deviation from this; there were more decreases than expected (binomial probability < 0.001).For slow-worms the same trend was not significant ($p = 0.182$).

**Table 9.** Reported population sizes and population status for adder and slow-worm. n = number of sites for which information was provided. Percentages in brackets.

| Population status | Adder | Slow-worm |
|---|---|---|
| Increased | 9 (6) | 14 (8) |
| Decreased | 38 (23) | 22 (12) |
| Stable | 59 (36) | 77 (42) |
| Not known | 56 (35) | 69 (38) |
| n | 162 | 182 |

In an analysis of adder and slow-worm status between regions, the data are too few to allow a comparison between the Nature Conservancy Council regions, so data were lumped into four larger regions; South West, South and South East, East Anglia and the Midlands and the North. In the case of the adder there were disproportionately more population decreases in the East Anglia/Midlands region (chi-square = 15.201, 6 d.f., $p = 0.019$). This trend is due to data from the Midlands alone. Although the data are few for East Anglia, there is no tendency towards population decreases within this region. Comparison of the Midlands (East and West Midlands combined) with the rest of England underlines this trend (Table 11). There were more population decreases in the Midlands than in the rest of England (chi-square = 14.794, 2 d.f., $p < 0.001$. There is no regional variation for the slow-worm (chi-square = 9.231, 6 d.f. $p = 0.161$), but a comparison of slow-worm status in the Midlands with the rest of England also reveals that there were marginally more population decreases in this region (chi-square = 6.265, 2 d.f., $p = 0.044$).

**Table 10.** Population status of adders and slow-worms across regions of England.

| | Adder | | | Slow-worm | | |
|---|---|---|---|---|---|---|
| Region | Increase | Decrease | Stable | Increase | Decrease | Stable |
| South West | 3 | 8 | 27 | 1 | 4 | 25 |
| South | 2 | 2 | 9 | 2 | 3 | 15 |
| South East | 2 | 3 | 4 | 7 | 4 | 14 |
| West Midlands | 0 | 9 | 3 | 1 | 6 | 8 |
| East Midlands | 0 | 4 | 1 | 0 | 2 | 4 |
| East Anglia | 1 | 3 | 6 | 3 | 1 | 6 |
| North West | 0 | 1 | 1 | 0 | 0 | 1 |
| North East | 1 | 8 | 8 | 0 | 2 | 4 |
| Total | 9 | 38 | 59 | 14 | 22 | 77 |

**Table 11.** Population status of adders and slow-worms in the Midlands and the rest of England.

| | Adder | | | Slow-worm | | |
|---|---|---|---|---|---|---|
| Region | Increase | Decrease | Stable | Increase | Decrease | Stable |
| Midlands | 0 | 13 | 4 | 1 | 8 | 12 |
| Rest of England | 9 | 25 | 55 | 13 | 14 | 65 |
| Total | 9 | 38 | 59 | 14 | 22 | 77 |

For sites where a change in the percentage of land occupied by adders/slow-worms was reported there were similar numbers of sites where this either increased or decreased. There was no significant difference between the percentage increases and decreases (Wilcoxon two-sample test, W = 202, p = 0.319 and W = 273, p = 0.503, for adder and slow-worm sites respectively).

**Table 12.** Number of adder and slow-worm sites in which a change in the proportion of land occupied within a site was noted, and the percentage change. n = number of sites for which information was provided.

| | **Adder** | | **Slow-worm** | |
|---|---|---|---|---|
| | **Increase** | **Decrease** | **Increase** | **Decrease** |
| Number of sites | 27 | 23 | 27 | 24 |
| Area | 29% (n = 17) | 44% (n = 12) | 29% (n = 18) | 40% (n = 15) |

## 3.6 Comparison of systematic and non-systematic assessments

As many of the sites reported (68%) were not monitored systematically (Table 3) a comparison of population size and status evaluations using systematic and non-systematic techniques was made (Tables 13 and 14). In evaluations of population size, systematic and non-systematic techniques gave different results for the adder (chi-square = 24.383, 3 d.f., $p < 0.001$) but not for the slow-worm (chi-square = 3.359, 3 d.f., p = 0.339). For adders non-systematic techniques resulted in a greater proportion of populations being scored as 'impossible to say'. They also resulted in a greater proportion of populations being ranked in the category of 11-50 adults, however this difference is not significant if the population size categories alone are considered, that is excluding the data from the 'impossible to say' category (chi-square = 1.332, 2 d.f., p = 0.514).

Systematic and non-systematic techniques also produced different results for the evaluation of population status. In adders non-systematic techniques resulted in a greater proportion of populations being rated as 'not known', whereas systematic techniques tended to yield more population decreases and fewer ranked as 'not known' (chi-square = 16.654, 3 d.f., $p < 0.001$). If the 'not known' category is removed then there is no significant difference between systematic and non-systematic evaluations (chi-square = 0.786, 2 d.f., p = 0.675). For slow-worm populations non-systematic techniques yielded fewer decreases and more populations ranked as 'not known' (chi-square = 25.149, 3 d.f., $p < 0.001$). This difference persists if the 'not known' category is removed; non-systematic techniques yielded a smaller proportion of population decreases (chi-square = 8.370, 2 d.f., p = 0.015).

**Table 13.** Population size of adders and slow-worms non-systematically and systematically surveyed sites.

| **Adder** | **Population size** | | | |
|---|---|---|---|---|
| | **< 10** | **11-50** | **> 50** | **Unknown** |
| Systematic | 12 | 20 | 9 | 4 |
| Non-systematic | 20 | 20 | 14 | 54 |

| **Slow-worm** | **Population size** | | | |
|---|---|---|---|---|
| | **< 10** | **11-50** | **> 50** | **Unknown** |
| Systematic | 9 | 15 | 10 | 31 |
| Non-systematic | 9 | 16 | 17 | 62 |

**Table 14.** Population status of adders and slow-worms non-systematically and systematically surveyed sites.

| Adder | Population status | | | |
|---|---|---|---|---|
| | **Increase** | **Decrease** | **Stable** | **Unknown** |
| Systematic | 3 | 18 | 22 | 5 |
| Non-systematic | 5 | 20 | 35 | 45 |

| Slow-worm | Population status | | | |
|---|---|---|---|---|
| | **Increase** | **Decrease** | **Stable** | **Unknown** |
| Systematic | 8 | 17 | 32 | 12 |
| Non-systematic | 6 | 5 | 43 | 49 |

## 3.7 Factors affecting population status

Factors affecting adder and slow-worm populations were identified at 81 sites supporting adders and 74 sites supporting slow-worms (Table 15). At some sites factors causing changes in population status were reported even though such changes were not reported. The data are presented for all sites where factors were noted and also for those sites where population decreases were noted (columns A and B in Table 15). At four sites factors not listed in Table 12 were cited: natural re-colonisation by adders followed alleged local extinction at one site (Iping Common); damage to hibernation banks negatively affected adder and slow-worm populations at one site (Norden); one slow-worm population was reported as being negatively affected by isolation (Hakefield Farm) and there was possibility that another was introduced with waste material at another (Fyent Country Park).

