

Sharing Information about Wildlife



Running a Biological
Recording Scheme
or Survey



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Running a Biological Recording Scheme or Survey

A handbook to help scheme or society administrators

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It has been said many times by different people that, without the voluntary organisations across the country that have developed and maintained biological recording as a pursuit over many years, Britain would not have the detailed knowledge that it has of its biodiversity, and the understanding of its natural environment.

These systems of study and recording have developed in an organic way for over two hundred years, and the organisations that have developed them have each contributed their special expertise to the whole. However, there has never been an attempt to bring together some of this knowledge and experience into one place. This is what this handbook seeks to do. It can never deal with all the detail of each and every existing recording scheme, each of which has tended to develop subtly different approaches to what are essentially similar operations. What it can do is to present a “checklist” of things for other people to think about and make use of.

The production of this handbook has stemmed from many years of

discussions with, seminars involving, and assistance given to various voluntary recording schemes and societies across the country under the auspices of the UK Biological Records Centre and more recently the National Biodiversity Network, of which it forms a part.

Without their existing expertise, the advice and information gathered together here would not have been possible

With thanks to the Balfour-Browne Club, one of many recording organisations that have helped us.

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1. Introduction

Biological recording – documenting the occurrence of wild species at a place, at a particular time, by a person – has been developed in Britain and elsewhere over several hundred years, so that it is now a highly-developed activity carried out by many organisations and individuals. The data collected have formed the bedrock of our broader understanding of the natural environment.

The level of complexity of recording has also developed enormously, and varies greatly between subject areas and taxonomic groups. New methods, newly-developed equipment

and facilities, together with evolving expectations and needs for information, have also led to it becoming potentially more demanding.

Bearing in mind that most biological recording is still carried out by voluntary organisations and individuals, the need for them to have at hand a reference guide to support their work has become recognised by the National Biodiversity Network Trust and its partners for some time. This handbook is therefore aimed at providing that kind of guidance. It is not the intention to “teach grandmothers to suck eggs”, because many

existing recording schemes will already either be doing much of what it contains, or will have thought about doing so. In particular, not all recording schemes or organisations running recording activities will need to be doing everything outlined here, but may want to consider them. However, some aspects of recording are essential for the effective running of any recording scheme, and these are identified within each section. The guidance therefore aims to be an *aide mémoire* to biological recording best practice, and a pointer to other, more detailed advice.

2. Why and what are we recording?

Many biological recording schemes have developed almost by default from the overall study of a particular taxonomic group, or in relation to the study of wildlife in a particular geographical area. The basic reason why many of them were set up, of course, was often enthusiasm for studying one or other group of organisms, and so what started off as a recreational pursuit by a group of like-minded peers may have grown into a more organised activity. As such, their original objectives may never have been clearly defined, and in fact may have shifted over time. However, it may be useful, even for these existing recording schemes, to consider the business afresh.

Apart from the original (and perhaps most important) driver: personal interest, biological recording is usually carried out for one or more of three main reasons:

- Recording data on species to refine understanding of the species themselves.
- Recording the occurrence of species across a geographical area over time.
- Recording species (and related features) associated with a particular locality or habitat.

Individual occurrence records made for any of these purposes could be of at least some use for others, and therefore general issues concerning recording are likely to be relevant in any case. However, this guidance is mainly concerned with the recording of species, not site or habitat recording, which usually needs a different focus.

2.1 Objectives of a recording scheme

Clear objectives from the outset are useful for any survey or recording scheme, in order to best use participants' input, as well as to produce meaningful results. Clearly defined objectives are often, increasingly, also essential for gaining external support and funding.

The objectives need to clarify the overall aim of recording, as well as define more closely the intended outputs. In doing so, the objectives should lead to clarity about the way participants are to be involved.

Objectives might include one or more of the following:

- To collect information on species to study their taxonomy and variation.
- To gain an understanding of the distribution and occurrence of species.
- To collect structured data on the autecology or habitat occupancy of species.
- To collect structured data to ascertain overall population trends over time.
- To collect detailed data on the occurrence of species at specific sites to monitor their

Check-box 1:

Setting up a recording scheme - things to consider

While no two recording schemes will be the same, this checklist of things to do might be useful (more or less essential elements are marked *):

Subject coverage

- Set up checklist of species to be covered (and mechanisms for updating this)*.
- Establish links with taxonomists working in the field.
- Sort out sampling strategies etc. (and advice on these)*.
- Establish the timescale of survey*.
- Set out what detail is needed (e.g. habitats, abundance etc.)*.

Materials

- Recording cards – set up and print (or other equipment for field recording) (the UK Biological Records Centre (BRC) or local records centres can often help)*.
- Advise on specimen handling materials (or where to obtain).
- Produce guidance for field recorders (recording packs etc.)*.
- Produce guidance on e.g. data quality (which species are "difficult" etc.)*.
- Advise on or produce identification keys (or information about these) (liaise with the Field Studies Council?).
- Produce publicity materials.

Data handling

- Define the flow of data in relation to the way you intend to handle records.
- Decide on whether to use online recording (e.g. the NBN Indicia online toolkit) or the database system to use (ensure species checklists are available)*.
- Sort out data receipt protocols (advise field workers about formats, timescales etc.)*.
- Consider data entry from hard copy – who is going to do this and how?*
- Data collation (if not using online recording) – set up systems to enable this (get NBN/BRC advice)*.

Specimen handling

- Produce guidance on collection and handling of vouchers*.
- Advise on the submission or use of digital images for identification.
- Set up procedures for the maintenance of vouchers (agreements with museums etc.).
- Establish mechanisms for linking voucher material or images with relevant records in data systems

- Set up a panel of referees, and consider whether these could be available to outsiders.

- Give guidance to expert referees on handling and passing on data.

Organisation

- Recruit people to share the work (data handling etc. as well as fieldwork)*.
- Consider affiliating the recording scheme with an umbrella organisation that can help with funding etc., or linking with other recording schemes to share the work.
- Contact BRC (or for a local scheme, the local records centre) to set up support*.
- Consider the financial or other resources needed, and how finances are to be handled*.
- Sort out permissions or covering letters for field workers.

Publicity

- Produce launch event/news release (NBN Trust/BRC/local records centres can help)
- Set up newsletter – hard copy or electronic. Consider the frequency of this and who will do it. (BRC may assist with distribution for national schemes).
- Establish website (BRC can assist national schemes. LRCs may help locally).

Training

- Consider what training is needed, and who might do this.
- Produce training packs. (The Field Studies Council or colleges may be able to help).
- Consider regional coverage or partnerships (e.g. with universities etc.).

Disseminating data

- Develop a data access policy (obtain guidance, e.g. from NBN Trust)*.
- Decide on sensitive data – what are these, and why are they sensitive?*
- Data dissemination through NBN or other electronic mechanisms (explore needs before data are collected) (consider use of NBN web services to deliver maps to own website)*.
- Sort out standard data use agreements (e.g. with local records centres).
- Publications (produce and publicise a programme for an atlas etc.).

population performance, or as an adjunct to habitat monitoring.

- To collect data across a geographic area or over a specific time period for the production of an atlas or other study.

The basic objectives would no doubt need refining.

Taxonomic schemes

The main objective here might not be so much recording occurrences, as collection of specimens. A record is a by-product of the collecting, which itself is usually carried out with the motive of identifying the specimen, or advancing knowledge about the variation or biology of a taxon. If a recording scheme has this as its primary driver, this may need to be made clear to potentially interested people, because it defines the way in which participants are expected to engage.

of assumptions about their operation within this overall approach. For example: they may have been originally aimed at mapping species occurrence merely at a 10km square resolution to produce a national atlas. This may still be relevant, but with increased capability in recording, both in terms of technology and manpower, as well as an increasing need for more detail, the opportunity now exists to record more precisely.

It would therefore be worth considering:

- Is it practicable to collect all records at a detailed level of resolution? In which case 6-, or even 8-figure grid references could be preferred. Bear in mind that it is always possible to use detailed data for large-scale distribution mapping, but it is not possible to use low-resolution data for most other purposes. However, the practicalities of recording and data handling may need a compromise.

date-classes can be useful both to target effort and to produce datasets for analytical purposes beyond their principal use for, say, a distribution atlas. However, field recorders should be asked to make records as precisely as possible, so individual records or samples can be identified with as specific a date as possible, or at least a defined year, to make the data as useful as possible. Data collected on an ongoing basis in this way can then automatically be used to measure change over time.

Autecological data or habitat recording

As distribution mapping has progressed with many groups, the need to understand distributions has also increased, and often the habitat or micro-habitat of species needs to be identified and characterised. Other aspects of the ecology of a species might

also be important, such as seasonal changes in occurrence, or responses to varying climate. Some existing recording schemes have already developed protocols for recording "associated attributes" with occurrence records, and standardisation of this can produce dividends, even for schemes that originally may have started out just as distribution mapping schemes. So, a more refined recording scheme might consider:

- Defining in advance a suite of specific "attributes" of species records relevant to the subject (e.g. host plant occurrence, climatic conditions, habitat structure, activities of observed individuals etc.).



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Distribution mapping

These kinds of schemes are the most familiar. Their focus is the geographical occurrence of species, and changes of occurrence over time. This may be at a UK or a local level (or both), and the objectives might be both the production of an atlas and the development of an inventory for a geographical region. A by-product of the recording may be information on the relative frequency or understanding the biogeography of the species. As such, *ad hoc* as well as more formally structured recording may be useful. The precise balance between these may depend on the level of existing knowledge and the overall potential for people to participate. Many existing schemes may have been set up with a number

- What is the geographical scale of the recording activity – the whole country, a region, county/vice-county¹? Is the original focus of an existing scheme able to generate useful information for use at a different scale and for different purposes? For example, a mapping scheme could encourage participants to record by identified sites, thus ensuring their data are useful at the local level for conservation purposes as well.
- Is the recording survey or scheme aimed at gathering data over a defined time period? If so, this ought to have been clarified from the outset, but may need re-stating. It would also be worth considering and explicitly stating what potential timescale there might be for re-survey. Compiling data in defined

- Refining the recording process to aim at collecting this sort of data as a matter of course, endeavouring to aim for precision with things like physical environment, number of individuals, date and even time of record.

