



**BRITISH ARACHNOLOGICAL SOCIETY
&
SPIDER RECORDING SCHEME**

**Improving the quality of spider records
available via the NBN Gateway**

**Contract report BAS.a Verification Rules
to BioD Services Limited**

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1. Summary

- The National Biodiversity Network (NBN) seeks to ensure relatively complete coverage of spider (Arachnida: Araneae) records on the NBN Gateway and to improve the quality of these data.
- British Arachnological Society (BAS) is the organiser of the national recording scheme for spiders in Britain, the Spider Recording Scheme (SRS), and is the major contributor of spider records to the NBN Gateway.
- A standardised approach to the essential and desirable data fields for spider records is recommended, together with information on handling verification queries and issues surrounding the flow and quality control of data.
- Baseline information has been developed for taxon-specific rules to assess the spatial, temporal and identification veracity of spider records using the recently-developed NBN data validation software. Taxa have been graded according to inherent difficulty of identification and information derived from existing sources has been used to define currently acceptable geographical distributions, maturity periods and appropriate year ranges. These rules will require regular revision and the methodology for regular updates of these has been developed in the work undertaken for this contract.
- Used together, the rules will enable records to be prioritised for scrutiny, which should be undertaken by the appropriate British Arachnological Society specialists in the form of its Verification Panel and the Spider Recording Scheme Area Organisers. If spiders are to be sent to any of these people for verification, then postage costs must be covered.
- Identification of most spiders to species level depends on microscopic examination of critical features in adult specimens. We therefore recommend that all spider records should be subject to verification by SRS Area Organisers and the BAS Verification Panel, as appropriate, prior to uploading to the NBN Gateway or being made available to potential data users via other means.
- Issues of data access are discussed and species that should be considered “sensitive” in the context of data sharing are defined.
- Possible development of rule sets for spiders are proposed.
- Consideration has been given to the existence of aggregate taxa records, and it is recognised that there is currently some inconsistency in the way in which these are treated by the Spider Recording Scheme. The need to define and publish consistent definitions for these recording aggregates has been identified.
- The current framework provided by the SRS scheme collates, verifies, validates and manages high quality reliable spider data. However, the long term sustainability of the scheme would benefit enormously from external funding. Any expectation that the scheme should manage larger quantities of data from external sources such as local record centres and other organisations would require staffing and substantial ongoing funding.

2. Introduction

2.1 Report objectives

This report aims to establish recommendations for the data format for spider records, along with quality assurance and data checking procedures, and advising on best practices for dealing with sensitive records. The report comprises seven sections: 1) an

introduction with report objectives and background on the British Arachnological Society and Spider Recording Scheme; 2) acknowledgements; 3) a summary; 4) guidance on the information spider records should contain; 5) suggested 'rules' for quality assuring spider records with an overview of the existing processes for verifying these records; 6) advice on dealing with sensitive records; and 7) a summary of recommendations.

2.2 The British Arachnological Society

The entirely voluntary British Arachnological Society (BAS) is the primary UK organisation with specialist expertise in the study and identification of arachnids, and through the Spider and Harvestmen Recording Schemes, the recording of the distribution and autecology of British spiders and harvestmen. Our members include the country's most respected arachnologists with the specialist expertise necessary to develop verification rules for arachnids. We have substantial expertise in, and are the first port-of-call for verification of spider records.

Spiders have only started to receive the attention they deserve during the past 60 years. The publication of *British Spiders* (Locket & Millidge 1951, 1953; Locket, Millidge & Merrett 1974), and the formation in 1958 of the Flatford Mill Spider Group, which became The British Spider Study Group and subsequently developed into the British Arachnological Society, provided a firm impetus for the study of arachnology in the last half of the twentieth century. The publication of a photographic field guide by Dick Jones (Jones 1983, 1989), the massively important modern identification work by Michael Roberts (Roberts 1985, 1987) and the Collins field guide (Roberts 1995) provided arachnologists with additional tools to identify reliably most species of spider to be found in Britain. Spiders have increasingly been found to be useful in assessing the quality of sites for nature conservation, and with the dependence of many species on structural aspects of a habitat for web building and predation, they are frequently useful in informing the management of sites for a wider range of flora and fauna.

2.3 Spider Recording Scheme

The gathering of records on spiders has been a core activity of the British Arachnological Society since April 1987, when a revised Spider Recording Scheme (SRS) was launched in collaboration with the Biological Records Centre. Following the county lists provided by Bristowe (1939, 1941) in the *Comity of Spiders*, Dr Peter Merrett initiated the mapping of the distribution of British spiders on an administrative county basis in Locket, Millidge & Merrett (1974) and has periodically published New County Record updates in the British Arachnological Society's *Bulletin*. However, it was the formation of the SRS in 1987 and the remarkable enthusiasm and energy of the late Clifford Smith that had been instrumental in encouraging the active support of arachnologists and increasing the numbers of recorders. This replaced a scheme that was started in 1964 but which had fallen into abeyance.

In the first fourteen years of recording (1987-2000), over 1500 volunteers contributed more than 517,000 records. Overall coverage of Britain is good, although not surprisingly it is patchy in some areas with a number of counties intensively recorded, whilst other areas remain more poorly covered. In 2002, at the end of phase one of the scheme, the *Provisional Atlas of Spiders of Britain* was published, based on data recorded and submitted to the scheme to the end of 2000 (Harvey, Nellist & Telfer 2002). This provides a very great amount of new information on every British species. The 647 species accounts were written by volunteer authors, without which the text could not have been produced in the timescale available.