Habitat management was the most frequently cited factor affecting sites, positively, for both adders (42 per cent of sites) and slow-worms (51 per cent of sites). Other factors affecting large proportions of sites were negative and included public pressure (disturbance), for adders and slow-worms (all sites and sites where decreases noted). Persecution adversely affected 29 per cent of adder sites where decreases were noted, whereas this factor was not so frequently reported as an issue for slow-worms.

Building development was reported as a negative factor affecting slow-worms (18 per cent of all sites reported and 56 per cent where decreases were noted), although this was not reported frequently for adders. Predation was reported to negatively affect 33 per cent of slow-worm populations where decreases were noted. However, the limited amount of data provided for slow-worm sites where population status was judged to have decreased (18) demand that the latter figures be treated with some caution.

The predators reported for both adders and slow-worms were cats and birds. Cats were reported as predators of adders at three sites and slow-worms at three sites (one site being shared by both reptile species). Buzzards were reported as predators of adders and slow-worms at two separate sites. Pheasants were noted as predators of adders at one site and both crows and magpies as predators at a another.

**Table 15.** Perceived positive and negative factors influencing population status change. A = perceived negative influences, B = perceived negative influences at sites where population status was judged to have decreased. Percentages in brackets.

| | Adder | | | Slow-worm | | |
|---|---|---|---|---|---|---|
| | Positive | Negative | | Positive | Negative | |
| | | A | B | | A | B |
| Building development | - | 8 (10) | 4 (14) | - | 13 (18) | 10 (56) |
| Agricultural changes | 1 (1) | 3 (4) | 3 (11) | 0 (0) | 2 (3) | 0 (0) |
| Forestry operations | 7 (9) | 8 (10) | 3 (11) | 3 (4) | 5 (7) | 2 (11) |
| Mineral/peat extraction/sand quarries | 1 (1) | 1 (1) | 1 (4) | 0 (0) | 0 (0) | 0 (0) |
| Fire | 1 (1) | 10 (12) | 3 (11) | 0 (0) | 8 (11) | 3 (17) |
| Public pressure (disturbance) | - | 20 (25) | 8 (29) | - | 16 (22) | 5 (28) |
| Persecution (killing or injury) | - | 14 (17) | 8 (29) | - | 3 (4) | 2 (11) |
| Predation | - | 7 (9) | 3 (11) | - | 9 (12) | 6 (33) |
| Pollution | - | 1 (1) | 0 (0) | - | 1 (1) | 0 (0) |
| Neglect/succession | 0 (0) | 11 (14) | 6 (21) | 1 (1) | 7 (9) | 2 (11) |
| Habitat management/creation | 34 (42) | 10 (12) | 5 (18) | 38 (51) | 9 (12) | 2 (11) |
| Introduction (development mitigation) | 2 (2) | - | - | 3 (4) | - | - |
| Introduction (conservation) | 3 (4) | - | - | 1 (1) | - | - |
| Weather conditions | 0 (0) | 1 (1) | 1 (4) | 1 (1) | 0 (0) | 0 (0) |
| Other | 2 (2) | 0 (0) | 0 (0) | 3 (4) | 2 (3) | 1 (6) |
| Total where factors identified | 37 (33) | 61 (75) | 28 (100) | 42 (56) | 49 (66) | 18 (100) |
| Impossible to say/do not know | 1 (1) | 5 (6) | 3 (7) | 0 (0) | 1 (2) | 1 (6) |

## 3.8 Relationship between site status and population status

The possibility that adder and slow-worm populations fared differently on sites with some wildlife designation or protective status compared with unprotected or undesignated sites was investigated. All sites reported as being nature reserves, National Nature Reserves, SSSIs or cSACs were lumped into a single group termed 'protected' in Table 16. All sites with no such designation or protection indicated were lumped into a second group termed 'unprotected'. Some sites were reported to encompass many of the status options given in the questionnaire, for example the North Yorkshire Moors National Park was reported as a single site that includes all site status options, including private and public land, protected and unprotected. In the current analysis 'protected' sites were defined as any including protected areas and 'unprotected' sites were defined as the remainder that do not include any protected areas. For both adders and slow-worms population status differed between the protected/unprotected categories (chi-square = 10.744, 2 d.f., $p = 0.005$ and chi-square = 9.101, 2 d.f., $p = 0.011$, respectively). Both species showed fewer population decreases on protected sites and more decreases on unprotected sites. There were too few data to make any conclusions regarding the number of extinctions on protected and unprotected sites.

**Table 16.** Population status of adders and slow-worms from protected and unprotected sites. Percentages in brackets.

| | | Population status | | | |
|---|---|---|---|---|---|
| **Adder** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Protected | 7 (11) | 16 (24) | 43 (65) | 6 |
| | Unprotected | 1 (3) | 21 (55) | 16 (42) | 6 |

| | | Population status | | | |
|---|---|---|---|---|---|
| **Slow-worm** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Protected | 10 (18) | 5 (9) | 42 (74) | 0 |
| | Unprotected | 4 (7) | 16 (29) | 34 (63) | 3 |

## 3.9 Relationship between site size and population status

To examine whether there were any relationships between site size and population status, sites were arbitrarily lumped into two size categories; 'small' (up to 5 ha) and 'large' (greater than 5 ha) (Table 17). For both adders and slow-worms population status (increasing, decreasing or stable) differed between the two site sizes (chi-square = 20.370, 2 d.f., $p < 0.001$ and chi-square = 9.007, 2 d.f., $p = 0.011$, respectively). For both adders and slow-worms population decreases were more frequent at small sites and less frequent at large sites. In the case of adders, there were also fewer stable populations on small sites and a greater number than expected on large sites. There are too few extinctions to be able to make statistically sound comparisons between small and large sites, but there is an indication that extinctions may have been more frequent on small sites.

**Table 17**. Population status of adders and slow-worms for small and large sites. Percentages in brackets.

| | | Population status | | | |
|---|---|---|---|---|---|
| **Adder** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Small | 3 (10) | 19 (66) | 7 (24) | 8 |
| | Large | 5 (7) | 14 (20) | 49 (72) | 4 |

| | | Population status | | | |
|---|---|---|---|---|---|
| **Slow-worm** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Small | 6 (12) | 16 (31) | 29 (57) | 4 |
| | Large | 6 (11) | 5 (9) | 45 (80) | 0 |

## 3.10 Relationship between site isolation and population status

To examine the relationship between site isolation and population status six categories of site linkage/isolation were lumped into two; 'isolated sites' and 'linked sites' (Tables 18 and 19). Over a third of all sites were isolated. In adder populations there were more decreases and fewer stable populations in isolated than in linked sites (chi-square = 7.844, 2 d.f., $p = 0.020$). There was no such effect for slow-worms (chi-square = 3.441, 2 d.f., $p = 0.179$).