Again, encouraging the recording of such features produces data that can not only be used for more general outputs, like atlases, but can also be used for many other purposes.

¹ See Section 8: Glossary of terms for definitions of technical terms used in the text.



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Check-box 2.

Examples of species occurrence attributes

British Myriapod & Isopod Group: Woodlice, Millipede and Centipede Schemes

All these recording schemes aim to record details of habitat and microhabitat along with species occurrence and numbers of individuals of sexes. The principal habitats are standardised, e.g.:

- 010 MARITIME
- 011 Rock
- 012 Shingle

These basic habitat data are qualified by details, also standardised and coded:

- 001 Intertidal
- 002 Around high water mark
- 003 Splash zone

Slope, aspect, soil types and methods of collection are defined, e.g.:

- 001 Casual/turnover
- 002 Dig/sieve/sort
- 003 Pitfall trap

Comments are also allowed for, and prompts given:

- Local topography
- Soil moisture status
- Litter type

Codes are used for data entry

British Lichen Society

The lichen site recording scheme has been set up to allow recording of species in relation to detailed localities. Recorders are encouraged to record site information separate from species lists:

- Site name (and sub-sites), grid reference, vice-county
- Site conservation status; county/district/parish
- Altitude
- Habitat; sub-habitat
- Natural Area
- Site assessment
- Notes

Species lists are asked to be recorded along with details of:

- Substratum
- Scale habitat
- Abundance
- Collection
- Determiner
- Record status
- Confidential indicator
- Notes

Surveillance and monitoring²

In many cases, surveillance recording is developed separately from basic distribution mapping because it tends to require a more concerted effort by participants, and a different form of structured fieldwork. The resulting data may or may not be usable for other purposes as a result.

Both surveillance and monitoring need careful design of recording effort to give reliable data.

² See Section 4.1 for further discussion of surveillance and monitoring.

Aspects to consider might include:

- The statistical reliability of different sampling methods and sample sizes: e.g. the use and distribution of random samples, standard quadrats, transects etc. relevant to the intended outputs.
- Ways of measuring the number of individuals of a species being sampled.
- Specifying the time period for survey and monitoring activities.
- Weather or other physical parameters influencing the effectiveness of recording.
- Careful definition of associated attributes being recorded in a structured way, and their practicality in relation to survey operation.

Recording for publications etc.

Some recording schemes set up in the past may have had a rather poorly-defined objective to eventually produce a distribution atlas or other publication. As such, the aim to produce this has almost inadvertently acted as a spur for the recording process to a greater or lesser extent, depending on the energies and resources of the recording scheme organisers and the number of participants.

With more planning and focusing of resources at the outset, this kind of stimulus can be more explicitly employed, and some societies and schemes have used the process of a specific recording project not only to spur recording effort, but also to structure how this is carried out within a defined time period. The results of this kind of project are often a strong surge of recording activity in response to the objectives of the survey from interested participants; and also the attraction of greater levels of funding because the objectives are clear and the intended product is seen to be useful.

Some specific points might be considered:

- If recording is being designed for a specific published product, the recording objectives ought to define clearly the precise kind and level of detail of data being collected. This implies considerable forward planning and understanding of the subject and the intended products are needed from the start. However, even for the best projects, the actual products of the survey cannot always be entirely predicted in advance, and it is always useful to bear in mind that

more detailed data than might initially have been contemplated may be usable for other purposes later.

- Defined recording projects also often have rather more specific objectives for studying particular issues, or are aimed at capturing specific kinds of data (e.g. proof of breeding). Defining clearly what these objectives are, and the level of recording effort needed to produce valid data are obviously important.

2.2 Which species are to be covered?

Species recording schemes and surveys vary enormously in the extent of their coverage. They may range from a handful of species (e.g. terrestrial flatworms) through to tens of thousands (e.g. fungi). The choice of species to be included may depend on:

- Taxonomic relationships between the species.
- The structure of the subject of study – how a species group or groups are regarded for study purposes by people and organisations already involved.
- The 'tractability' of the group or groups – how easy or otherwise are they to get to grips with, both in terms of practical study and identification?
- The availability of appropriate literature, such as identification keys, covering the group or groups in question.
- The focus of the support infrastructure (societies, institutions etc.) related to the subject.
- The likelihood of potential participants in the recording scheme to be able to undertake recording of the group(s) or species being considered.
- The geographical and physical occurrence of the species – species in similar biotopes may be more relevant than those in highly disjunct ones.
- The usefulness to the scheme organisers and to others of information generated, and how this might serve other priorities.

Whatever the species to be covered, it is essential for a recording scheme to consider:

- Is the scheme or survey likely to be able to handle the taxonomy (and changes in the taxonomy) of the group in question over the lifetime of the scheme?
- Are there likely to be enough people involved with the recording scheme or survey to be able to cope with the likely level of recording, bearing in mind the tractability of the subject, the difficulty or otherwise of identification, and the physical nature or geographical extent of the recording activity?

There will also be other questions that need to be considered:

- **Taxonomy:** how does the recording scheme relate to current taxonomic work? Are the people or organisations involved in

taxonomy likely to be able to participate in the survey or at least feed into it? Some kind of link between a species recording scheme and the taxonomic basis for the subject of study is often essential, even for local recording schemes, if they are to be fully effective.

- **New species:** is the recording scheme going to be able to pick up and encompass recording of new species to the UK or to science? The former may need to extend to the ability to pick up and focus recording on the arrival of introduced exotic species. Relationships with not only taxonomists but also other bodies having an interest in or knowledge of introductions may therefore be necessary. For completely new species, availability of high quality identification skills within the scheme would be essential. Links with other bodies involved with invasive species might be worth exploring (e.g. the GB Non-native Species Secretariat)
- **Checklists:** a recording scheme will need to establish a basic checklist of the species to be recorded from the outset. This will need to reflect current taxonomic thinking, but also be capable of adapting to the realities of field recording. For example, the definition and recording of "aggregates" (separate taxa encompassed within one recording entity) may need to be considered.

Not only will the checklist need to be defined at the outset, but a clear idea of how it will be updated, and at what timescales, should also be considered. The timing of updates is particularly important. Many taxonomic groups experience regular developments in understanding, new species being added, changed treatments of existing taxa etc. The rate of these changes varies between groups, but in some is frequent enough to cause major problems with the stability of recording activities. Having a policy on how these changes are brought into operation in the recording scheme is important, and having a "fixed" version of a species checklist for a defined period of time may help. The scheme will also need to have some way of evaluating proposed changes in collaboration with

authorities in the groups concerned, so that revised checklists reflect accepted practice as far as possible.

The role of the recording scheme in relation to the maintenance of a checklist will vary. Many recording programmes will be using existing checklists provided by others, but in some cases, the recording society or scheme will also take on responsibility for maintaining the list. This has increasingly become the case as formal institutions with a remit to undertake taxonomic work have declined.

In addition to the basic needs of recording schemes to be able to use reliable checklists themselves, the advance of biological recording and data management across the board has meant that reliable, regularly updated checklists have become increasingly important for others as well. In particular, software designed to handle biological records must have agreed checklists to operate effectively. Databases like *Recorder* or *MapMate* are examples. The checklists in *Recorder* are designed to be the same as those used in the National Biodiversity Network's internet Gateway. The NBN Species Dictionary, maintained by the Natural History Museum in London on behalf of the NBN partnership, is the source of these checklists. However, the Museum is not necessarily the organisation that compiles and maintains the individual parts of this Dictionary, relying heavily on relevant specialist societies and recording schemes for regular updates.

- **Identification keys and literature:** the availability of up-to-date and accessible identification literature or other resources is obviously essential. This may include the availability of introductory materials, to attract new entrants to the subject, as well as authoritative works to underpin serious study. While for many groups there are problems with availability of high quality taxonomic literature, for others, organisations like the Field Studies Council and the Freshwater Biological Association have been keen to work with existing or intended recording schemes to develop essential keys or other identification materials.



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3. Planning and Funding

One of the drawbacks of the traditional approach to voluntary recording schemes and surveys has been that little consideration was given at the outset to how these were to be funded and supported. Small-scale schemes and surveys may be feasible enough with little in the way of funding, especially if these are supported from a society's existing resources, or through the UK Biological Records Centre in the Natural Environment Research Council's Centre for Ecology & Hydrology, but the more complex recording becomes, and the more the outputs are produced in the form of substantial publications or other outputs, then the more they will need to be set up and supported with effective funding from elsewhere, or at least supplemented.

Many larger societies will already have developed project plans for one activity or another, and may well have experienced staff capable of doing this sort of planning. Smaller societies and one-man-band recording schemes may find it more difficult. This is one major reason why the NBN Trust has encouraged recording schemes to "brigade" together in groups with similar objectives, if they are not already under the umbrella of an existing society, to enable them to work together to get further support.

An important point to note is that, in order to gain independent funding, a recording scheme needs to be, or be under the umbrella of, a legally recognised entity, such as a properly constituted society or charity, in order for them to be eligible to receive funding from most sources. Charitable status may well help, as this can entitle an organisation to receive funds from some sources not open to non-charitable bodies, although charitable status comes with the need to be able to report annually to the Charity Commission, including a financial statement. It also requires the charity to have both public-benefit objectives and independent trustees who will be liable for its governance. Rules on the running of a charity have been revised and tightened since 2006, and details are available from the Charity Commission website.

3.1 Project planning

Using a defined project to focus recording effort has been mentioned above. Their benefit in recruiting field workers and encouraging activity cannot be under-estimated, especially for voluntary work. Structured and well-planned projects are also essential if funding is to be secured from organisations like the Heritage Lottery Fund or charitable foundations, which may only fund for a limited number of years, or even from government organisations of one kind or another, because these bodies will need to be able to justify funding for specific outputs, and will need to be able to measure performance.