There are currently over 883,000 records for 660 species of spider established in Britain, increased from 645 British species in the Araneae check list published by Merrett & Murphy (2000), with a further 7 species recently recorded which may also be established residents. Updated species text and summary charts for adult season, broad and structural habitats and other autecological information is summarised on the SRS website at <http://srs.britishspiders.org.uk>.

The BAS administers the scheme. Membership of the BAS is not essential for a recorder in the scheme or for reliable spider recording, but is strongly recommended. There is a National Organiser who is supported by the British Arachnological Society and a number of Area Organisers, each of whom is responsible for one or more vice counties. Area Organisers are often the County Recorder for their group, but some manage a number of vice counties, especially in parts of northern England and Scotland, where arachnologists may be thin on the ground.

2.4 Spider Recording Scheme Objectives

Phase two of the recording scheme has placed greater emphasis on autecology and phenology, and has the following objectives:

1. To define the geographical distribution at 10 × 10 km (hectad) resolution of each species of spider found in Britain and the Channel Islands, where possible recording distribution information at 1 x 1 km, 100m x 100m, or for rare species, even 10 × 10 m resolution.
2. To provide opportunities to extend our knowledge of the biology of spiders, with special consideration of their habitats, seasonal occurrence and population dynamics, e.g. by recording distributions afresh on a regular basis so as to track changing distributions over time, and collect and collate records with full dates, numbers of males and females and structured habitat details to allow increased understanding of the adult activity periods and life-cycles of British spiders.
3. To establish a profile of the ecological characteristics of each British spider species.
4. To establish a data bank which will form a base line against which future ecological work can be compared, and provide quantified information on spider ecology which will aid future research and stimulate new studies.
5. To identify the 'hot-spots' of biodiversity of spiders in the British landscape.
6. To identify those habitats where species richness and/or presence of notable species makes them of special conservation interest, and how well these are represented in protected areas.
7. To record the spider fauna of selected sites of particular concern to nature conservation, and other areas whose habitat potential might be threatened. From time to time the Scheme and the BAS organise surveys of specific sites. Area Organisers should be the first point of contact for their Vice Counties.
8. To lead in the assessment of species' rarity and conservation status for spiders in Britain.

3. Acknowledgements

The views of other arachnologists have been sought in the preparation of this report and in the refinement of the verification rule sets, within the timescale available for delivery of the contract outputs. Views expressed in this report have also been informed and shaped by discussions with other arachnologists and naturalists over many years, but are entirely the responsibility of the author.

This project has been subject to consultation with Council of the BAS and a number of Area Organisers in the SRS, who have provided a Project Team who have helped reaching a consensus on the identification difficulty classification. We are particularly grateful to the following arachnologists who have helped in this work, Mike Davidson, Ian Dawson, Francis Farr-Cox, John Harper, Paul Lee, Doug Marriott, Geoff Oxford, Howard Williams, Richard Wilson. The Project Team also enabled a consensus to be reached on details of the specific criteria to be used in the generation of the rule sets. We are grateful to Mike Davidson, Ian Dawson, John Harper and Geoff Oxford for valuable discussion about these rule set criteria and aggregate species.

We are also grateful to Paula Lightfoot for guidance during this contract.

4. Guidance on the information records should contain

4.1 Essential data fields

The following data fields are considered essential for all spider records: taxon or species, location, grid reference, date, recorder and determiner or person who identified the taxon (if different to the recorder). There may be a few instances where spider records not attributable to individual observers can be of some value if their status can be judged by other means.

4.1.1 Taxon or species name

Species name – all records must have a taxon name associated with them, although this may be an aggregate where a species split has occurred and older records cannot be assigned to a specific taxon without examination of a voucher specimen by a specialist or in very few cases an identification cannot be confirmed to a specific taxon by a specialist. Virtually no UK spiders have universally accepted vernacular names, so the use of scientific binomial names is essential. Names should follow the NBN's Species Dictionary managed by the Natural History Museum (<http://nbn.nhm.ac.uk/nhm/>) or the names in use in the species index of the SRS website at <http://srs.britishtspiders.org.uk/portal.php/p/A-Z+Species+Index>. Where old records are being validated and name changes have occurred which provide taxonomic problems, then it is essential that an expert arachnologist is involved in the critical appraisal of the names in use in the records.

4.1.2 Location or site name

A location or site name should be taken from Ordnance Survey mapping, so that names can be located and provide a back-check against grid references. The recommended method to use when naming sites is MainSite, SubSite: Compartment, followed by a descriptive identifier in parentheses if a broad habitat is included, so that users can

identify the habitat associated with a particular site name. The whole site name is limited to 64 characters.

4.1.3 Grid reference

An Ordnance Survey (OS) grid reference is the preferred method of spatial referencing a location. It is essential that the grid reference is a 'containing grid reference' i.e. that it denotes a location WHERE THE SPIDER ACTUALLY OCCURRED and not 'centre of site' or 'entrance to site' grid references.

The range of commonly used resolutions for spider records are 100m (6-figure), 1-km (4-figure) and as a last resort 10-km squares (2-figure). Very few records are at 2-km square (tetrad) resolution. Latitude/longitude coordinates and in urban situations full postcodes are also acceptable, since these may be converted to 100m or 1-km resolution. Free online resources enable conversion, and also grid references may be found from on-line mapping at various sites, including <http://srs.britishspiders.org.uk/portal.php/p/Locate>. It is also important to bear in mind that recording spiders at too precise a resolution is generally unnecessary and may be counterproductive. Spiders, like many invertebrates, are potentially mobile within habitat areas and it is therefore inappropriate to record them at less than 100m resolution, unless (1) the spider is extremely rare or (2) the records are the result of trapping at a fixed location over a period of time and there will be many records from the single location.