**Table 18.** Habitat connectivity. n = number of sites for which information was provided by respondents. Percentages in brackets.

| | Adder | Slow-worm | All sites |
|---|---|---|---|
| Completely isolated by many km distance | 11 (7) | 13 (7) | 20 (8) |
| Isolated from nearby sites by sub-optimal habitat (non-revertible) | 10 (6) | 22 (12) | 26 (11) |
| Isolated from nearby sites by sub-optimal habitat (revertible) | 26 (16) | 29 (16) | 40 (17) |
| Total isolated sites | 47 (28) | 64 (35) | 86 (36) |
| Linked by corridors (e.g. along river or railway line) | 27 (16) | 32 (18) | 42 (18) |
| Part of a larger group of populations in a habitat mosaic | 49 (30) | 55 (30) | 66 (28) |
| Part of a larger block of occupied reptile habitat | 42 (25) | 31 (17) | 45 (19) |
| Total linked sites | 118 (71) | 118 (65) | 153 (64) |
| n | 165 | 182 | 239 |

**Table 19.** Population status of adders and slow-worms at isolated and linked sites. Percentages in brackets.

| | | Population status | | | |
|---|---|---|---|---|---|
| **Adder** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Isolated | 3 (11) | 15 (54) | 10 (36) | 5 |
| | Linked | 5 (7) | 20 (27) | 49 (66) | 6 |

| | | Population status | | | |
|---|---|---|---|---|---|
| **Slow-worm** | | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| | Isolated | 9 (23) | 9 (23) | 21 (54) | 2 |
| | Linked | 7 (9) | 13 (17) | 55 (73) | 2 |

## 3.11 Relationship between population size and population status

For adders there was an effect of reported population size on population status (chi-square = 22.793, 4 d.f., $p < 0.001$) (Table 20). There were more population decreases and fewer stable populations in the smallest populations (< 10 individuals) and, conversely, fewer decreases and a greater incidence of stability in the largest populations (> 50 individuals). For slow-worms there was no such effect (chi-square = 1.246, 4 d.f., $p = 0.870$). For both species, in cases where population size and status had been reported, there were too few data regarding extinctions to draw any firm conclusions. However, for adders all three extinctions reported among these data occurred within populations reported to comprise fewer than 10 individuals.

**Table 20.** Population status of adders and slow-worms for populations of different sizes. Percentages in brackets.

| | Adder population status | | | |
|---|---|---|---|---|
| **Population Size** | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| < 10 | 1 (4) | 17 (71) | 6 (25) | 3 |
| 11-50 | 5 (15) | 7 (21) | 22 (65) | 0 |
| > 50 | 1 (5) | 3 (14) | 17 (81) | 0 |

| | Slow-worm population status | | | |
|---|---|---|---|---|
| **Population Size** | **Increase** | **Decrease** | **Stable** | **Extinctions** |
| < 10 | 2 (13) | 4 (27) | 9 (60) | 1 |
| 11-50 | 3 (13) | 4 (17) | 17 (71) | 1 |
| > 50 | 3 (16) | 3 (16) | 13 (68) | 0 |

# 4. Discussion

This questionnaire survey has brought together information about adder and slow-worm populations from a wide variety of sources. In spite of the contribution of information from a broad range of contributors, the study still contains biases, discussed below, and is hence unlikely to be fully representative of sites nationally. Many of the sites reported on were protected or were managed as nature reserves. Thirty-six per cent of sites were National Nature Reserves, Sites of Special Scientific Interest or candidate Special Areas of Conservation. A further 33 per cent were non-statutorily designated nature reserves. In total 131 (54 per cent) of sites had some nature conservation, or similar, protective designation. To put this into a national perspective, SSSIs represent about 7.5 per cent of land in England and National Nature Reserves approximately 0.6 per cent (English Nature 2003); note that these designations often coincide, so that most National Nature Reserves are also covered by SSSI designation, and all candidate SACs are also SSSIs. The current data are biased towards protected sites compared to the country as a whole. Analysis of the data indicates that the status of adders and slow-worms is better on protected, rather than on unprotected sites, where population decreases were more frequent and stable and increasing populations less frequent.

The reason for the bias towards the collection of data from protected sites may be due to the nature of the information required for this study, namely observations from sites that are well-known to the reporter, and ideally long-term. Designated sites are more likely to have the personnel to maintain long-term information. The bias towards designated sites may be due to a further contributing factor. Interested persons are more likely to make long-term studies of, or repeated visits to, particularly strong reptile population, as are found on protected sites. The data summarised in this report are considered to be biased towards relatively strong reptile populations, on protected sites, when compared to the country as a whole. They may not be representative of widespread reptile sites nationally, many of which occur on pockets of rough or derelict land which fall outside of the scope of protection by the system of SSSI designation (Cooke and Scorgie 1983).

## 4.1 Status

In spite of this study's inherent bias towards higher quality sites, and by inference populations, the national status of both species, but especially adders, is not favourable. For adders there was evidence of a national decline, as there were more population decreases reported than would be expected to maintain stasis. The Midlands is an area of particular concern as here both adders and slow-worms are in greater decline than elsewhere in the country, although the latter is only marginally significant. Individual reports reiterate the concern over adder population status in the Midlands. Monitoring in the Wyre Forest (Worcestershire and Shropshire) has detected decreases in the number of sites occupied by adders and decreases in the mean number of sightings per site (Sheldon unpubl.). The only known adder site in Nottinghamshire was reported to have been damaged by forestry operations in January 2003 and the fate of the population is unknown. At the time of writing, surveys had not detected adders at the site following the damage (John Osborne, pers. comm.).

Few population extinctions or new populations were reported, as might be expected for the overall study sample size. For adders there was a significant trend towards population extinctions. However, the current study may be biased towards detecting extinctions over

new populations as long-term observations of sites are intrinsically biased towards occupied sites that may become extinct rather than unoccupied sites that may become colonised. Nevertheless, the data on extinctions and new populations support the finding that, nationally, adder populations are in greater decline than slow-worms.

The results of the current questionnaire support the broad findings of the previous, vice-county-based surveys of Cooke & Scorgie (1983) and Hilton-Brown & Oldham (1993); nationally adders are in decline whereas declines in slow-worms appear to be have abated and are generally non-significant. The site-based data collected in the current report are too few to allow the more detailed regional analysis of the previous questionnaires, but they do highlight the Midlands as an area of particularly strong declines in the adder, in contrast to the previous surveys, which identified East Anglia. The differences in conclusions may be due to small samples sizes, both due to the scarcity of adder populations in the Midlands and the number of people contributing information to these surveys. The current results on adder status are also broadly consistent with those of Atkins (unpubl. data)

A central issue when considering wildlife population status is whether patterns observed are part of natural cycles or fluctuations. Both the adder and the slow-worm have been in decline since approximately the 1930s (Atkins, unpubl. data; Arnold Cooke pers. comm.; Cooke & Arnold 1982; Cooke & Scorgie 1983; Hilton-Brown & Oldham 1993). In the light of this and the present study it appears that adders, and to a lesser extent slow-worms, with respect to the current data, have been experiencing long-term declines throughout much of England. It is unlikely that such prolonged declines are part of a natural cycle.

## 4.2 Factors affecting populations

Habitat management was widely regarded as having a positive impact on population status of both species. This result appears to contradict some concerns among the herpetofaunal conservation community. For instance, in Atkins' (unpubl. data) survey unsympathetic habitat management was the second most frequently cited reason (after agricultural improvement) for adder declines. The difference in perception of decline factors between the current study and that of Atkins (unpubl. data) may be due to differences in questionnaire design and sampling strategy; in addition, the latter study was a considerably more modest investigation than the current one. However, individual cases of damage to reptile habitat and populations were reported in the current project. For example a SSSI was reportedly damaged by overgrazing, exposing adders to buzzard predation. Reptile hibernation sites were destroyed and the population declined almost to extinction. A further potential threat to reptiles from habitat management is the increased mechanisation of management operations, which increases the scale of the physical impact on any particular site.