Planning a project implies at least some ability to produce a structured plan, even

if only a fairly simple one. Small recording societies and schemes may not feel competent to do this on their own, in which case they may want to seek help. The NBN Trust has offered help in these areas for some time. Contact the NBN Trust Secretariat in the first instance for help.

The advantage of this approach is also that it identifies from the outset the level of resources needed for specific tasks and outputs. If an atlas is an objective of a project, then a costed plan for its production could be used to bid for sponsorship or other funding; while plans to make the detailed data available through the NBN Gateway may be more likely to attract support. If paid staff or even volunteer expenses for specific tasks are required, then a clear specification of the work involved and the need for it, the timescale of the work etc., will aid in seeking support.

Having a clear idea of the potential beneficiaries of a project is essential, and a development plan needs to be produced with their needs in mind, as well as the goals of the organisation carrying out the recording project. This way, there is much more chance of gaining support. It is also usually essential to consider the funding priorities of the organisations being approached.

3.2 Funding sources

This can be one of the most problematic issues for most recording societies and schemes, although many may not appreciate the opportunities that actually exist.

As mentioned above, production of a project plan is almost always essential for gaining funding, and may be more successful if the recording effort is seen as part of a bigger project, e.g. production of a publication or on-line database available for the public, or related to some other public objective.

Potential sources of external funding, in addition to voluntary funds derived from a parent organisation, can be divided into essentially four kinds:

• Public authorities and agencies etc.:

- *Central Government*, e.g. Defra. Funding is usually only available to the largest organisations, for specific delivery of work to agreed contracts etc. Voluntary organisations are usually funded via contracts arranged through government institutions, such as the Centre for Ecology & Hydrology. Government targets will need to be met. Different government departments, however, will have different kinds of targets, and it may be that funding for projects aimed at social inclusion etc. may be available from other departments than those interested in conservation or biodiversity.
- *Government agency*. Many of the medium-sized recording schemes, and projects run by societies will have received at least some funding from the principal conservation

agencies. This funding can come from different sources within the agencies, e.g. species specialists or local teams, although these funding streams are being rationalised in most agencies, and more recently funding has become very focused on strategic requirements of the agency. As the agencies are principally interested in reliable data relating to target species or groups etc., funding from these sources may well be most appropriate for e.g. surveillance programmes, monitoring etc. However, very few projects funded from agency sources are supported for more than a few years at a time.

- *Local authority* Local authority funding is sometimes available, especially for local/county recording projects, in which case this may be channelled through delivery organisations involved with biodiversity or countryside. Local records centres may be agents for this kind of work, where they are based in local authorities, or are contracted to carry out this function by local authorities. However, biological recording is not a statutory function, and therefore funding is likely to be very uneven across the country, depending on local initiatives and requirements, and cutbacks since 2008 have meant severe limitations on the availability of funding for this kind of work. Sometimes funding in relation to community development is available.
- *EU funding*. Large scale projects relevant to EU funding might include some national projects, although these are likely to first need to be supported by government agencies etc.
- *Research Council funding*. Essentially, support from the UK Biological Records Centre comes under this category, and many national recording schemes will therefore have benefited from this source, even though they will not have applied for funding directly. Funding for specific projects, or for essential core support on top of existing commitments is occasionally available, e.g. data capture projects, especially at year ends (i.e. February-March). Other funding might be available from Research Councils direct, if linked to joint projects of direct interest to their research priorities. The Natural Environment Research Council is the main likely source, although the Biotechnology and Biological Sciences Research Council may also be involved.
- *Universities etc.* Funding from these sources is unlikely, although sometimes joint research projects can help support work, especially if part of programmes being implemented through studentships etc. Occasionally public-engagement projects may be undertaken that enable voluntary organisations to participate. Only a limited number of universities now have a direct interest in whole-organism biological sciences or ecology.

- *Museums and other public institutions.* Direct funding from museums for biological recording is now very limited, unless a regional museum retains an active natural science department with a budget for this. The Natural History Museum in London and some other large institutions (e.g. botanic gardens) do support voluntary recording schemes etc. to some extent, mainly through collaborative work, or assisting with identifications and the archiving of specimens and documents. More recently funding has been available through Lottery-funded schemes under the OPAL (Open Air Laboratories) Project, but this was time limited. Ongoing support may continue through OPAL partners, such as the Natural History Museum.

One thing to bear in mind with many government authorities is that there are sometimes opportunities to gain funding for well thought-out, ready-to-run projects towards the end of a financial year, if the authority concerned has an unexpected underspend on its budget. It is therefore worthwhile having worked up project plans "on the shelf" for this kind of contingency, and to make enquiries at the appropriate time of year (e.g. mid-January).

- **Lottery.** There are a number of different sources under this heading, each with its own focus. Priorities change annually, and funds are increasingly limited because of competition, particularly from sport and the arts, which receive by far the largest slice of lottery funds. However, overall priorities and criteria for assessing funding change over time, and it is always worth consulting the relevant Fund if an application is being considered. Current (2008) relevant programmes are:

- *Heritage Lottery Fund: 'Your Heritage'.* Grants up to £50,000. This has been a potential source of funding for at least some larger recording projects, and has the advantage that applications are normally turned round relatively quickly. Support for recording related projects has been very patchy, depending on the HLF's interpretation at the time of project plans against their frequently changing criteria. Social objectives for funding are usually paramount, with the result that purely wildlife-focused projects are unlikely to get funding. Projects with high profile elements of public engagement, especially with minorities etc., are most likely to be of interest. In the last few years, the HLF has regionalised its funding, so that there can be different applications of the HLF criteria in different regions. While it is possible for nationally focused organisations to make bids under this programme, they need to be aware of these regional differences.

- *Heritage Lottery Fund: 'Heritage Grants'.* These are grants of over £50,000. They are relevant for large-scale projects aimed at a wide audience. Both regional and national objectives are relevant. As with the 'Your Heritage' programme, the criteria

are heavily focused on public engagement and benefit. Any project that is likely to be deemed more the province of government will not be supported. However, a few major recording projects have received funding, owing to skillfully constructed project plans. An example is the National Moth Recording Scheme project *Moths Count*. Applications can take 6 months or more for a decision, and are subject to rigorous scrutiny, both before and after the application has been approved, including production of detailed progress reports.

- *The Big Lottery Fund.* The focus of this is improving communities in England, but the potential funds involved can be very large indeed. A limited number of major projects are supported by this fund. Biodiversity related funding is possible, but would need to be a major scheme, with many partners, directly involving local communities across the country. Project management using standard methods will be required. A recent example of a project funded through this mechanism has been the Imperial College led OPAL Project.

- **Charitable sources.**

These are usually either a rather limited number of UK-wide charitable foundations with biodiversity as a major focus, or more often local or regional trust funds that might support environment-related projects. The following are examples of national funds:

- *Esmée Fairbairn Foundation,* with an annual budget of approximately £25 million for all its main areas of interest, is the most supportive charitable body funding biological recording related projects. It has said it is specifically interested in projects related to the development of knowledge related to 'non-charismatic' species groups; i.e. it is interested in things other than those that usually attract funding from elsewhere. It is able to respond quite rapidly, and is very engaged with the objectives of biological recording.

- *John Ellerman Foundation:* a UK focused charity, with conservation as one of its aims, for which one of its objectives - "promotion of better understanding of and solutions to major environmental issues" - may be relevant to supporting documentation and research into the occurrence of species etc. They are especially interested in recruitment and training of volunteers, and in promoting partnerships etc. The Trust distributes about £4 million per year, but only about £500,000 of this is focused on conservation-related areas.

- Some scientific societies also give small grants for work related specifically to their interests.

Details of local trusts and funding bodies can usually be found through the Web.

- **Sponsorship.** Sponsorship from commercial organisations may be available, but obtaining it often requires a considerable amount of effort. Matching the kind of work the scheme is interested in to the likely interests of the company also requires a certain level of imagination and skill. Spotting likely relevant issues or the potential for a company to find some marketing value is useful. Many companies will have annually revised priorities for supporting voluntary activity. It would be no use approaching these if the proposed project did not fit into their targets for that period, although these targets may well change. Company websites often give details of the current year's objectives, or



Image © Philip Briggs/BCT

their public relations departments will be able to supply information. Finally, personal approaches to known contacts are often better than approaches out of the blue. For local schemes and projects, local offices of major companies might be the most effective approach. Smaller firms may be most interested in purely regional or local projects, and if they are likely to get high profile local exposure as a result of their sponsorship. Whatever company is involved, they are likely to want to have a high profile in any publicity sent out as a result of the project. However, they may also be specifically interested in funding publicity materials of this sort.

Experience and advice from other organisations that have followed particular funding routes is always helpful. The NBN Trust may be able to help in making contact with relevant organisations willing to help in this way.

4. Field Recording

The precise nature and objectives of the recording scheme or survey will strongly dictate the way it approaches field recording. It will also be strongly affected by the extent and location of the proposed scheme or survey, and the number of people likely to be involved.

However, whatever the scale, it is extremely useful if, from the outset, the recording scheme draws up explicit guidance as to how recording can best be carried out to suit its objectives. Even if it is a low-key recording operation reliant on casual observations from enthusiasts, they will benefit from having some guidance on how to go about their recording. Such guidance will also help to standardise the data being collected and hence improve its overall quality.

Guidance for field workers in any kind of scheme or survey needs not only to include advice on the technicalities of recording, but also needs to bear in mind things like:

- legal restrictions on survey or collecting (protected species licensing etc.)
- codes of conduct for surveying
- map use and their availability (it is surprising how many volunteers may not be able to read maps or give accurate grid references)
- permissions to survey or collect
- health and safety issues
- risk assessments that might need to be made
- insurance for field workers

The NBN Trust, in collaboration with the Tracking Mammals Partnership, has produced a handbook of guidance: *Engaging with volunteers: setting up and managing volunteer networks*, available from the Tracking Mammals Partnership website (see: Scoping Studies and Reports > Reports > Reports), which gives detailed guidance on these aspects, relevant to all kinds of surveys.