The optimum minimum resolution for spider records depends on both the nature of, and the intended use of, the records in question. Even with sensitive records, for example *Eresus sandaliatus* and *Dolomedes plantarius*, where observers may only feel comfortable submitting such records at a relatively low resolution, such as at the 10-km square level, it is recommended that records should provide at least 6-figure (100m) resolution but that this information is not made publicly available. Note that whilst records with no spatial reference whatsoever cannot be used for any form of distribution mapping they may still have some limited value for phenological analyses.

4.1.4 Date

Dates for spider records come in two forms: Single dates and date ranges. Single dates must include day, month and year. The format preferred by the recording scheme is numeric form dd/mm/yyyy (used by many databases), but if data are provided in spreadsheet or Excel form, the dd.mm.yyyy should be used to avoid the software misinterpreting or corrupting the date data.

Where date ranges are provided, these should be given in the format dd/mm/yyyy-dd/mm/yyyy (day range), 00/mm/yyyy-00/mm/yyyy (month range) or 00/00/yyyy-00/00/yyyy (year range).

4.1.5 Recorder name

The name of the recorder (i.e. the observer, recorder or collector) of the sighting is essential, in part for verification purposes and in part to define the ownership of that record. It is acceptable for records to be anonymous if no recorder name can be located, but this should be exceptional. The preferred formats for names are: Last name, optional title, First name/s or initials. Multiple recorders' names can be combined, separated with a comma or semi-colon, with a maximum character length of 64 for the field.

4.1.6 Determiner name

If the species recorded has been identified by a different person to the Recorder then this person's name should also be provided as the Determiner, in a separate data field. There should only be a single determiner in the Determiner field, formatted as per Recorder names; however, there other determiners may be listed in the Comments field as required.

4.2 Desirable data fields

The following data fields are considered desirable for all spider records, some of which are specifically used to improve the quantitative data available:

4.2.1 Broad habitat

The inclusion of broad habitat information is extremely useful for two reasons, firstly it helps highlight records of species from unusual habitats which require verification and secondly it helps the recording scheme to continue to build up an ecological profile of each British species which may highlight differences in different parts of the country.

4.2.2 Vice County

The Watsonian vice county definition is another valuable aspect of location information. This can help validate grid references and location names and enable analyses of species data for vice counties and counties for County Recorders and Area Organisers. The vice county can be looked up on various on-line websites e.g. the NBN Gateway <http://data.nbn.org.uk/> or <http://herbariaunited.org/gridrefVC/> and is automatically located by biological recording software such as MapMate <http://www.mapmate.co.uk/>

4.2.3 Stage

Identification of the vast majority of spiders to species level depends on the critical examination of the spider in alcohol under a low power microscope using good illumination. This is required to examine the genitalia (male palp and female epigyne), leg spines, position of trichobothria, and other diagnostic features in sufficient detail to enable identification. Verification procedures rely on this information and there are only a relatively small number of species where reliable identification can be made of adults or non-adults in the field from general appearance, examination with a hand lens or from photographs.

Stage information is also essential for analyses of adult season and phenology.

4.2.4 Sex

In some species the gender of a spider can impact greatly on the ease of identification, and this information is very valuable in assessing the reliability of identifications. Sex information is also of great importance to adult season, with males generally having much shorter adult season than females. Records providing this information are therefore very valuable in enabling the recording scheme to build up adult season and

phenology information. Any one record should only contain one gender. Separate records should be created in order to record separate quantities of males and females.

4.2.5 Quantity

The quantity or abundance of a recorded species is useful and potentially important information. For example it can help to identify breeding colonies or important sites for species of conservation concern. If no abundance is recorded we recommend the use of "Present". It should be noted that the use of "0" (zero) in the abundance field is a problematic issue in biological recording. The MapMate recording software, which is widely-used by spider recorders and record collators, utilises "0" to indicate a

positive record that has no abundance information, whereas the Recorder 6 software uses "0" to indicate a negative record (i.e. recording was undertaken but no individuals of the taxon were seen).

4.2.6 Status (structural habitat)

This field is used to record the structural vegetation layer **in which** the spider has been found using a system based on the vegetation layers in woodland. In a simplified form these can be seen as the ground layer, the field layer, the understory or shrub layer and the canopy. Non-woodland habitats can be seen in a similar way, but without the canopy. If a particular microhabitat cannot satisfactorily be associated with a structural vegetation layer the Status field should be left 'Not recorded'. Further details of the classification in use is given on the Spider Recording Scheme website in the Recording Methodology page at <http://srs.britishspiders.org.uk/portal.php/p/Recording+Methodology/>.

4.2.7 Method and habitat details

The method of recording can be provided. This includes standardised options commonly used by arachnologists and can also include 'Photographic record' where a spider can be reliably identified from a photograph. This field is also used to record habitat detail about where in a habitat the spider was found. Several habitat details are included because they provide microhabitats commonly used by various spiders. Neither the Status nor Method will be available for analyses unless the terms used are within the SRS classification.

4.2.8 Comment

The presence of a comment field is very useful for any other relevant comments. These might include whether there is supporting evidence for a record in the form of voucher specimen, whether genitalia determination or dissection has been carried out, or if anyone else saw and confirmed the identification. This is extremely useful for rare or difficult species. The comment field can also be used to flag up unverified data of any kind, by adding the phrase "Dubious record".