The full impacts of habitat management activity can sometimes be difficult to address. Several examples were reported of activity that has caused immediate damage, that may in the long-term be beneficial to reptiles. Heathland restoration at Swinley Brick Pits (Berkshire) (Sussex, pers. comm.) and bracken clearance at Furzebrook (Dorset) have removed cover, but this may be beneficial in the long run. Rewetting of mossland at Risley Moss (Cheshire) may have removed reptile habitat when scrub was cleared and peat scrapes excavated, however embankments resulting from the latter activity may provide even better reptile habitat (Rob Smith, pers. comm.). Although potentially damaging activity may be beneficial to reptile populations in the long-term, and possibly essential in maintaining the

open aspect of sites, the impact of these activities is rarely monitored and so long-term effects are difficult to evaluate.

Even though such cases of habitat damage through management operations may be in a minority, they may still cause local extinctions, which, due to population isolation (Sheldon unpubl.; current report) may occur on sites that cannot be naturally re-colonised. Identifying features of sites of importance to reptiles is a readily attainable goal. Site managers should be encouraged to incorporate the locations of these into management plans which should be implemented in such a way as to retain key features for reptiles and minimise harm to reptile habitat and populations.

Of the factors adversely affecting populations, public pressure (disturbance) was the most evident for both species. This factor was a separate category to persecution, so that in this report it covers aspects such as disturbance, particularly of basking animals, by human usage of sites, especially for recreational activities. Such disturbance was also recognised as being problematic for adders by Edgar (2002) in a review of the impacts of increased public access to sites as proposed under the Countryside and Rights of Way Act 2000. However, Edgar regarded such effects as minimal for slow-worms.

In populations where negative factors were linked to population decreases persecution was a further factor identified as affecting adders. One reporter noted finding adders that appeared to have been killed by being hit with an object such as a stick. In the case of slow-worms building development was responsible for over a half of the population decreases confirming previously suspected fears (Foster 1977; Platenberg 1999). Predation was responsible for a third of slow-worm population decreases. In only three of the cases of slow-worm predation were the predators named; cats in two cases and buzzards in the third).

## 4.3 Population/site size and isolation effects

Population size is constrained by site size, so the effects of these two variables are likely to be related. Many of the reported populations were small. A third of adder populations and almost a quarter of slow-worm populations were estimated to consist of fewer than 10 adults. Slow-worm population size is difficult to determine, and may be under-estimated by the reporters, as discussed below. However, if adder populations are being reported accurately this gives cause for concern. Adverse effects of inbreeding (low genetic variability and an increase in deformed and stillborn young) have been reported from Sweden in a small, isolated adder population containing fewer than 30 adults (Madsen *et al.* 1996). The data collated during the current study show that for the adder there were more decreases and fewer stable adder populations than expected among small (fewer than 10 adults) populations, whereas there were fewer decreases and more stable populations in the largest populations (more than 50 adults).

Thirty-one per cent of adder and 44 per cent of slow-worm sites were smaller than 6 ha. In both species declines were more frequent on these small sites and in the case of the adder there were fewer stable populations.

Inbreeding is not the only factor that may adversely affect small populations. Natural fluctuations are likely more likely to lead to local extinctions in such cases and small populations/sites are likely to be less resilient to the harmful effects of factors such as

careless habitat management. Unsympathetic management regimes, such as intensive grazing, are more likely to harm reptile populations on smaller sites (Offer *et al* 2003).

36 per cent of all sites were isolated, including 28 per cent of adder and 35 per cent of slow-worm populations. However, site isolation had an effect only on the adder; there were more population decreases on isolated sites.

## 4.4 Limitations to study

The data gathered by the current study highlight some constraints in the status assessment of the widespread reptiles in England. There is no national co-ordination of monitoring these species. Hence, even at sites where reptile populations are relatively well-known, there is often no systematic monitoring programme in place and population status was not known at approximately 40 per cent of sites within the present study. Population size was regarded as impossible to determine in 40 per cent of the reports on adder populations and 57 per cent of reports on slow-worms. The higher figure for the slow-worm may due to its fossorial lifestyle which makes populations difficult to study (Reading 1997; Platenberg 1999). Recognition of individuals is also not as easy as it is for other reptiles, such as the adder.

The population size data from the present study show no difference between adders and slow-worms across the categories used in the status questionnaire. In reality it seems unlikely that adder and slow-worm population sizes are so similar, as slow-worm population densities can be in excess of 1000 per hectare (Smith 1990). Again, this may reflect the difficulty of assessing slow-worm population characteristics and underlines the lack of quantitative information on slow-worm populations upon which to base status evaluations.

Most of the information pooled by this study was collected during non-systematic survey and as such may be regarded as relatively crude. However, the reliance on such data is likely to mask, rather than create, spurious trends, and information gathered from a wide variety of sources can be useful in detecting large-scale population changes (Carrier and Beebee 2003). Reassuringly, the data relating to population size and status were broadly similar to those collected by systematic techniques; the main difference being that non-systematic techniques seemed to under-record slow-worm population decreases. Less confidence can be placed on the determination of factors affecting population status, which was largely subjective. Such assessments can yield misleading results (Cooke and Scorgie 1983).

The questionnaire did not attract sufficient information to allow satisfactory conclusions to be drawn regarding slow-worm population status on brownfield sites. Only 5 per cent of sites were identified as brownfield sites. Further, although 22 per cent of sites were associated, either directly or indirectly, with building development, only 4 per cent of the reports came from surveys directly related to building development. At development sites where mitigation is implemented, data on slow-worm populations (and to a lesser extent adders) may be collected by wildlife consultancies. Surveys prior to development and, in cases where populations are translocated, after translocation may be legal requirements and/or demanded by planning conditions. The existence of such data is not tracked by a centralised body, hence the quantity of these data remains unknown and their use in monitoring national status is limited. The present questionnaire may have failed to gather data from this potential resource.

If it is accepted that the information collated in this report is probably biased towards healthier populations and high quality habitat, then the magnitude of the declines detected should be regarded as conservative.

# 5. References


ARNOLD, H,R., 1995. *Atlas of Amphibians and Reptiles in Britain*. ITE Research Publication No. 10, HMSO.

CARRIER, J. & BEEBEE, T.J.C., 2003. Recent, substantial, and unexplained declines of the common toad *Bufo bufo* in lowland England. *Biological Conservation*, 111, pp.395-399.

COOKE, A.S. & ARNOLD, H.R., 1982. *National changes in the status of the commoner British amphibians and reptiles before 1974, British Journal of Herpetology*, 6, pp.206-207.

COOKE, A.S. & SCORGIE, H.R.A., 1983. The Status of the commoner amphibians and reptiles in Britain. *Focus on Nature Conservation*, No. 3. Peterborough: Nature Conservancy Council.

DEFRA, 2003. *The environment in your pocket 2002*. DEFRA.