4.1 Producing guidance for field recorders

The following are ideas aimed specifically at different kinds of recording scheme or survey:

Taxonomic recording schemes

This kind of recording scheme may focus mainly on sampling populations of species to provide information for identification and to further taxonomic understanding etc. As such, participants will need to be familiar with the overall ecology and likely occurrence of the group concerned. The scheme will also probably want to specify the way that specimens are to be collected and submitted. Specific advice might therefore include:

- **The species and groups to be covered.** These will have been identified at the time of setting up the scheme or survey,

often self-evident from the name of the scheme, but guidance may be necessary for those coming to recording for the first time as to the extent and coverage of the scheme, including drawing attention to species complexes that might cause trouble with both field survey and identification. Processes for updating information on species will also be necessary, as new species are identified or changes made in taxonomic understanding.

- **Relevant sampling techniques.**

Not only is it valuable for expert field methods to be documented for others, maximising the returns for effort and increasing the likelihood of keeping recruits active in a scheme, but this is also important for standardising the way recording is carried out, so that collected information is comparable.

- **Advice on equipment.** This could include both the availability and sources of equipment, as well as methods of home construction and advice on use. It could also include advice on protective clothing etc.

- **Guidance on habitat recognition and its recording.** One of the most important aspects for many effective recording schemes is the passing down of often poorly documented knowledge held by experienced surveyors on the precise habitat or physical features indicating the potential presence of particular species. Standard approaches to the way that habitat and micro-habitat are recorded are also important. These might also need to be correlated with similar recording carried out by others.

- **Timing of surveys.** Timing of surveys is often crucial in relation to the activity of species, either during the day, in particular weather conditions, or through the seasons. Advice on this may be important especially for newcomers to surveying.

- **Collection and handling of specimens.** Collecting specimens for identification or later study may be at the core of this type of recording scheme. In the modern cultural climate, there are sometimes issues about promoting this type of work, although its importance for ongoing understanding of a group needs to be fully recognised and upheld. For this reason, codes of conduct on the collection of specimens have been developed (e.g. Invertebrate Link's 'A code of conduct for collecting insects and other invertebrates'), and need to be promoted. At the same time, effective

methods of collecting will also need to be advocated, to minimise damage or loss of relevant information. Advice may be needed on the necessary numbers of specimens for a sample; how to handle these physically during collection; how to deal with specimens as humanely as possible; and how to preserve them for future study. The need for relevant licences to collect also should be addressed.

- **Methods of study, including dissections etc.** Following from collection of specimens, guidance on handling and manipulating them for identification or for maintaining research collection material for later analysis is often needed. This will include advice on sources of materials to assist with this (stains, mounting agents etc.) and their handling (there may be issues of health and safety involved, or of security relating to poisons). It may also require advice on equipment and its use.

- **Approaches to identification, including literature.** Guidance for both beginners and experienced workers may be needed on the literature needed to tackle especially difficult groups. Sources of more obscure publications will need to be outlined or copies secured, and schemes may want to produce their own literature (keys, hints on identification etc.). The use of Web-based information may need advice (see the *Feedback* section under 6.3). In addition, advice on examining specimens for identification, microscope technique etc. may also be needed (see the *Training* section under 6.2).



Image © Natural England

- **Advice on taxonomic difficulties.**

Knowing when and in what way species can be difficult to identify is enormously important for all schemes, but especially for those focusing on increasing taxonomic understanding. Guidance on where to go to get expert assistance will be necessary in many cases. For this, many larger societies have panels of referees, but smaller schemes may have to rely on expert help from institutions like museums. In the case of the latter, scheme organisers should ensure that these institutions are able to take on the potential demand for identifications before guidance is issued to participants in the recording scheme or survey.

Apart from areas directly related to the field of study, guidance ought also to encourage good practice in documenting records for future uses.

- **Standard approaches and terminology** for recording attributes associated with specimen collection

(e.g. standard approaches to measuring specimens; standard terminology for habitat descriptions; measurement of abundance, e.g. the use of the DAFOR scale, or other numerical scales) (see Check-box 4, p.12).

- **Documenting sample locations**

(e.g. advice on the way to generate and use Ordnance Survey grid references, or Latitude/Longitude; use of "tetrad" recording systems (e.g. the 'DINTY' system) (see Check-box 3) or other sample areas; the use of place-names as both site identifiers and as a cross-reference for grid references; location measurements and the use of field markers for recording).

- **Documenting expert determinations**

(e.g. recording the date of determination, literature employed).

- **Documenting the location of specimens**

(e.g. the use of standard museum or herbarium reference systems and accession numbers).

Distribution recording schemes

The focus for these schemes is the geographical occurrence of species in a defined area, often over specific periods of time. The difference between these and taxonomic recording schemes, however, is often blurred, and many existing schemes have an element of both, especially if they are concerned with more "difficult" groups.

The level and intensity of recording varies enormously with such schemes. Some may have relatively few participants, in which case the level of coverage will always remain low, and therefore the objectives, in terms of sampling effort, may be at a lower level of expectation. However many schemes or surveys, especially looking at the more charismatic groups, will potentially aim to attract large numbers of field workers, in which case the kinds of guidance and the

Check-box 3.

Biological sampling by Ordnance Survey grid squares

Recording of occurrence within Ordnance Survey grid squares has required the short-hand notation of the individual squares for ease of recognition and reference. This is self-generated for 10 km squares themselves, using standard O.S. notation: SP, SU, TF, TL etc. and the co-ordinate numbers for the bottom left-hand corner of the relevant square: e.g. TL10.

For 5 x 5 km 'pentads', which are occasionally the unit of sampling, the usual method is to define these by the relevant quadrant of the 10km square: TL10 SE, SW, NE, NW.

For 2 x 2 km 'tetrads', there is no easily identified O.S. notation, and for this, different solutions have been proposed, of which the most commonly used is the so-called 'DINTY' system (its acronym formed by the letters of the second row of tetrads down in a 10km square). It uses 25 of the 26 letters of the alphabet to denote individual tetrads within a 10km square: TL10A, B, C, D...Z (omitting 'O'). These are designated from the bottom left-hand corner of the 10km square to the top right:

	E	J	P	U	Z	0
	D	I	N	T	Y	8
	C	H	M	S	X	6
	B	G	L	R	W	4
	A	F	K	Q	V	2
0	2	4	6	8	0	0

For 1 x 1 km 'monads' there is currently no recognised notation system.

structure of the recording scheme may be very different, and may offer itself as potential for gaining targeted project funding, e.g. from the Heritage Lottery Fund (see section 3.2).

Many of the objectives already listed for taxonomic schemes will be similar for distribution schemes, but the emphasis may be different. Potential guidance for field workers might also include:

- **Instructions for making field records,**

including familiarisation with the recording area and its habitats; approaches to narrowing down the areas of search; field techniques; the treatment of "critical groups" (e.g. recording of "aggregate taxa", which will need defining); the level and kinds of detail needed to be recorded (e.g. sex, life-stage, activity); abundance measurements etc. (including recording of negative results); and the formats of records.

- **Geographical focus of recording**

effort. Many recording schemes and surveys have long used the Watsonian vice-county system as a basis for recording, partly to standardise manageable recording areas for local groups and form a basis for data management, and partly to foster local 'ownership' of recording (see Check-boxes 6 & 7, p.13 & 14). Within this framework it is most usual for surveys to use 10km squares of the Ordnance Survey grid. Surveys then may define sample units as, say, a tetrad or a 1km square. However, individual records ought to be made at a more precise scale (e.g. 6- or even 8-figure Ordnance Survey grid references) if at all possible. But the precision of a record should not be confused with the scale at which repeated sampling of an area or County is carried out. It may also be possible to get recorders to record in specific land parcels, using maps of appropriate scale (1:25,000 or higher) or

on-line mapping (e.g. Google Maps on the internet), so that data collected can be directly related to other information. Following this up by defining recording 'sites' in this way can enable repeat surveillance and integration with other recording.

- **Timescale of coverage.** Recording scheme work is often focused through a "recording project", aimed at engaging field workers and ensuring geographical coverage of an area within a defined time period. The aim should also be to ensure that recorders do not confuse the timescale of the survey with the need to make individual records with as much time precision as possible, so that records can be used flexibly in the future. Timescale could also refer to the actual time spent on surveying a particular sample for best effect.
- **Coverage of relevant habitat within sample areas,** including sampling methods, and standard sampling procedures recommended (e.g. quadrats and transects, and how these are to be defined and samples taken).
- **Level of repeat sampling** to achieve thorough recording over a season or longer period.
- **Use of recording and sampling equipment,** e.g. traps, mobile phone applications, GPS or data loggers.
- **Level of expertise expected for correct identification of the taxa being recorded,** and how to go about recording "critical" or rare species; the collection of "voucher specimens" or other evidence (e.g. photographs).
- **Recording ancillary information,** such as threats to species or localities, habitat management etc.
- **Use of other resources to aid survey,** such as aerial photographs to assist with habitat identification, information on the Web etc.
- **Where to send records** and supporting evidence/vouchers, and how, what frequency etc.

As recording schemes or surveys progress, further guidance may become necessary:

- **Focusing survey effort,** identifying gaps in geographical coverage, or weaknesses in species coverage.
- **New species, or focusing on expanding or contracting species,** including dissemination of information about identification, field recognition etc.
- **Changes or amendments to survey organisation.**

Some recording schemes also put the guidance together with other resources, such as introductory guides, literature references, recording forms/cards etc., in a "resources pack" for distribution to participants in the recording scheme.

Check-box 4.