Some species identifications are 'confirmed' by a third party, other than the recorder and determiner, i.e. someone else gave a second opinion and agreed with the identification. In this case the name of the confirmer can be put in a Comment field to provide additional evidence of the species identification.

4.2.9 Site-related information on substrate, hydrology, management

The inclusion of information on management, substrate and hydrology of the recorded area is extremely useful to the recording scheme if we are to continue to build up an ecological profile of each British species which also covers possible regional differences. Since these features are site-related, affecting a whole area being recorded, these need to be recorded for each recorded location, rather than for each taxon record.

The verification and importation of these data into the recording scheme database is not as straightforward as with species records, and it is therefore probably not realistic to expect these data to be provided by recorders working outside the recording scheme. Since reliable spider recording requires specialist expertise, an ability to recognise one's own identification limitations and where help should be sought is absolutely vital. We consider that Area Organisers are best placed to guide recorders in this respect and in the provision of site-related information.

5. Methods

Work to achieve the report objectives was undertaken during the period February – March 2012 by the National Organiser of the SRS, Peter Harvey, with support from the Council of the BAS and Area Organisers of the recording scheme - Project Team.

All resident spider species were included in the assessment of rules, including species that are currently regionally extinct in Britain. Species that have only occurred in the Britain as very rare accidental imports were excluded, as were all species whose British records are considered doubtful. Species which have colonised Britain and are known or suspected to have become established were included. The total number of species was c.667.

In addition, some subspecies and forms, as well as *sensu lato* aggregates, where two or more very similar species have been split and cannot be recorded in older records without re-examination of voucher material, have been included. These taxonomic entities have to be used by spider recorders where re-examination of voucher material has not taken place or taxa are listed in data published prior to the split. They therefore might occur in datasets being checked by the NBN validation tool.

Species names follow the Spider Recording Scheme species list based on the checklist by Merrett & Murphy (2000) and those used by the Recorder 6/NBN Species Dictionary. An update is due to bring names in line with The World Spider Catalog, V12.5 by N. I. Platnick © 2000 – 2012 (<http://research.amnh.org/entomology/spiders/catalog/>), affecting especially the genus *Lepthyphantes* (Linyphiidae) but this has not yet taken place.

5.1 Verification rule sets

Four separate rules have been developed and specified for each of c.667 taxa in the Araneae as part of this work: identification difficulty, geographical range, maturity (adult season, identifiable season) period and year range. The Project Team have helped to provide a consensus on the criteria used to develop these rule sets and to accord an identification difficulty rating to each species.

The Record Cleaner is a decision support tool, so we have taken a pragmatic approach when creating the rules and asked “would we want records of this species to be flagged up if the identification might be suspect or the records fall outside the temporal/spatial range?” The rules have been developed to try and ensure that the Record Cleaner does not flag up so many records it will create a burden on the Area Organisers and national experts, but will alert Area Organisers to potentially interesting and important records in their region.

Some testing of the rules against real data has been undertaken, within the timescale allowed by the tender contract.

5.1.1 A classification system for identification difficulty of spider species in the UK has been developed. Consensus on the identification difficulty accorded to each species has been reached primarily through email exchange and the use of an on-line form for all 667 taxa completed by the Project Team. Categories are defined according to the difficulty of identification combined with the level of the recorder’s expertise and need for additional evidence to substantiate a record. The verification rule set does not allow different values for males and females, so where a particular sex is more difficult to identify this has been used to assign an identification difficulty.

5.1.2 Baseline acceptable distributions have been defined for each species to provide geographical rules. This has been done at the hectad resolution for the UK and provided in a suitable format for inclusion in the NBN validation tool. The recent recorded distributions of each species in the SRS have been used as the starting point from which to generate baselines. The specification for the criteria used to create the final rule set was agreed after on-line testing of the affect of a number of possible variables on the hectad distribution (see Appendix 2).

5.1.3 Temporal rules for the adult life-cycle stage of each taxon have been developed. Adult males and females often have substantially different adult periods, with males often found for much shorter periods than females, which lay eggs and often guard the eggsacs and even care for the young spiderlings. The rules relate to the main months of the current adult period(s) of each spider in the year, with males and females also treated separately. Temporal rules cover juvenile stages in the small proportion of species where these can be reliably recorded from general juvenile appearance.

Temporal rules have also been produced governing the acceptable year range for records of each taxon (i.e. species that were first discovered in or first colonised the UK in a certain year and species that became extinct in the UK in a certain year).

5.2 Processes for verifying records

Guidelines have been developed for data collators in how to handle records that fall outside the verification rules defined in the work. Comment will also be provided on the NBN’s suggested framework for classifying the status of records (i.e. into the categories Correct, Considered correct, Requires confirmation, Considered incorrect, Incorrect, and Unchecked).

5.3 Criteria for sensitive records

A review of each of the spider species has been undertaken to identify those taxa that should be considered sensitive. The criteria used to justify the selection has been stated and best practices for dealing with sensitive records are provided.

6. Results

6.1 Rules for quality assuring records in the NBN data validation software tool

Four separate sets of rules were developed for use with the NBN validation software. For each of 667 taxa (species, sub-species or varieties and *sensu lato* taxa or aggregates) of spiders, information has been provided to define rules of identification difficulty, geographical range, adult/identifiable season, and year range.