EDGAR, P., 2002. *The effects of public access on amphibians and reptiles. An assessment of the potential effects of increased public access due to the introduction of the Countryside and Rights of Way Act 2000*. Bangor: Countryside Council for Wales.

ENGLISH NATURE, 2003. *Annual report 1 April 2002 – 31 March 2003*. Peterborough: English Nature.

HILTON-BROWN, D. & OLDHAM, R.S., 1991. The status of the widespread amphibians and reptiles in Britain, 1990, and changes during the 1980s. *Focus on Nature Conservation*, No. 131. Peterborough: Nature Conservancy Council.

FOSTER, J., 1997. *In:* RIDDELL, A. (ed.). *The Slow-worm*. Canterbury: Kent Reptile and Amphibian Group.

INNS, H., 2003. Wildlife reports. Reptiles and amphibians, *British Wildlife*, 14(3), pp.206-207.

LANGTON, T., 1986. *Protecting wild reptiles and amphibians in Britain*. London: Fauna and Flora Preservation Society.

MADSEN, T., STILLE, B. & SHINE, R., 1996. Inbreeding depression in an isolated population of adders *Vipera berus. Biological Conservation*, 75, pp.113-118.

OFFER, D., EDWARDS, M. & EDGAR P., 2003. Grazing heathland: A guide to impact assessment for insects and reptiles. Peterborough: *English Nature Research Reports,* No 497.

PHELPS, T., unpublished. *Herpetological report 2002*. Unpublished report.

PLATENBERG, R J., 1999. *Population ecology and conservation of the slow-worm* Anguis fragilis *in Kent.* PhD dissertation, University of Kent at Canterbury.

READING C J., BUCKLAND, S T., MCGOWAN, G M., GORZULA, S., JAYASINGHE, G., STAINES, B W. ELSTON, D A. & AHMADI, S., 1995. *Status of the adder* Vipera berus *in Scotland*. Perth: Scottish Natural Heritage Research, Survey and Monitoring Report No. 38.

READING, C J., 1997. A proposed standard method for surveying reptiles on dry lowland heath. *Journal of Applied Ecology*, 34, pp.1057-1069.

SHELDON, S., unpublished. *Wyre Forest Adder Report 2002. Correlated with local and meteorological data*. Unpublished report.

SMITH, N., 1990. *The ecology of the slow-worm (*Anguis fragilis *L.) in Southern England*. M. Phil. Thesis, University of Southampton.

SWAN, M J S. & OLDHAM R S., 1993. Herptile sites. Volume 2: National Common Reptile Survey Final Report. Peterborough: *English Nature Research Reports,* No 39.

TAYLOR, R H R., 1963. The distribution of amphibians and reptiles in England and Wales, Scotland and Ireland and the Channel Isles: a revised survey. *British Journal of Herpetology*, 3, pp.95-115.

UK BIODIVERSITY ACTION PLAN STEERING GROUP, 1995. *The UK Steering Group Report Volume 2*. HMSO.

WILD, C. & ENTWISTLE, C., 1997. Habitat management and conservation of the adder in Britain, *British Wildlife,* 8(5), pp.287-295.

# Appendices

1. **Introductory letter**
2. **Preliminary Questionnaire**
3. ***Snakes Need Friends*, Froglife Advice Sheet 2**
4. **Text from Froglife's website**
5. **Status Questionnaire**

# Appendix 1: Introductory letter

6 December 2002.

Dear Colleague

## Adder and slow-worm status questionnaire

Although adders and slow-worms are widely-distributed throughout England, there are concerns about population declines, based on anecdotal information. Hence, Froglife, in partnership with English Nature, is requesting your help to investigate more closely. We want to gather information on changes in the national status of these species, and the factors driving such changes. This information is needed to determine future conservation policy and, in particular, to feed into the major review of the UK Biodiversity Action Plan in 2005. Your participation will make a valuable contribution to this important project.

This assessment of status will focus on sites. It will be carried out through questionnaire, and Froglife is seeking individuals and organisations that may be able to help. We hope to gather information about sites that have been well known to observers for many years.

The survey is a two-stage questionnaire. Initially we would like you simply to list (on the enclosed *Preliminary Questionnaire*) sites that you have visited and known well since, ideally, 1980, or at least, 1990, and the present day. Please include sites at which populations may now be extinct. Sites in less well-surveyed places (e.g. Northumberland) are particularly important. Please return the completed form in the enclosed, postage-paid envelope.

Once we have collected this preliminary data we will select a number of sites about which we would like more detailed information. We will then send you a more full questionnaire for these sites, which will take about five minutes to fill in per site.

If you know of anyone else who may be able to help with this important survey, please pass them a copy of this letter and *Preliminary Questionnaire*, or ask them to contact the Froglife office.

I also enclose Froglife's recently updated advice sheet *Snakes Need Friends*, which I hope you will find useful. Further copies of this are available, free of charge, from the Froglife office.

Yours sincerely

John Baker, Conservation Officer

P.S. If you can help with this survey, please remember to sign the *Data protection opt-out and copyright agreement*. This is important to ensure that we carry out this survey within the law. If you have any concerns about this, please do not hesitate to contact the Froglife office.

# Appendix 2: Preliminary Questionnaire

## Adder and slow-worm status - Preliminary questionnaire

**DATA PROTECTION OPT-OUT & COPYRIGHT AGREEMENT**

*I understand that the information I provide on this form, including details of my name and address, will be entered on to a computer database at the Froglife Trust. It will be used to select sites for the second stage of the questionnaire survey and may be used for other conservation purposes*.*

*If there are any intellectual property rights to the information I have provided, then I agree to share these with Froglife, so that I have unrestricted use of this information and so that Froglife can use the information for the purposes of this survey and other reasons of conservation benefit*.*

**SIGNED** _____ **DATE** _____

*Please note. If there are real threats to adder sites, records will not be made publicly available if you tick the non-disclosure box for each site.

Name _____

Address _____

_____

_____

_____

Telephone _____

| County/Area | Site name | Adder | Non-disclosure | Slow-worm | Since what year have you known the site? |
|---|---|---|---|---|---|
| eg Cornwall | Dunmere village dunes | ✓ | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**THANK YOU FOR RETURNING YOUR FORM BY THE END OF DECEMBER, 2002.**

Your contribution will be acknowledged in any final report We will be back in touch shortly.

ENGLISH NATURE

FROGlife

# Appendix 3*: Snakes Need Friends*, Froglife Advice Sheet 2

FROGlife

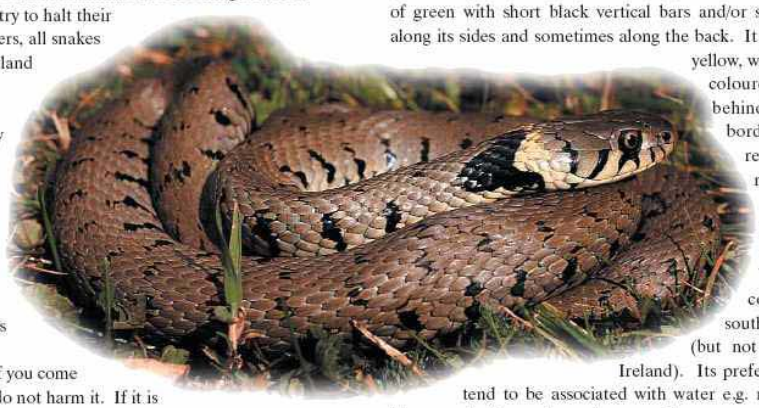
Advice Sheet 2

## SNAKES NEED FRIENDS

### Advice on snakes (and slow-worms) in gardens

### Snakes are protected by law

Snakes are a spectacular element of Britain's biodiversity. But, sadly, these beautiful animals are becoming scarce in many areas. To try to halt their decline in numbers, all snakes in England, Scotland and Wales are protected from killing and injury under the Wildlife and Countryside Act 1981 (as amended). As for our rarest snake, the smooth snake, its habitat is also protected. So, if you come across a snake, do not harm it. If it is trapped or injured contact the RSPCA (0870 5555999).