Measuring abundance

Standard methods of measuring abundance of species in the field are varied, but two are especially frequently used:

The DAFOR scale

DAFOR (Dominant, Abundant, Frequent, Occasional and Rare) is often a method of defining abundance, especially where quick surveys are being used, or the precise numbers or coverage of a species in the field is difficult to measure. The method is open to interpretation, and is therefore only a broad estimate of frequency. Attempts are sometimes made to standardise the meaning of the terminology; also qualifiers (e.g. L-F – locally frequent) may be employed.

The DOMIN scale

For sampling of species communities, particularly plants, another frequently used system is the DOMIN scale, where numerical designations are given to different levels of percentage cover:

Few:	1
Several:	2
<4%	3
4 – 10%	4
11 – 25%	5
26 – 33%	6
34 – 50%	7
51 – 75%	8
76 – 90%	9
91 – 100%	10

This kind of system is especially relevant to quadrat measurements, where precision is possible in relation to a fairly small, defined area. It can also be used in relation to contacts using a point quadrat.

Surveillance and monitoring

This is not the place for detailed guidance on monitoring programmes, but some general points may be useful.

- **Surveillance** is the focused repeat sampling of overall populations or groups of particular species in order to assess general changes over time.
- **Monitoring** is the continuous or regular observation of the activities or performance of individuals of a species, or of habitat parcels in specific localities.

These activities imply a far greater focus of survey, in a much more structured form, than taxonomic or distribution recording schemes usually aim to achieve. The outputs will also

be different in kind – generating structured analytical data.

While the generic issues discussed above for other recording may still apply (field identification, sampling methods, techniques etc.), more attention to the detail and practise of field recording, as well as designing the sampling to meet specific objectives and outputs is needed. Statistically sound sampling strategies, and the capacity of the resulting data to be analysed using techniques that deliver robust results are also often important. The advice of qualified statisticians in setting up such schemes is therefore valuable. (The UK Biological Records Centre at CEH Wallingford may be able to help).

Methods employed in surveillance may be of relevance even for the more generic distribution mapping schemes, especially if there are substantial numbers of people potentially engaged in the survey, or if the scheme covers species of importance (e.g. BAP Priority Species) for which more intensive data are required for particular purposes. It is also possible to use well-designed surveillance data for distribution mapping, if the sampling process records at the relevant level of resolution (e.g. using the O.S. grid as the basis for sampling).

At the same time, the opportunity for recorders engaged in basic distribution, or even casual recording, to be directed to generate meaningful data for surveillance and monitoring purposes should not be overlooked; for example, getting people involved in general recording to count populations according to a fixed protocol, or to carry out repeat recording in a standardised way along a fixed route, could develop meaningful monitoring data, if directed in the right way.

4.2 Recording projects

While a general recording scheme may have long-term aims, a short-term, focused recording project may be more appropriate for specific objectives, especially if there is a need to develop low level recording activity to deliver more or greater outputs.

Many recording organisations therefore use "projects" to gain support and obtain funding for intensive activity. This is particularly the case with work to develop large-scale participation in producing, for example, breeding atlases. The overall project will include many or all of the following:

- Statement of defined, time-limited objectives.
- A clear programme for implementation, including:
 - Project planning and design.
 - Consultation with interested outside parties.
 - Piloting methods and review.
 - Implementation of the full project.
 - Completion of project objectives
 - Round up, review and plan for the future.

- Development of a funding strategy and budgets.
- Development of appropriate recording and sampling strategies.
- Setting up and administering liaison or project steering groups.
- Publicity and promotion, including high-profile “launches”.
- Possibly the employment of a project officer and establishment of an office.
- Establishment of data management systems, data validation processes, support networks and communication lines.
- Production of recorder support materials (e.g. recording packs).
- Design and planning of project outputs (e.g. a published atlas).

Such a programme is essential if funding is sought from organisations like charitable foundations or the Heritage Lottery Fund. Project objectives may also need to be assessed against the published objectives of the funding body, making necessary adjustments to meet their requirements. It may be necessary for such projects to be run through a partnership with other organisations, or for specific parts of the work to be carried out or assisted by other bodies. For example, identification guides may best be produced in partnership with the Field Studies Council; or publicity can be organised in association with a professional institution or scientific society.



Image © Craig Slawson

Check-box 5.

Recording standards for species occurrence data

A biological record needs at least the following basic minimum of detail to be valid:

Species, Location, Date, Observer

In addition, most recent data will have at least some additional information:

Spatial (grid) reference (usually at least 2km “tetrad”, preferably at least 6-figure)

Number of individuals

Determiner

Habitat

Recording these in a standardised way allows for greater flexibility and use for analytical purposes. However, with the power of modern computer software, the capacity to make effective use of much more detailed records allows us to record many more occurrence attributes in a similar standardised way, thus enabling powerful analysis to be carried out. An example is given here:

Recording attributes in the Recorder database

Recorder, in its most recent configurations, has been designed to record a wide range of standardised attributes in association with species occurrence records. These include:

Samples (information about a collection of records made at the same time and place)

Sample Events (data on groups of samples made by named individuals on a date)

Location information (type, ownership etc.)

Spatial (grid) references (up to 10 –figures, or Latitude/Longitude etc.)

Sample type (e.g. pitfall trap)

Counts (including type and accuracy)

Record provenance/source

Record type (e.g. swept, nest record, field observation, voucher specimen)

Determiner and date of determination

References (standard lists, editable)

Voucher specimens (location, reference numbers)

Site/sub-site (can be complex hierarchies, including mapped boundaries)

Habitat detail (biotope) (inclusive dictionaries) with the capacity to record against a range of standard classifications, which are able to be extended, e.g.:

NVC, Phase I, Lichen communities, Shimwell urban habitats, EUNIS, CORINE, BAP Habitats

In addition, the database uses standard, editable **Term Lists** to qualify data entered for some of these attributes, such as:

Record type (e.g. field, collected, literature)

Location type

Location feature type (e.g. geology, topography)

Site status (e.g. legal designation)

Substrate

Check-box 6.

The Watsonian vice-county system of recording

Introduced by a precursor of the Botanical Society of the British Isles in the 19th century, this is a system of standardisation of then county boundaries for recording purposes, aimed at minimising variation between recording areas. It defined 112 ‘vice-counties’ across England, Wales and Scotland. Similar divisions for Ireland were introduced at the beginning of the 20th century. Many larger administrative counties were subdivided, while one or two smaller counties were amalgamated with neighbours to form larger areas. This system enabled individual vice-counties to be allocated ‘recorders’ with responsibility for organising recording effort and collating information locally.

The system was adopted by botanical societies generally, and zoological societies largely followed later. Some organisations, notably the British Trust for Ornithology, have more recently adopted a similar system, but based on groups of 10km squares of the Ordnance Survey grid.

The vice-county boundaries in Britain were defined by H. C. Watson in the 19th century, but were not properly standardised until the publication of *The Watsonian vice-counties of Great Britain* by the Ray Society in 1969, based on 1:10,560 scale O. S. maps with hand-drawn boundaries added by J. E. Dandy, held by the Natural History Museum, London. More recently, the National Biodiversity Network Trust has carried out a GIS digitisation exercise to develop a high resolution digital version of the vice-county boundaries, based on the original Dandy maps. This is issued through the NBN Trust and is used in the NBN Gateway etc., defining a fixed standard for these boundaries at any scale of mapping.

Much debate has been had on the merits or not of using vice-counties. Some societies, notably the British Bryological Society and the BSBI, have made extensive use of them for targeting recording effort and maintaining overall understanding of distribution. Others advocate merely using O.S. 10km squares. The merits of the system include among other things: local identification with the recording effort, the ability to work directly with all past records regardless of whether their precise locality is known or not, and direct relationship with land-use boundaries and landscape structure for the most part.

Check-box 7.**Watsonian Vice-counties of Britain & Ireland****Vice-counties: Britain****VC Standard VC names**

1	West Cornwall (& Isles of Scilly)
2	East Cornwall
3	South Devon
4	North Devon
5	South Somerset
6	North Somerset
7	North Wiltshire
8	South Wiltshire
9	Dorset
10	Isle of Wight
11	South Hampshire
12	North Hampshire
13	West Sussex
14	East Sussex
15	East Kent
16	West Kent
17	Surrey
18	South Essex
19	North Essex
20	Hertfordshire
21	Middlesex
22	Berkshire
23	Oxfordshire
24	Buckinghamshire
25	East Suffolk
26	West Suffolk
27	East Norfolk
28	West Norfolk
29	Cambridgeshire
30	Bedfordshire
31	Huntingdonshire
32	Northamptonshire
33	East Gloucestershire
34	West Gloucestershire
35	Monmouthshire
36	Herefordshire
37	Worcestershire
38	Warwickshire
39	Staffordshire
40	Shropshire (Salop)
41	Glamorgan
42	Breconshire
43	Radnorshire
44	Carmarthenshire
45	Pembrokeshire
46	Cardiganshire
47	Montgomeryshire
48	Merionethshire
49	Caernarvonshire
50	Denbighshire
51	Flintshire
52	Anglesey

VC Standard VC names

53	South Lincolnshire
54	North Lincolnshire
55	Leicestershire (& Rutland)
56	Nottinghamshire
57	Derbyshire
58	Cheshire
59	South Lancashire
60	West Lancashire
61	South-east Yorkshire
62	North-east Yorkshire
63	South-west Yorkshire
64	Mid-west Yorkshire
65	North-west Yorkshire
66	Durham
67	South Northumberland
68	North Northumberland (Cheviot)
69	Westmorland with North Lancashire
70	Cumberland
71	Isle of Man
72	Dumfriesshire
73	Kirkcudbrightshire
74	Wigtownshire
75	Ayrshire
76	Renfrewshire
77	Lanarkshire
78	Peeblesshire
79	Selkirkshire
80	Roxburghshire
81	Berwickshire
82	East Lothian (Haddington)
83	Midlothian (Edinburgh)
84	West Lothian (Linlithgow)
85	Fifeshire (& Kinross)
86	Stirlingshire
87	West Perthshire (& Clackmannan)
88	Mid Perthshire
89	East Perthshire
90	Angus (Forfar)
91	Kincardineshire
92	South Aberdeenshire
93	North Aberdeenshire
94	Banffshire
95	Moray (Elgin)
96	East Inverness-shire (& Nairn)
97	West Inverness-shire
98	Argyll (Main)
99	Dunbartonshire
100	Clyde Isles
101	Kintyre
102	South Ebudes
103	Mid Ebudes
104	North Ebudes