6.1.1 Classification of spiders according to identification difficulty

British spiders were classified for identification difficulty into five categories (grades). Categories were defined according to the difficulty of species identification combined with the necessary level of the recorder's expertise and need for additional evidence to substantiate a record. The classification was agreed by the Project Team who reviewed a draft of the category definitions and criteria to be used. These classifications were then used in an on-line form (see Appendix 1) which the Project Team could use to submit their difficulty ratings. The form allowed the Team to also submit notes on specific identification difficulties if they felt this relevant. Both the identification difficulty values and identification notes were submitted into a database and a consensus from these used to inform the rule set.

The classification produced applies at the British Isles level (i.e. England, Northern Ireland, Scotland and Wales) and can also include the Isle of Man, but does not include the Channel Islands or Ireland. The identification grades recognise that other European species may become part of the British fauna, so whether identification confirmation would be needed to recognise new species has also been considered.

The classification of each species was based purely on identification difficulty or where extreme rarity indicated that specialist confirmation of a record was necessary, not on likelihood of occurrence in a particular place or time of year. However location, habitat, time of year and other factors also play important parts in the correct identification of species. The British Arachnological Society and Spider Recording Scheme therefore strongly recommend that the identification difficulty classification is used in conjunction with rules addressing spatial and temporal occurrence for the purposes of verification of spider records (as in the case of the data validation software being developed by NBN).

Spiders were classified into the following five grades according to identification difficulty. **In all cases, it is assumed that the spider being identified is in good condition and that the recorder has the basic level of competence needed for the identification of this taxonomic group** (i.e. use of low power microscope with good lighting, ability to use keys, ability to critically use genitalia figures in spider identification works, to use comparative identification criteria, and to recognise when a second or specialist opinion is necessary). These are important as almost no spider taxa can be identified with complete reliability by members of the public with no training, experience or access to specialist materials to aid identification (e.g. field guides, specialised identification works, low power microscope, good lighting and examination of voucher specimens etc).

Even where spiders are distinctive and can be reliably identified in the field or from photographs, a look at the internet will confirm that such species are not always correctly identified. Generally in our experience it is people who have a good grounding

in lab ID who are best at field identification, but it is usually necessary for identifications to be confirmed with a voucher specimen.

There are some species pairs such as *Araniella cucurbitina/opisthographa*, *Meta menardi/bournetti* and *Oonops pulcher/domesticus* where people are liable to jump to a conclusion based on habitat and commonness/distribution. Again, critical examination of adult voucher material is the only way to avoid these difficulties.

Grade 1: Can be identified at sight in the field by anyone with a bit of experience. Species with which the beginner rapidly becomes familiar. Usually identifiable from a photo. Records acceptable from most sources.

Grade 2: Can be identified in the field with care and experience. Needs a good view or examination with a good quality lens. Beginners should take voucher specimens until they gain familiarity and experience. May be identifiable from a good photo. Records acceptable from competent recorders.

Grade 3: Adult voucher specimen needs checking under magnification and good lighting. The Recording Scheme would accept records from experienced recorders without further question unless the date, region or habitat was especially unusual. Voucher specimen should be retained. Records accepted from known experienced recorders.

Grade 4: The Recording Scheme would require confirmation in the majority of cases, e.g. specimen having been checked by the appropriate Area Organiser or an acknowledged expert.

Grade 5: Voucher specimen of adult required (unless protected by law) to be examined by national expert. Even the most expert of recorders should seek a second opinion or the species is so rare that confirmation by a national expert is needed even if it is relatively easy to recognise.

6.1.2 Spatial distribution rule set - geographical ranges of spiders

Baseline distributions were defined from existing records in the Spider Recording Scheme database. This source represents an accurate modern assessment of the true distribution of each taxon, although some species and geographical areas are under-recorded. Thus it will be important to revise the baseline distribution rules over time as more records are gathered from currently un-recorded or under-recorded areas.

A large number of spider taxa can present difficulty for a non-specialist or inexperienced arachnologist to reliably identify, and even common or widespread species can be amongst these. In order for our aims to build up a reliable ecological profile of every British spider and to understand how this varies across latitude and longitude in the country, we need reliable identifications of all species. A number of the indications available which might suggest the need for verification include the broad and structural habitat in which a species is found, the date, gender and stage to name just a few. This means that simply relying on recorded hectads for the distribution rule definition is probably too crude a methodology both in terms of the potential workload it places on specialists such as Area Organisers and its value in ensuring accurate data are recorded.

Baseline acceptable geographical distributions for each taxon were defined and provided to the NBN in text file format to be used in the NBN's validation software using

the specification discussed and provided below. Records falling outside of the defined distribution will be flagged for further verification.

Cut-off year for modern records

The year **1980** was chosen as the starting point for the modern distributions because recording and coverage have been particularly good after this date, with intensive recording associated with the Recording Scheme starting in 1987 and a few years prior to this, and with the availability of modern reference works which opened up identification to a much wider audience also occurring at about this time. There was also intensive sampling in the 1980s in some areas, for example Yorkshire and in the southern heathlands, which has not been repeated. It is assumed that there has been no decline in the distributions of particular species over the last 30 years and thus the occurrence of many of the species recorded at that time is still likely in the same locations. Other rule sets used by the NBN validation software should appropriately highlight records which need further verification.

Vice Counties (VCs)

The distribution rule set files firstly list the VCs from which a taxon has been recorded 1980-on, so that any record for a spider new to a VC will be highlighted for further validation.