Grass snake, Graeme Skinner

### Snakes on the slide

Snakes are a very vulnerable group of animals that cannot easily cross large areas of inhospitable habitat. This means that they are often confined to small areas of snake-friendly habitat, and if these become damaged or destroyed, they have nowhere to hide. Some animals may move out and survive for several years in less suitable areas, where they may appear unexpectedly and cause concern, but generally, if the habitat is lost, so is its population of snakes. Once snakes disappear from a site, then it may be too isolated from other populations to be re-colonised naturally, even if the habitat is suitable.

In addition to the problems of shrinking and increasingly fragmented habitat, snakes still suffer from persecution. There is much superstition and misinformation surrounding snakes, so that many people fear them unnecessarily. Sadly, this can lead to snake persecution to the extent that they become locally extinct.

### Which snake is it?

There are three native snakes in the UK, and one legless lizard, which may be confused with them. They are quite easy to tell apart. Colour and markings are important in identification because the sizes of the different species overlap and change with age.

**Grass Snake (Natrix natrix)**

The grass snake is the largest British snake, growing to about 150 cm (60 inches), but more commonly up to around 90 cm (36 inches). It varies in coloration, but is usually a shade of green with short black vertical bars and/or spots running along its sides and sometimes along the back. It usually has a yellow, white or cream coloured collar behind the head, bordered to the rear by black markings.

It is found throughout much of Wales and central and southern England (but not Scotland or Ireland). Its preferred habitats tend to be associated with water e.g. rivers, canals, lakes, ponds, fens and marshes, as well as open grassland, open woodland, woodland edge, and quite often gardens that adjoin these habitats. Compost heaps on farms and in gardens may be used as egg-laying sites, sometimes leading to mass emergence when the young appear in late August and September. Grass snakes feed mainly on amphibians and fish, and so may visit garden ponds. They are harmless to people.

**Adder (Vipera berus)**

Graeme Skinner

Adders tend to keep to specific areas of suitable habitat and do not wander far from these.

version September 2002

The adder can grow to 80 cm (32 inches) but rarely exceeds 65 cm (26 inches). Coloration is variable and differs between the sexes. The background colour is usually grey in males and brown in females. Both sexes have a thick, black, zigzag pattern running along the length of the back.

Adders are locally distributed in England, Scotland and Wales, occurring most frequently on sandy heathlands and rough grassland slopes on free-draining soil. Their food consists mostly of small mammals. Adders give birth in late summer or early autumn - they do not lay eggs, or make nests.

The adder is Britain's only venomous snake, but because the venom is designed to kill only small animals like voles it is not particularly potent. Although adders should be treated with respect, the danger of adder bite is often exaggerated. Adders are only occasionally found in gardens because of their specific habitat requirements.

### Smooth snake (Coronella austriaca)

Smooth snakes are slender and rarely grow to more than 70 cm (28 inches). They are beige, grey or greyish brown, with a double row of dark blotches, or single row of dark bars, on the back. There is a dark stripe on either side of the head, running through the eye. There is usually a dark butterfly or heart shape on the top of the head.

Smooth snakes are rare in Britain, with only a few thousand individuals left in the wild. Hence they are strictly protected, as are their heathland habitats where they feed on lizards and small mammals. Smooth snakes are confined to parts of Dorset, Hampshire and Surrey and heaths of immediately surrounding counties. If you think you have found one in this area, please contact The Herpetological Conservation Trust (01202 391319).

Marion Dalton

The rare smooth snake is confined almost exclusively to heathlands in Dorset, Hampshire and Surrey.

### Slow-worm (Anguis fragilis)

The slow-worm is, in fact, a lizard, but as it has no legs, it is often mistaken for a snake. Slow-worms do not grow to become as big as our snakes, reaching about 40 cm (16 inches). They are brown or grey. The scales are small and smooth, giving slow-worms a metallic or polished appearance. Females and juveniles have black, or dark flanks and a thin black line running along the back. Adult males have a duller brown/grey background colour and usually lack the darker markings. Some males have a few blue spots, which can be quite noticeable.

Slow-worms are fairly widespread in England, Scotland and Wales, and are found in a variety of habitats, particularly

Graeme Skinner

Jim Foster

The slow-worm is the reptile most commonly found in gardens. Male (upper photograph) and female.

grasslands and heathlands. Of all our native reptiles they are the most likely to be found in gardens and allotments. They can be quite common in some urban and suburban areas. They feed largely on slugs and are hence a friend of gardeners.

Although they may be noticed moving about on mild days, especially after rain, slow-worms spend most of their time underground or underneath objects. Hence, they are more likely to be found under paving slabs or large items of rubbish such as discarded roofing felt, carpet, corrugated iron or similar. They are often found in compost heaps, presumably attracted by the warmth and soft-bodied prey items, such as slugs, found there. Although slow-worms can fare very well in gardens and allotments they are sometimes attacked by cats, and also suffer from careless mowing or strimming.

## Unusually coloured snakes

Graeme Skinner

Occasionally, adders, like this one, and, more rarely, grass snakes, are completely black or very dark.

Colour variations are occasionally found in all of our native snakes and the slow-worm. However, if you find a snake that does not match any of the descriptions in *Which snake is it?*, bear in mind that it may be an escaped pet. There is a wide range of exotic snakes kept by enthusiasts, and they vary enormously in colour, size and shape. If you think you have found one of these, contact the RSPCA (0870 5555999), or a local police station, and ask neighbours whether they have lost a pet snake. Almost all pet snakes are non-venomous, but until any snake is identified by an expert, it should be treated with caution and certainly not handled.

## Snake bite

The adder is the only native snake in the UK that has a venomous bite. The number of adder bites in Britain is very low, with the majority of incidents resulting from an uninformed person grabbing at a snake. Although adder bite is potentially dangerous, statistics show that people in Britain are far more likely to be harmed by bees or horses.

Advice on first aid treatment of snake bite is given in the *First Aid Manual*, the authorised manual of St. John Ambulance, St. Andrew's Ambulance Association and the British Red Cross. Hospital treatment is advised.

Dogs and cats are unlikely to be seriously affected by adder bite, but if you suspect that your pet has been bitten, take it to a vet for examination.

## Questions about snakes in gardens

### I am worried about snakes in my garden - what can I do?

If you find a snake in your garden and are anxious about the situation, there are several points to consider.