VC Standard VC names

105	West Ross
106	Easter Ross
107	East Sutherland
108	West Sutherland
109	Caithness
110	Outer Hebrides
111	Orkney Islands
112	Shetland Islands (Zetland)
113	Channel Isles

Vice-counties: Ireland

H1	South Kerry
H2	North Kerry
H3	West Cork
H4	Mid Cork
H5	East Cork
H6	Waterford
H7	South Tipperary
H8	Limerick
H9	Clare
H10	North Tipperary
H11	Kilkenny
H12	Wexford
H13	Carlow
H14	Laois
H15	South-east Galway
H16	West Galway
H17	North-east Galway
H18	Offaly
H19	Kildare
H20	Wicklow
H21	Dublin
H22	Meath
H23	Westmeath
H24	Longford
H25	Roscommon
H26	East Mayo
H27	West Mayo
H28	Sligo
H29	Leitrim
H30	Cavan
H31	Louth
H32	Monaghan
H33	Fermanagh
H34	East Donegal
H35	West Donegal
H36	Tyrone
H37	Armagh
H38	Down
H39	Antrim
H40	Londonderry

5. Managing Data

Whatever the scale of operation of a particular recording scheme, the question of how to manage incoming records is a key priority. The data management system employed will depend on the overall objectives of the recording scheme, its scale, and the kinds of outputs it envisages. It will also often depend on the available resources, human and financial, although these in turn also depend to an extent on the level of forward planning involved in setting up the scheme, or on planned development of their capabilities at later stages.

When many existing national recording schemes were set up, computerised data handling was in its infancy. As a result the system of handling data that was set in place may now have become outdated. However, once a recording scheme or survey has established methods, it can also be hard to change these to adapt to new capabilities. At the same time, the demand for information of a different order of magnitude in detail, as well as being more capable of use in different ways, means that existing recording practice is also under pressure to change. The ability of a recording scheme to adapt to these changes is a measure of the flexibility of the way it approaches its work.



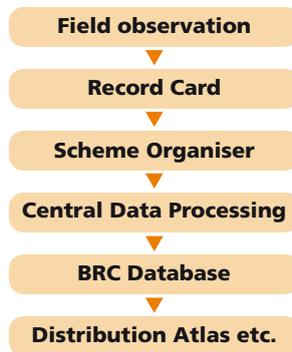
5.1 Working out the data management framework

An important first step to consider is: will the recording scheme or programme be handling its own data, or will it be reliant on other institutions to some extent for part or all of this aspect of its work?

Essentially, the options might include:

Traditional species recording scheme.

Many of these at the national level have been set up under the aegis of the UK Biological Records Centre. In the original pattern, a recording scheme was set up with a standard checklist of species printed on field recording cards used by participants. Data from these field samples were then collated manually by the scheme organiser, and submitted periodically for computerisation in the BRC. The data were held on the BRC's central database, and eventually used to generate printed distribution atlases, or supplied for analysis and research projects. The recording schemes are often (although not always) independent, stand-alone operations, with no paid staff, and with few people involved in the actual administration of the scheme.

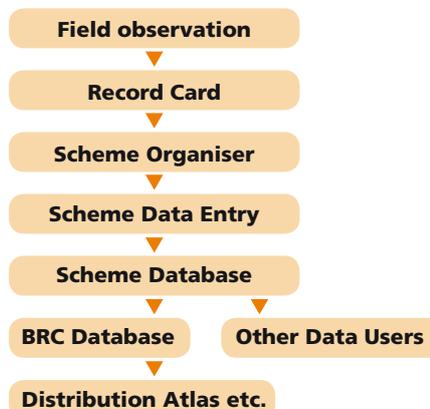


This pattern has also been used in a similar way by some local records centres, operating local recording projects, often in collaboration with local natural history societies. It has the advantage of being simple, able to be run with minimum resources, and uses a simple, centralised data management facility. Its drawbacks include reliance on out-of-date technology (or none at all locally), and limited capacity to handle large amounts of data or increased recording effort. A particular limitation is often the capacity of the data management system to be able to cope, and its outputs are governed by the priorities and resources of the data managing organisation.

Recording scheme run by a parent society etc.

During the last 20 years or so, there has been an increasing move for species recording schemes or their parent organisations to take on at least part of their data handling themselves. This has followed the availability of cheaper and more powerful computers and database software tailored for use in biological recording.

The model might then be:



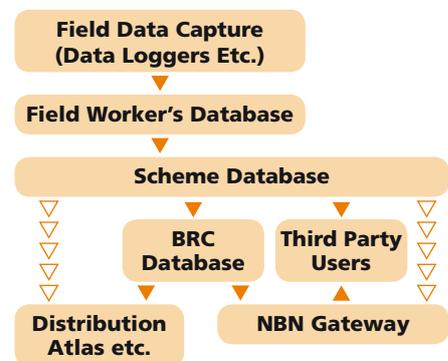
The essential differences from a traditional species recording scheme are that: a) the society or scheme has control of the initial database, passing down data to the UK BRC (or local records centre etc.) for collation into

the centre's database; b) it allows the scheme to supply third parties independently, or use the data in other ways; but c) it places much more onus on the scheme (and its parent society) to be able to handle the incoming and outgoing data.

Electronic recording scheme

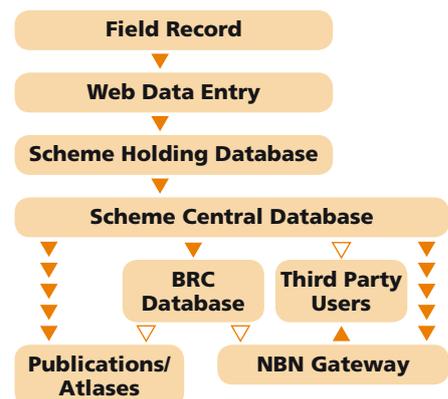
As technology has moved on, the capacity for data to be handled has become easier, allowing several different configurations of recording to develop, based on making electronic data capture as close to the field observation as possible.

An example could be:



Here there are alternative potential routes for data to follow, depending on whether or not the originating society wanted to make direct use of the central facilities of the BRC (or local records centre) or not. The National Biodiversity Network internet Gateway is also available to any organisation, and therefore the ability to control the provision of data can be kept by the originating organisation, although it may not want to handle the work this might entail. This model reduces the capacity for data capture error, but the system depends heavily on the capability of both the field workers and the scheme organiser(s) to be able to handle data efficiently.

A recently developed alternative to this has been:



Here the society or recording scheme is the primary repository for data, using the NBN Gateway or other means to disseminate them, and using the UK BRC (or local records centre) as an archive for its data holdings. It also uses direct Web data entry, removing the need for field workers to handle data entry and management themselves, thereby reducing error. Until recently, data handling from Web data entry could be cumbersome, but the future is for automated entry into a holding database, ready for validation and passing down to a central database. This option is much like the previous one, in that it allows the originating organisation to control data, but it also places even more onus on the organisation to be able to manage the sophisticated Web data entry systems, as well as its central database etc. A developing alternative to the data flow model given here is therefore for the UK BRC to act as the online data warehouse for participating schemes, who then access their datasets online, without having to maintain their own databases, while retaining control of data validation etc.

5.2 Choosing a data-handling system

The objectives of the recording scheme or survey, coupled with available resources, will be important in deciding what kind of system is chosen.

Key questions could include:

- Does the recording scheme have the necessary in-house skills to be able to handle the kind of data it is likely to want to collect, or could these skills be obtained through sufficient planning and resources?
- Does the recording scheme aim to involve the public, or a wide range of relatively early-stage participants, or is it directed at a relatively small number of existing experts?
- Is the recording scheme interested primarily in occurrence/distributional data, which might be rather simple in structure and therefore capable of being entered into computers by relatively unskilled people, and into less complex databases, or is there a likelihood of it requiring more detailed data (e.g. information about specimen collections or associated attributes)?
- Is it intended for data to be entered by the field workers and communicated in electronic form to a central collation point, e.g. using online recording; are field data loggers or mobile phone applications being used?
- Does the recording scheme have to communicate data efficiently to outside organisations which use existing systems of data management? If so, will their system be able to accommodate the scheme's output data (e.g. formats etc.)?
- What levels of control are needed on terminology, including taxonomic names, being used in the recording programme or online system, and are these capable of being handled effectively by the chosen system?
- How much support for the chosen data management system is available either within the parent organisation, or readily from elsewhere, and is this support vulnerable or likely to be sustainable for the duration of the project?
- Is the chosen data management system easy enough to be learned by new users who are going to need to use it, or is training readily accessible?
- Will the preferred system be able to be used on the available hardware?
- The complexity of the data being captured (is a simple database enough?).
- The ease of data entry (speed and reliability).
- The ability of the system to meet accepted data standards (including in-built validation checks).
- The system's capacity to collate and export data in required formats easily.
- The compatibility of the database with other data systems (those that need to be accessed).
- The number of people that need to use the system at the same time.
- The long-term prospects for support of the chosen system.

The current options are quite varied, but each has its limitations and advantages, depending on the answers to these questions. Essential elements to bear in mind are:

Check-box 8.