Defining hectad distribution for the rule set

Various options about how to define the distributions used in the rule set were considered. The simplest would rely on a list of those grid squares for which there were records of a species since a chosen cut off year. With this definition any records from 'new' 10km grid squares will be highlighted, those from already occupied grid squares will not. However this would apply to all species regardless of their status as common or rare, resulting in all new hectad records being highlighted and requiring further verification input, principally from the SRS Area Organisers and BAS Verification Panel, who undertake their work on an entirely voluntary basis and with very limited time resources available.

Scarce species

It was decided to treat scarce species separately from more common and widespread species, principally to avoid undue demands on our voluntary system of Area Organisers and Verification Panel in providing specialist follow up on records highlighted by the Record Cleaner.

Where a species is scarce or rare (as defined in a new national status review due to be published soon) any new hectad record is highlighted for further validation checks and verification as necessary. For the more widespread and common species all hectads in a vice county are included in the allowable distribution unless they fall into the criterion below as a species rare in the vice county. This will mean that common and widespread spiders will not be highlighted by the Record Cleaner even where they occur in new hectads, unless this represents a new hectad in a vice county with very few recorded hectads for that species.

Hectads per VC

Therefore a decision has been made to apply the rule differently to records of species rare in a vice county, which an Area Organiser would certainly feel needed verification if they were recorded by an inexperienced specialist, non-specialist or a recorder with unknown identification skills. The number of hectads where a cut off is chosen might vary from one vice county to another depending on a number of factors, including how well recorded the vice county is and its size, but a range of options were considered here, from where a species had only 3, 5, 10, 15, 20 recorded hectads beyond the cut

off year, or a percentage of hectads in a vice county rather than actual hectad numbers. The number chosen has been selected to highlight records which would be from a new hectad for a vice county where there are existing records in a vice county from **3% or less** of the total number of vice county hectads. If the number of hectad records for a species is above 3% of the vice county total, then all hectads in the vice county are allowed. This allows common and widespread species to be included without their highlighting by the NBN Record Cleaner.

Tetrads/hectad Frequency Ratio

Species may occur in a very restricted number of hectads yet be quite common and widespread within these areas, with high numbers of tetrads occupied. Species occurring in a small number of hectads but with low numbers of occupied tetrads indicate a scattered, possibly even widespread, distribution but with isolated sites and populations. These are the more vulnerable species that require the greatest nature conservation effort (Pearman 1997). Even the more widespread species which occur in many more hectads but with very low tetrad numbers could be under much greater threat of decline through loss or degradation of habitat than may be apparent from a hectad or tetrad distribution map. Pearman used the numbers of tetrad and hectad records for a species to calculate a Frequency Ratio of tetrads/hectad. A very low Frequency Ratio may indicate that a species should be of nature conservation concern even though the hectad distribution may suggest a widespread and common species. Our rule set uses a Frequency Ratio of less than 1.5 to highlight records which may be of higher nature conservation significance and therefore may need to be brought to the attention of Area Organisers.

New species

There is an issue about species that have not yet been recorded in the UK. Clearly these have not been included in the development of the geographical baselines for validation rules and, thus, the software will not flag up records of new species. This is unfortunate as species 'new to the UK' are a regular occurrence for spiders and such records should be picked out for detailed verification. Over twenty new spider species have been recorded in Britain for the first time since 2000 and have now either colonised the country or were species previously present but unrecorded. Some of these are now being recorded regularly across a wide area of Britain. In this situation, it is important to revise the geographical baseline distributions regularly so as to include new species recorded in the UK.

6.1.3 Temporal rule set - seasonal range of spiders

Temporal rules for the adult life-cycle stage of each taxon were developed. These were in the form of a start date and end date for each species, between which records of reliably identifiable spiders could reasonably be regarded as normal occurrences for verification purposes. For the vast majority of spiders this range is for adults only, but a very few spiders can also be identified as juveniles and have been included in the seasonal range given for all stages. An adult seasonal range is also provided, covering the main months of the adult period(s) of each spider species in the year, including periods when adult spiders may be over-wintering. Adult males and females often have substantially different adult periods, with males often found for much shorter periods than females, which lay eggs and often guard the eggsacs and even care for the young spiderlings. A seasonal range is therefore provided separately for adult males and adult females.

All these ranges have been derived from the date data held in the SRS database, but to ensure spiders recorded outside their normal expected adult season are highlighted by the Record Cleaner as requiring further checking the rules are based on dates for

months where the numbers of records are 5% or more of the total records for that species stage. We have used months rather than weeks because we know phenologies in Britain vary by latitude and longitude and so weeks are likely to be too fine a division to use. We believe this is a reasonable compromise between the need for further verification checks and recorded dates being accepted by Record Cleaner. It should also be recognised that there is undoubtedly a phenological shift in seasonal range in Britain affected by latitude and longitude, and the rules have therefore had to encompass this countrywide variation, as well as normal variation from one season to the next.

Undoubtedly a few individuals will still occur outside the temporal rules that we have defined, but these would be worthy of further verification checks.

To take account of very rare species where there are very few records, if the first and last dates in the records in the database are less than 31 days, we have set the range to include the whole month or 15 days before or after earliest and latest record, whichever is greatest. This is to ensure that Record Cleaner does not highlight every date outside our present data knowledge base, but instead uses a range we know to be applicable to other adult spiders.

As with the other verification rules, it will be important to update the seasonal range period information over time due to ongoing phenological shifts driven by climate change and to take account of additional data as they become available.