- Snakes (and lizards) pose little or no threat to people and pets.
- It is quite likely that the snake is just passing through your garden, or on a search for food. You may never see it again.
- Snakes usually glide off into the undergrowth when approached - they are more afraid of you than you are of them.

All snakes are protected by law from killing or injury. Anyone wishing to remove them from a garden has to have a very good reason. In practice, this might be if there are adders in a garden where children and pets play. Removing adders in such an instance would require careful advice as there are certain legal obligations regarding transporting the animals. Unless you are experienced in venomous snake handling, it is unwise to attempt to pick up an adder. You can seek advice on adders and the law, and handling snakes, from Froglife (contact information at the end of this leaflet). There are also local groups in many counties/districts that may be able to help if you have enquiries about any snake.

Moving grass snakes or slow-worms is usually unnecessary as they are harmless; in any case it may be very difficult to do so. They can be difficult to find and grass snakes move over quite large areas, and so are usually temporary visitors rather than easily evicted residents.

It may be necessary to move a snake or slow-worm if it is in a dangerous situation, e.g. on a road. In this case it should be moved to the nearest suitable habitat (see above under *Which snake is it?*). Again, contact Froglife for information on local people with whom you can be put in contact, as moving a snake or slow-worm to an unsuitable place can be considered cruel and may be illegal.

Occasionally grass snakes play dead if disturbed, by turning the front part of their body upside-down and lolling the tongue out. They may also exude a strong smelling, musky (but harmless) fluid. If you find a snake feigning death, it is best to leave it well alone, or possibly move it from a particularly exposed location.

Although the removal of snakes is difficult, you can (as a last resort) discourage them from coming onto your land by managing the area carefully. This may involve keeping grass cut short, not letting areas of dense vegetation grow up, and removing hiding places such as log or stone piles.

### How can I help snakes on my land?

If you own or manage a garden or other land, and there are snakes occurring naturally in the area, there are a few measures that you can take to encourage them and benefit other wildlife, too.

- Manage a mosaic of habitats. Do not mow all grass at once leaving no refuges; plan for having some long, and some short areas.
- Check the area is clear before using mowers (set blades high) or strimmers in long grass, as snakes are often injured by such machinery.
- Create compost heaps from waste vegetation, especially cut grass. Grass snakes lay their eggs in composting vegetation, which provides them with warmth and protection. Do not disturb the heap between June and October when eggs may be present. Compost heaps can also provide good basking sites if placed in a sunny spot.
- Be careful using plastic netting. If this is used (e.g. over your pond or on the vegetable patch), choose a mesh size of 1½ inch (4 cm) or larger because snakes often get tangled up, and can die, in narrower mesh.


Tom Langton

Snakes, like this grass snake, can become entangled in garden netting where they may die.

- Create a wildlife pond and allow it to be colonised naturally by newts, frogs or toads. Grass snakes may then visit in search of food. Froglife can supply a free

booklet, "Pond Heaven", on creating wildlife ponds (send an A5 SAE).

- Place rock and log piles in your garden to provide basking spots and shelter for snakes and lizards. Creating embankments angled to provide sunny, south-facing slopes also helps sun-seeking reptiles.
- Provide a few covered reptile refuges. A piece of old carpet, plywood board, sheet metal, or similar, laid in a sunny position will provide a place for grass snakes and slow-worms to warm up, away from the eyes of predatory birds or cats. However, beware of placing such refuges in areas vulnerable to disturbance by people.

### A snake is eating my frogs/fish. What can I do?

Grass snakes eat primarily amphibians and fish. They may visit garden ponds looking for food (most instances of snakes appearing in garden ponds turn out to be grass snakes). Garden ponds can provide good wildlife habitat, so in this respect, a visiting grass snake is a mark of success. Fish keepers may view the arrival of a grass snake somewhat differently. However, it is worth bearing in mind that snakes eat very few meals. An adult snake will eat about half a dozen large prey items a year. So, if large numbers of fish start to disappear from a pond it may be that other factors, such as a visiting heron, are involved.

## Snake sightings

An easy way to help protect our snakes is to note down your sightings and pass them on to interested parties. Your records can help develop a clearer picture of local status, distribution and habitat preferences, all of which are essential information for snake conservation. Froglife can put you in touch with your local amphibian and reptile group and your county reptile recorder and tell you about national recording schemes that will benefit from your information.

If you have noticed grass snakes laying eggs in your compost heap, or indeed any other location, this would be particularly useful information. However, any snake record is still valuable. Please note as much detail as you can (e.g. species, location, date, weather conditions, habitat type). A photograph would also be most useful. For records of grass snake eggs, please note what sort of material the eggs were found in.

## More help for snakes

There is a network of amphibian and reptile groups (the Herpetofauna Groups of Britain and Ireland) that promotes the conservation of these animals through recording, surveying, site protection, education and practical management. The involvement of local people is the best way to help snakes and there is a lot that you can do to assist in their conservation. If you would like to know more, contact Froglife at the address below.


If you want to make new friends for snakes then why not buy and display a *Be Kind To Snakes* sticker? Available from Froglife (£1.00), profits go towards UK reptile and amphibian conservation.

## Further reading


Beebee, T and Griffiths, R (2000) **Amphibians and Reptiles. A Natural History of the British Herpetofauna**. The New Naturalist Library, HarperCollins.

English Nature (1991) **Facts About Reptiles**. Advisory leaflet. English Nature, Peterborough.[#]

Field Studies Council (1999) **Guide to the Reptiles and Amphibians of Britain and Ireland**. Field Studies Council, Shrewsbury. (Waterproof identification guide).*

Froglife **Which snake is it?** A4 identification poster.*

Gent, T and Gibson, S (1998) **Herpetofauna Workers' Manual**. JNCC, Peterborough.

Gibb, R and Foster, J (2000) **The Herpetofauna Workers Guide 2000**. Froglife, Halesworth. (Contains extensive reference lists of amphibian/reptile conservation and regional contacts).*

Langton, T (1989) **Snakes and Lizards**. Whittet Books, London.*

Langton, T (2002) **Pond Heaven: How to Create Your Own Wildlife Pond**. BBC Wildlife Magazine.*

RSPCA (2001) **Snakes Alive!** Advisory leaflet. RSPCA.

Stafford, P (1987) **The Adder**. Shire Publications, Princes Risborough.*


* Available from Froglife (address below). Send SAE for our *Frogalogue* catalogue of free and low-cost publications.
[#] Available free from English Nature (0870 1214177).

## Other advice sheets in this series

1. Frogs, toads and newts in garden ponds
3. Amphibians and roads
4. Signing toad crossings
5. Reptile and amphibian recording
6. Conserving grass snakes
7. Unusual frog mortality
8. Exotic reptiles and amphibians in the wild
9. The planning system and site defence
10. Reptile survey
11. Surveying for (great crested) newt conservation


Produced by Froglife with funding from the Bridge House Estates Trust in support of the London Garden Pond Project.

Froglife, Mansion House, 27-28 Market Place, Halesworth, Suffolk IP19 8AY. Tel: 01986 873733, website: www.froglife.org.

Froglife Trust is a registered charity, dependent upon donations and grants.