Some current data management systems for biological recording

MS EXCEL

Spreadsheets have the advantage that they are readily available to most people with a computer, and are very easy to set up and enter data. Macros and formatted entry screens can also be set up to regulate the way data are entered, and these can be passed around as templates. They also offer very effective ways to enter data rapidly into a format that can be readily mapped to more complex databases. The disadvantages, especially with uncontrolled spreadsheet data entry, can be: the ease with which data can be "scrambled" by inadvertent misuse; the potential for serious errors, using the "autofill" capability; the lack of standardisation of terminology, particularly dates, names and associated attributes, causing difficulties for later transfer to other systems; and the limited ability to run queries on them.

MS ACCESS

This is a readily-available bespoke relational database that can relatively easily be set up by anyone to handle basic data. It is very flexible, and can be used to run tailor-made queries on the data in other databases. It can also export data to EXCEL, WORD etc., and is therefore compatible with other generalised systems running Microsoft software. Its drawbacks are: it is not specifically designed for biological recording, and therefore all its capabilities have to be designed by the user, making it likely to be non-standard. As a result, any data entered are likely to have non-standard terminology and can be difficult to integrate with data in other databases. It also has a fairly limited data capacity, depending on the complexity of records.

MapMate

This is a tailor-made, commercial ACCESS-based data capture and management system designed specifically for biological recording by amateurs that is both easy to master and use. It has the advantages of: many readily-available built-in queries; the ability to share data with other similar databases through the internet (using "synchronisation"); the ability to generate instant maps of species at different scales; and is supplied with regular "patches", including taxonomic name-changes. Its limitations include: limited capacity, off-the-shelf, to handle complex data involving multiple attributes, especially using standard habitat classifications (although tailored additions can be obtained); lack of compatibility with other database systems, other than through EXCEL export; limitations of overall capacity through reliance on the ACCESS database platform.

Recorder 6

This is tailor-made, WINDOWS-based dedicated biological recording software, developed with support from JNCC, and aimed at being able to handle data of greatly varying complexity, using a standard data model and standardised nomenclature. The result is that data captured through the system can be exchanged readily with data of whatever complexity captured elsewhere using the same system. It is able to accept data from EXCEL spreadsheets; and it can export readily to EXCEL and to other databases, as well as to the Web. It also makes use of regularly-updated centrally administered taxonomic checklists and is able to handle data entered using different checklists elsewhere. Its disadvantages include: somewhat more difficult than other systems to learn to use; limited off-the-shelf internal mapping. *Recorder 6* operates on either MS Sequel Server, with almost limitless data capacity, or on the run-time version MySQL with a capacity of about 1.3 million records.

AditSite

This is an independent commercially-available WINDOWS-based relational database, compatible with ACCESS, EXCEL etc. It is specifically designed to take data of a varied nature concerning sites, including the facility to map sites and habitats, as well as being able to capture species data, export to linked mapping facilities, GIS etc. It is capable of user-defined extension, and is able to be queried using standard database queries from e.g. ACCESS. The parent company offers updated species checklists for many groups, but the system does not require the use of standardised checklists or terminology.

Indicia Online Recording Toolkit

This is not actually a database, but allows the organisation that sets up and runs the system to make use of external databases to manage their data, if necessary, or to enter data into their existing database direct from the online recording screens. It can be tailored to suit needs for either complex or very simple data. It enables reporting back to those submitting data, using NBN web service mapping, for example. It also enables online and internally automated validation of data, and allows the data managing organisation to enable interested external partners to gain access to data online.



Image © Craig Slawson

5.3 Data collation

Collation of data into a recording scheme can be one of the more onerous tasks. Simple recording schemes based on the organiser entering data into a basic database direct from hard copy original records submitted by field workers is not necessarily difficult, although time-consuming. Data submitted by participants in non-standard computer formats,

or in forms like WORD tables, from which it is time-consuming and tedious to extract data, can be much more of a problem.

Even if sophisticated online recording systems are not being implemented, it is useful if systems of data handling are thought through from the outset to minimise problems. Provision of a template for submission of

records can be very useful. These can readily be developed in spreadsheet formats and made available via email or as downloadable forms from websites. In setting these up, it is important to ensure that the columns ("fields") are defined in such a way that they readily map to data fields in the recording system in use.

Species Name	Location	Grid_Reference	Date	Observer	Determiner	Comment	Altitude	Vice-county_number	Abundance	Provenance	Record_Type	Sex_Stage	Surveyors_Ref

An example of a simple spreadsheet set up for data import to Recorder

Example data entry screen designed to submit records to Recorder or MapMate via a spreadsheet

Example of an online recording form as used by The Mammal Society, which utilises Indicia

5.4 Online recording

This is an area that is still developing. Quite a few organisations have some sort of online recording form that allows people to submit observations direct to a scheme. These usually either take data from the Web data-entry screen and put them direct into some form of spreadsheet, or they send individual records in the form of an email direct to a holding address, where the separate records then have to be extracted by hand into a database or spreadsheet. Such systems can be time-consuming to administer, and data entered also need to be checked. They are often used mainly for public-engagement surveys of easily identified species.

More recently some Web recording systems have become more sophisticated, feeding data direct into a database, such as ACCESS. An example is the Ladybird Recording Scheme, where records entered by a member of the public have been fed into a database, which also issues a reference number, given to the provider of the record, who can then submit a specimen or other evidence to verify their observation, if needed.

More recently, sophisticated online recording systems have been developed in several places where data are fed direct into holding databases that are then accessed remotely by those involved in data administration, validation etc. Several local record centres have set these kinds of system up. More recently still, the NBN Trust has developed the Indicia Online Recording Toolkit that enables users to set up their own system, either on existing websites, or using specially tailored websites. This lets contributors manage their own submitted data and gives them feedback reports;

uses automated data validation tools (NBN Record Cleaner); and allows submitted data to be checked remotely by authorised users before data are passed to the main database. The housing database may either be with the organisation setting up the system, or can be elsewhere, such as at the UK BRC.

Advice on setting up such systems may be gained from the UK Biological Records Centre, or from some local records centres.

5.5 Data validation and verification

Separate general guidance on these areas was issued by the NBN Trust in 2006, updated 2011 (available from the NBN website). For voluntary recording schemes and the societies that oversee them, a range of issues have been highlighted and guidance given. Some principal issues are relevant here:

Data verification

Some existing recording schemes and their governing societies have well-organised processes of data verification in place already, but not all. These usually involve at least some of the following:

- **Data verification** is the checking of the accuracy of the identification of the things being recorded.
- **Data validation** concerns the often automated checking of transcribed details of a record from an original source.
- Identification of taxa for which records need expert identification, and the dissemination of information about these.
- Setting up a network of local and/or national experts or referees to check records and verify identifications.
- Issuing guidance on the way records of these species need to be handled.
- Issuing guidance on the collection and preparation of specimens or other evidence to support records.
- Issuing guidance on the long-term curation of specimens as vouchers.



Image © Philip Briggs/BCT

Check-box 9.

Examples of voluntary data verification systems

The Botanical Society of the British Isles has a dual system in place to help with data verification. At the local level, each vice-county has a VC Recorder, part of whose job is to assist local recorders with identification and the collection of specimens to verify records. For difficult groups of species, national referees have been established, for use by both ordinary members and VC recorders (but not for use by non-members), to whom specimens can be submitted for identification. Each of these specifies the nature of the material they are prepared to examine. The Society has also prepared guidance generally for the level of expertise at which records of different plant taxa may be accepted, which is now being used in automated data validation routines. It has also issued information periodically on the availability of herbaria nationally and locally in which voucher specimens can be deposited. Finally, it has a process of submission of new VC records that update a published list of species which are recorded from each vice-county; and it also has separate specialised databases of accepted records of critical groups.

County ornithological societies have systems in place to verify records of rare and scarce birds, adjudicated by county recorders. Lists of species which are regarded as needing notes and descriptions to be checked by a local rarities panel are regularly updated and published. At the national level, the British Birds Rarities Committee has been established for many years, with volunteer participants proposed and elected by members of ornithological societies, and whose task is to review records of birds that are regarded as requiring validation at the UK level. Its methods and decisions are published on the Web and in *British Birds* magazine.

In managing data, the better quality data management systems have the capacity to record details of the determiners of records, as well as allow for information to be recorded on specimens retained as vouchers. Some also record levels of probable validity of records.

Data validation

The range of methods that can be used to do this is reviewed in some detail in the NBN Trust guidance on data verification and validation mentioned above.

Dedicated biological recording software has at least some automated validation checks built-in. For example, *Recorder* has automated validation of grid references and dates, and also ensures that site names are recorded properly. The status of entered records is also recorded, ranging from “correct” to “incorrect” or “unchecked”. Data imported

from spreadsheets are validated automatically during the process of importation.

Briefly, the following are examples of things that might be subjected to automated checks:

- Taxonomic names and authorities can be checked for appropriate use against existing checklists.
- Identifications can be validated against checklists.
- Accuracy in identifications can be checked against criteria defining levels of expertise required to name species.
- Statuses of taxa can be checked as correct.
- Format of grid references can be checked as correct.
- Grid references can be checked against their known occurrence in counties/vice-counties or other defined geographic areas.
- Species occurrence in geographic areas can be checked against known distributions.
- Species occurrences can be checked against known time periods of occurrence, or dates from first records.
- Site names can be checked against standard gazetteers.
- Formats and contents of dates can be checked as correct.
- Dates can be checked against survey periods.
- Observer/compiler/determiner names can be checked against standard lists.
- Validity of record sources can be checked.

The NBN Trust has more recently produced a tool to aid data validation and verification processes: the NBN Record Cleaner tool, downloadable from the NBN website, which can be used for checking data in a computer database or spreadsheet to identify potential problem records, and to enable them to be compatible with the NBN Gateway.

5.6 Ownership and rights over data

These are important areas that tend to be overlooked by some, especially voluntary recording organisations. With the advent of electronic data processing, and the use of the internet to disseminate data, they have become even more important.