6.1.4 Temporal rule set - year ranges for spiders

Temporal rules were also defined to cover the acceptable year range for records of each taxon. The default start year was the first year recorded in the SRS database and default end year was not specified (to signify the present year). Spider recording in Britain was not properly established until the work of Pickard-Cambridge and other Victorian naturalists. Taxa that were first discovered in Britain or have colonised since that period are given a start year in accordance to the first record in the database. This is normally the year of the discovery/colonisation event. Similarly, taxa that have become extinct in the UK or have not been recorded at all in the country for many years were given an end year to their acceptable year range. This was chosen to be 10 years, so that potentially important records of species recorded either before the first recorded occurrence or after the last known occurrence will be highlighted by the NBN validation software.

As with each of the sets of rules, the year range temporal rule will become outdated over time as new species are recorded in the UK for the first time or species are not recorded for a long period.

6.2 Processes for verifying records

6.2.1 Dealing with records that fall outside the verification rules

The SRS operated by the BAS uses its system of Area Organisers, the National Organiser, a Verification Panel and ultimately a national authority as the means to ensure records are verified and acceptable to the scheme. The final decision about the acceptance or otherwise of a record rests with the National Organiser and the BAS Verification Panel. Thus, the process for dealing with records that fall outside of the verification rules defined by this contract and used in the NBN validation software is to refer to the local Area Organiser or National Organiser, who may then enlist the help of

others in the Verification Panel as appropriate. If spiders are to be sent to any of these people for verification, then postage costs must be covered.

Contact details for Area Organisers are subject to change. Up-to-date details are available on-line to registered logged-on members of the BAS and SRS at the latter's website at <http://srs.britishspiders.org.uk>, but can also be gained by contacting the National Organiser at srs@britishspiders.org.uk.

At the local 'county' level, the Area Organiser/County Recorder may have additional specific procedures in place for dealing with verification issues. In addition, many Area Organisers/County Recorders will refer difficult records on to acknowledged national experts in an informal way.

It is recommended that brief information about the outcome of a verification decision is recorded where the original details of the record are amended. This can be done using the comment field of the record.

In the SRS it is normal practice for all records accepted by the scheme to be considered correct. Records requiring confirmation or regarded as incorrect are not normally accepted or are removed from the dataset. On some occasions a record may be retained, but 'archived' so that it is not transferred to other users.

6.2.2 Dealing with records highlighted by Record Cleaner

The classification that has been proposed by the NBN previously is considered to be a sensible and reasonable approach for use with spider records, namely:

- Correct
- Considered correct
- Requires confirmation
- Considered incorrect
- Incorrect
- Unchecked

The BAS and SRS recommend that all spider records should be subject to verification by SRS Area Organisers, National Organiser and the BAS Verification Panel, as appropriate, prior to uploading to the NBN Gateway or being made available to potential data users via other means. Records which pass the Record Cleaner rule set tests should be submitted to the local Area Organiser, who may then recommend further verification based on local knowledge.

1. Records where a voucher specimen or sufficient other evidence has been identified or confirmed by an experienced arachnologist and where the identification difficulty grade does not indicate that this should be confirmed by the appropriate Area Organiser, National Organiser, BAS Verification Panel or a national authority may be accepted as **correct** and should be submitted to the SRS.
2. Records highlighted by the Record Cleaner should be subject to appraisal by the appropriate arachnologists, in the first instance the local Area Organiser, then the National Organiser, BAS Verification Panel or a national authority (the Verification Process) as appropriate. Records which pass this further test can be **considered correct** and should be provided to the Spider Recording Scheme. If voucher specimens are then confirmed or other evidence has been approved as sufficient by the Verification Process then these can be changed to **correct**.

3. Records **considered incorrect** will be those where a record is either considered unlikely and there is insufficient evidence to confirm the identification, or no voucher specimen has been confirmed by the Verification Process. These records should **not** be submitted to SRS or uploaded to the NBN Gateway.
4. Records which are **incorrect** will be those where an identification has been shown to be incorrect by examination of a voucher specimen or other evidence in the Verification Process. Only the corrected record should ever be submitted to Spider Recording Scheme, with the verification decision recorded in the comment field, or uploaded to the NBN Gateway.

6.3 Identification of sensitive records

The BAS and SRS aim to maximise the use of spider data, in a controlled and managed way, for the conservation of spiders and their habitats, in line with the British Arachnological Society charitable objectives. Nevertheless, with recording schemes reliance on the participation, goodwill and trust of thousands of volunteers is essential, and the sharing of sensitive data might present a major stumbling block.

Data provision involves the copyrights of recorders and compilers of various local and national datasets, as well as the legislation and regulations dealing with Freedom of Information, Environmental Information Regulations and Data Protection. Following consultation with volunteer arachnologists and Area Organisers, the BAS provides public access to records limited to the hectad square resolution, or as mapped dots on tetrad distribution maps. Access to records at capture resolution is available only in specific circumstances and never for commercial purposes, for which these data should be sought through local record centres and local county recorders.

All spider species have been reviewed and the conclusion is that access to location data is unlikely to pose any threat to the conservation of spiders with the exception of one species. This sensitive species is *Eresus sandaliatus*, a spider fully protected under Schedule 5 of the Wildlife & Countryside Act, 1981, and where it is possible that there might be interest in the illegal collecting and sale of specimens. Unauthorised access to the locations of this species at its original locality and more recent translocation sites might also cause damage to their habitats, affecting the small and vulnerable population/s present. Details of these records should not be released if they could lead to the identification of colony locations at finer than hectad grid square resolution.