Supported by BRIDGE HOUSE ESTATES TRUST FUND
CORPORATION OF LONDON

# Appendix 4: Text from Froglife's website

## Adder/slow-worm Status Survey

There is still time to help with Froglife's questionnaire survey investigating the status of adders and slow-worms. If you are familiar with a site (in England) occupied by either adders or slow-worms and would be prepared to fill in a questionnaire concerning habitat and the status of the population/s then you may be able to help with our survey. We particularly need information on sites in the North-west, Avon, Buckinghamshire, Cambridgeshire, Cheshire, the Humberside area, Leicestershire, Lincolnshire, Oxfordshire, Staffordshire, Suffolk, Warwickshire and the West Midlands.

(March 2003)

## Adder and Slow-worm Questionnaire

Froglife, in partnership with English Nature, is carrying out a questionnaire survey to investigate the national status of adders and slow-worms. If you have long-term knowledge of an adder or slow-worm population, then you may be able to help with this important project.

(December 2002)

# Appendix 5: Status Questionnaire

ENGLISH NATURE

FROGlife

## Adder and Slow-worm Status Questionnaire

**DATA PROTECTION OPT-OUT & COPYRIGHT AGREEMENT**

*I understand that the information I provide on this form, including details of my name and address, will be entered on to a computer database at the Froglife Trust. It will be used to assess reptile status and may be used for other conservation purposes. The location of sensitive sites will not be made publicly available if the confidential site box below is ticked*.*

*If there are any intellectual property rights to the information that I have provided, then I agree to share these with Froglife, so that I have unrestricted use of this information and so that Froglife can use the information for the purposes of this survey and other reasons of conservation benefit.*

**SIGNED** _____ **DATE** _____ ***Confidential Site** ☐

---

| | | | |
|---|---|---|---|
| **Name of site** | | **Grid reference of site centre** | |
| **Surveyor** | | | |

**How do you know this site? (tick one or more)**

I monitor this site for my own interest/as part of a survey ☐
I have helped with habitat management ☐
I have tried to defend this site from development/land use change ☐
I have handled reptiles here as part of a capture/release project ☐
Other ☐

**In how many years (approximately) have you visited the site?**

1-5 ☐
6-10 ☐
11-15 ☐
16 or more ☐

**How many visits in total have you made to this site over the years (approximately)?**

1-10 ☐
11-20 ☐
21-50 ☐
More than 50 ☐

**Habitat type (tick one or more)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Farmland – arable | ☐ | Heathland | ☐ | Rail embankment | ☐ | | |
| Farmland – pasture | ☐ | Moor | ☐ | Road embankment | ☐ | | |
| Rough grassland | ☐ | Dune/coastal | ☐ | Garden | ☐ | | |
| Woodland – deciduous | ☐ | Brownfield | ☐ | Allotment | ☐ | | |
| Woodland – coniferous | ☐ | Quarry | ☐ | Other | ☐ | | |
| Scrub | ☐ | Churchyard | ☐ | | | | |

**Tick one box that best describes how the site is connected to other adder/slow-worm sites**

Completely isolated by many km distance ☐
Isolated but some slight linkage (e.g. along river/railway line) ☐
Linked but by largely sub-optimal habitat that could not be reverted to suitable habitat ☐
Linked but by largely sub-optimal habitat that could be reverted to suitable habitat ☐
Part of a larger group of populations in a habitat mosaic that could allow movement between them ☐
The site described is just one part of a large block of occupied reptile habitat ☐

**Site status (tick one or more)**

Unmanaged land ☐
Nature reserve ☐
NNR/SSSI/cSAC ☐
Public land ☐
Private land ☐

**How big is the site?**

Less than 1 ha ☐
1-5 ha ☐
6-50 ha ☐
More than 50 ha ☐

How long have you known this site? From (a) To (b)

| Population status | Adder (A) | Slow-worm (SW) |
|---|---|---|
| Has the population been present since (a) above? | | |
| Has the population become extinct? | | |
| If yes, above, what was the year of extinction? | | |
| Is this a new population?* | | |

*_New_ indicates a site that has come to your attention through introduction or natural colonisation.

**Population Status (Extant Sites)**

| **In your opinion has the population:** | **A** | **SW** |
|---|---|---|
| Increased | | |
| Decreased | | |
| Remained stable | | |
| Not known | | |

| **How big is the population now?** | **A** | **SW** |
|---|---|---|
| Fewer than 10 adults | | |
| 11-50 adults | | |
| More than 50 adults | | |
| Impossible to say | | |

**Is the population *not* reproducing?** Some populations, especially adders, can persist at a site for a long time, even if the adults are no longer breeding. If you believe this to be the case, please tick one of the boxes to the left. If you are not certain of breeding status, leave blank.

| **A** | **SW** |
|---|---|
| | |

**What method(s) were used to assess population status/size? (tick one or more)**

| | | | |
|---|---|---|---|
| Non-systematic (casual) observation | | Refuge survey | |
| Systematic (e.g. transect) observations | | Historical records* | |

*If site records are sufficiently detailed it may be possible to deduce long-term population changes by comparing your recent personal observations with such documented information.

| | **Increased** | | **Decreased** | |
|---|---|---|---|---|
| **Has the area of land occupied within the site increased or decreased?** | **A** | **SW** | **A** | **SW** |
| If possible, assign a percentage loss/gain | | | | |

**If the population has changed in status, or become extinct, what do you think is the cause of this? (tick one or more, according to whether a positive or negative influence)**

| | **Positive** | | **Negative** | |
|---|---|---|---|---|
| | **A** | **SW** | **A** | **SW** |
| Building development | | | | |
| Agricultural changes | | | | |
| Forestry operations | | | | |
| Mineral/peat extraction | | | | |
| Fire | | | | |
| Public pressure (disturbance) | | | | |
| Persecution (killing or injury) | | | | |
| Predation – cat or other (indicate) | | | | |
| Pollution | | | | |
| Neglect/succession | | | | |
| Habitat management/creation | | | | |
| Introduction (development mitigation) | | | | |
| Introduction (conservation) | | | | |
| Weather conditions | | | | |
| Changes in legislation | | | | |
| Impossible to say/do not know | | | | |
| Other (indicate) | | | | |

| **If *building development*, was selected** tick if any mitigation (habitat enhancement/creation) has taken place. And have animals been translocated away from the site? | **A** | **SW** | **A** | **SW** |
|---|---|---|---|---|
| | | | | |
| | | | | |

**If *habitat management/creation* was selected, above, or if site loss/damage occurred please describe this:**

ENGLISH NATURE

English Nature is the Government agency that champions the conservation of wildlife and geology throughout England.

This is one of a range of publications published by:
External Relations Team
English Nature
Northminster House
Peterborough PE1 1UA

www.english-nature.org.uk

© English Nature 2002/3

Cover printed on Character Express, post consumer waste paper, ECF.

ISSN 0967-876X

Cover designed and printed by Status Design & Advertising, 2M, 5M, 5M.

You may reproduce as many copies of this report as you like, provided such copies stipulate that copyright remains with English Nature, Northminster House, Peterborough PE1 1UA

If this report contains any Ordnance Survey material, then you are responsible for ensuring you have a license from Ordnance Survey to cover such reproduction.

Front cover photographs:
Top left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Middle left: $Co_2$ experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792
Bottom left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Main: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888

CHARTER MARK
Awarded for excellence