Species	Scientific name	Preferred taxonversionkey	Reasons for sensitivity	Level of resolution
Ladybird spider	<i>Eresus sandaliatus</i>	NBNSYS0000008832	<ul style="list-style-type: none"> • Fully protected by law • possible collectable species with commercial value • damage to habitat by unsupervised access 	10km

7. Summary of recommendations

7.1 Updating of rule sets

The rule sets will require regular revision to accord with changes to information which becomes available in the SRS database. The methodology to enable regular updates has been developed in the work undertaken for this contract.

7.2 Ancillary species list rule sets

We have a SRS database with over 883,000 Araneae records with distributional data and a considerable amount of phenological and autecological information for Britain. These data are co-ordinated and fed into our centralised database by our system of specialist Area Organisers who, together with a Verification Panel of national experts and the National Organiser, ensure the quality of data is extremely high.

AncillarySpecies rule sets which specify a list of species that are expected to be found, e.g. in a habitat, could be developed for spiders.

7.3 Developing rule sets

We would see high value in changes being made to the Distribution rule set so that it can include different specific criteria for different species or groups of species e.g. where similar species overlap e.g. *Tegenaria saeva* & *T. gigantea*, to flag up possible confusion, and to be able to apply specific text to specific taxa.

The majority of spiders require microscopical examination of the adult genitalia for reliable identification to species, and even then there are groups of species which present a challenge to experienced arachnologists. It is not uncommon for the different sexes to present different levels of identification difficulty, and it would be desirable for the rule set to accommodate this.

7.4 Definitions for aggregate taxa

Consideration has been given to the existence of aggregate taxa records, and it is recognised that there is currently some inconsistency in the way in which these are treated in the SRS. The need to define and publish consistent definitions for these recording aggregates has been identified.

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Appendix 1

On-line identification difficulty form which allowed the project team to provide their specialist expert input to the classification system used in the generation of the rule set.

1. Can be identified at sight in the field by anyone with a bit of experience. Species with which the beginner rapidly becomes familiar. Usually identifiable from a photo. Records acceptable from most sources.
2. Can be identified in the field with care and experience. Needs a good view or examination with a good quality lens. Beginners should take voucher specimens until they gain familiarity and experience. May be identifiable from a good photo. Records acceptable from competent recorders.
3. Adult voucher specimen needs checking under magnification and good lighting. The Recording Scheme would accept records from experienced recorders without further question unless the date, region or habitat was especially unusual. Voucher specimen should be retained. Records accepted from known experienced recorders
4. The Recording Scheme would require confirmation in the majority of cases, e.g. specimen having been checked by the appropriate Area Organiser or an acknowledged expert.
5. Voucher specimen of adult required (unless protected by law) to be examined by national expert. Even the most expert of recorders should seek a second opinion or the species is so rare that we would want confirmation by a national expert even if relatively easy to recognise. We should also recognise that other European species may become part of the British fauna, so would id confirmation be needed to recognise new species?

Most species will require a rating of 3 or 4, few will be accorded a rating of 1 or 2, some 5. If you don't feel able to complete all taxa, just leave these blank. You can save and return to the form at any time. Notes are optional and will rarely be necessary, but if you feel they might help, please provide them.

Select entry method: Save all entries at bottom of form Single entry

Agelenidae	Agelena labyrinthica	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria agrestis	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria atrica	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria domestica	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria ferruginea	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria gigantea	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria parietina	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria picta	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria ramblae	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input checked="" type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria saeva	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Tegenaria silvestris	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Agelenidae	Textrix denticulata	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Amaurobiidae	Amaurobius fenestralis	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Amaurobiidae	Amaurobius ferox	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Amaurobiidae	Amaurobius similis	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note
Amaurobiidae	Coelotes atropos	<input type="radio"/> 1	<input type="radio"/> 2	<input checked="" type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	Add/edit id note

Appendix 2

On-line form to enable testing of the affect of applying different criteria to a distribution rule. This was used to help come to a consensus view of the best criteria to use for the rule set.

Spider and Harvestman Recording Scheme website

the national recording schemes for spiders and harvestmen in Britain.

Home >> Latest changes >> Index >> Species Index >> Search >> Help >>

[add new page](#) [edit this page](#) [view/cancel](#) [picture upload](#) [my stuff](#) [logoff now](#)

Distribution Rule Set Test Page

Remember. The Record Cleaner is just a decision support tool, so we have to take a pragmatic approach when creating the rules and ask "would we really want records of this species to be flagged up if they fall outside this temporal/spatial range?". If Record Cleaner flags up too many records it will create a burden on the Area Organisers and national experts. If it flags up too few records, Area Organisers might not be alerted to potentially interesting and important records in their region.

Select year cutoff: 1950 1980 1992 Select hectad/VC: % 3 Not scarce: Ratio rule:

[previous species](#) | [next species](#)

Actual recorded distribution

Segestria florentina

10km data:
x pre 1980
● 1980-1991
● 1992 on
17 Mar 2012
Copyright © 2012 SRS

Possible Record Cleaner distribution rule

Segestria florentina distribution rule result

10km data:
x pre 1980
● 1980-1991
● 1992 on
17 Mar 2012
Copyright © 2012 SRS

1. Select year cutoff: year to use as 'modern' records.
2. Select hectad/VC: Number of hectads per VC before allowing records for all VC hectads.
3. Percentage: Use % of recorded hectads rather than actual number.
4. Not scarce: Exclude scarce species from hectad and ratio rules, using only actual distribution for these.
5. Ratio rule: In combination with hectads/VC, ratio of number of recorded Tetrads/hectads below which all VC