The NBN Trust has issued separate detailed guidance on the issues involved for general use (available from the NBN website), but it is worth giving a brief account here for those involved in recording scheme and survey operations.

Intellectual Property Rights and Copyright

The basic principle is that any written record conveys with it intellectual property rights that are vested in the originator of the record. These rights remain with the record, in whatever form

it is held, and cannot be transferred to another person, although the owner can waive them or allow the record(s) to be used by others.

In practice, the NBN Trust has recommended that anyone collating data for a recording scheme needs to try and ensure that these rights are waived from the outset, by use of standard recording forms, incorporating a simple form of words. The NBN guidance gives details of forms of wording for different purposes, and also explains how recording scheme or survey organisers can handle data that have been accumulated in the past without this formal acknowledgment.

Copyright is rather different, in that it relates to the written or published form of information. Therefore data compiled into another form are subject to the copyright of the compiler. This can be transferred to other persons. The copyright in a database is rather different again, in that it relates to the structured content of the database, not necessarily to the database system itself, and the database is copyright of the person or organisation that has collated and managed it. The detailed NBN guidance gives more information on these aspects.

From the point of view of a recording scheme or survey operation, the key points are:

- Individuals contributing data to the scheme retain intellectual rights over their records, wherever they are held.
- These rights can be effectively managed by the scheme if handled properly from the outset.
- Problems can develop if they are not addressed.
- Data compiled into a database by a recording scheme are the copyright of the scheme, subject to the effects of waived rights conferred by data suppliers.

If a recording programme is set up from the outset making it plain what the data are to be used for (including publication and onward transmission through other media), then those contributing records to the scheme do so in the full knowledge this is the case. However, good practice in running a scheme should dictate that sources of records are acknowledged wherever practicable, and that the interests of the data suppliers are looked after.

Environmental Information Regulations

The Environmental Information Regulations 2004 were put in practice in association with the Freedom of Information Act 2000. The objectives of the EIR are to free up public access to environmental information of any sort that is **in the public domain** (i.e.: held by a public authority of some sort). As such, data held directly by private organisations are **not** subject to the Regulations. However, if those data are passed down to a public authority, including an organisation that is being operated on behalf of a public authority by someone else, they may be subject to the Regulations, because public authorities have a legal duty to proactively make available

any environmental data they may hold, even if they are not their own data. Despite this, there are a number of caveats which allow some kinds of data (e.g. sensitive data, data whose disclosure may prejudice further data supply, or data subject to ongoing research etc.) to be excepted, and an understanding of the way these exceptions may be acted upon by the public authority concerned is therefore important for any scheme or society which passes down records. It needs to be stressed, though, that very few problems with data being handled by public authorities have yet (2011) been reported.

The NBN Trust has issued specific advice on the Regulations, subject to the understanding that it has no capacity to offer official, definitive guidance (available from its website).

The Data Protection Act

Unlike the EIR, the Data Protection Act 1998 applies to any organisation or individual that holds information related to people. This includes information like addresses, specialist capabilities, qualifications etc., which a recording scheme may hold, in any format. The DPA requires organisations and individuals that hold such information to be registered with the Information Commissioner, and to declare what they hold and what they use the information for. Information about people must only be disclosed in accordance with these declarations, and data must be both up-to-date and specifically relevant to the operations that have been disclosed.

For many recording schemes, parent

organisations will already have registered under the Act. For small independent schemes, it is wise to register. In doing so, it is important to remember that it is not specifically prohibited to hold, use or disseminate personal information, as long as this is done a) in compliance with what has been declared to the Information Commissioner; b) in the knowledge of those to whom the information relates, and with their permission. So, good practice is to publicise what information is held, and for what purpose, and to gain consent for its use.

It is also worth bearing in mind that the validity of biological records will usually rely on them including the name of the person who made them, in order for the records to be objectively assessed by others. Some organisations have followed rather strict legal advice that has inferred that even persons' names attached to records cannot be passed down. This appears to be a misreading of the Act, and in any case may be circumvented by legitimately declaring that data will be handled in this way.

Many organisations also publish a Privacy Policy in compliance with the Act, which states what they do with personal data. Anyone supplying data to a recording scheme may then be referred to this publicly stated policy.

Further advice on the operation of the DPA in relation to biological records has also been issued by the NBN Trust (see the NBN website), and definitive guidance on the Act in general is available from the Information Commissioner's website (<http://www.ico.gov.uk/>), through which registrations can also be made.

Image ©
Shirley Thompson/BCT



6. Publicity, recruitment, training and support

Even the smallest voluntary recording survey or scheme is likely to need to recruit people to take part, if it is to be at all active. Targeting the right kind of volunteer, relevant to the scheme or survey's objectives, is crucial, but so is planning for the expected level of response. Publicity and recruitment therefore go strongly hand in hand, but also need to reflect the overall capacity of the recording scheme or parent organisation to be able to handle the results.

Detailed advice on these areas can be found in the Tracking Mammals Partnership-NBN Trust handbook *Engaging with Volunteers: setting up and managing volunteer networks*, but the following pointers and examples may help.

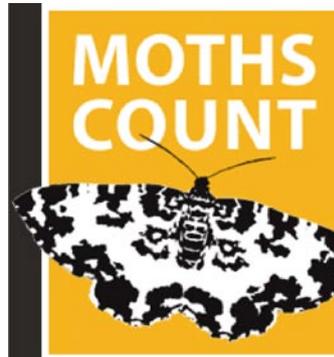
6.1 Publicity

Effective publicity needs to be carefully designed, targeted and timed to get the best effects. It needs to be succinct, eye-catching for the right kind of audience, and clearly focused.

Not only is the design of specific publicity material important, but care with its dissemination also needs to be taken. The intended audience obviously needs to be carefully considered in advance, and the way that it can be reached. So outlets and mechanisms for disseminating it need to be set up well in advance.

Publicity also needs to be produced so that it matches the capacity of the intended targets to understand and respond to what is needed. The level at which it is to be pitched should therefore guide the whole way it is produced, the kind of materials developed and the way they relate to the interests and expectations of the intended audience. For more specialised recording, targeting through specialised outlets may be all that is needed (e.g. society journals or websites), but for more 'charismatic' groups, and groups where it may be desirable to attract a broader audience, then other ways of attracting attention will be possible, but will require much more polished publicity materials as a result.

If expansion of a hitherto limited recording activity, and therefore a greatly broadened range of participants, is needed, then a specific publicity campaign, perhaps as part of a scheme (re-)launch may be appropriate. An example is the 2007 launch of the Butterfly Conservation *Moths Count* Project, which built on existing recording activity, but aimed to engage with a far larger number of people, with a different scale of recording effort, co-ordinated much more strongly. Publicity for this launch was built up consistently with clear messages



The 'Moths Count Project' logo

and targeted outputs over 2 years. It employed a readily recognisable slogan and logo that states its aims cleverly for a wide audience. As a result, it has been an immensely successful Project.

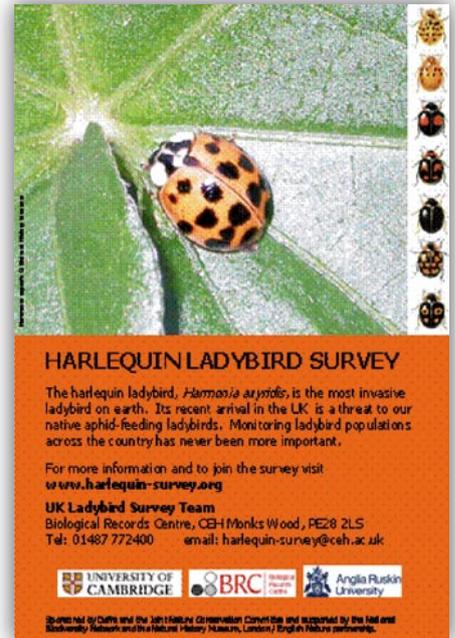
Whatever level of publicity is considered, a highly important part of any publicity campaign is the capacity of the organisation carrying it out to be able to respond effectively to the people it attracts. It is no good drawing people in to an activity if they are then not handled efficiently and at the right level of engagement. Beginners need to be inducted properly and made to feel welcome. Experienced recruits need to be handled with the respect their existing abilities command. The ability to be able to handle feedback from publicity is also valuable for the next time round.

The physical form of publicity can be very varied, and covers everything from simple handouts to websites and interactive displays. The account here touches on key issues with a

number of these, but does not attempt to go into detail about their production.

Posters, handouts and leaflets

Many larger organisations will have the facilities to produce well-designed posters and handouts, although these can be expensive, and their effective distribution and sustained use without unnecessary waste is often a key drawback.



Example of a publicity leaflet aimed at recruiting existing interested amateurs



Image © Sussex BRC

Websites

Modern electronic communications demand that most especially larger scale recording activity should have at least some sort of Web presence. For larger societies, this will probably already exist, although even for such organisations ongoing maintenance can be a problem. For smaller recording schemes, it is usually possible for a Web presence, in the form of at least a page or two of information, to be provided under the umbrella of another organisation. For example, all the existing national recording schemes set up under the umbrella of the UK Biological Records Centre are given basic contact details on the BRC's own website, while the BRC also offers all these schemes the chance to have hosted web-pages. Likewise, other umbrella bodies also have similar reference pages to recording schemes that they oversee, such as the Dipterists Forum or the Bees Wasps & Ants Recording Society.

The problem for website design is the need to be clear about who is expected to be using the website, and whether it will attract the right level of engagement. Good websites should be informative and attractive, without being overloaded. Finding information should be straightforward, and it should be readily possible to retrace steps, or find another part of the site.

A specific issue with website design is the need to consider accessibility for a range of potential users. So, consideration for people using different Web browsers, as well as ensuring material is readable is important.

Design of websites should also consider the relationship between the website and the organisation. Style of presentation, formats, logos and language will all be important in this. Advice on setting up and maintaining websites can usually be obtained from especially organisations like the BRC or the larger societies with professional staff involved.

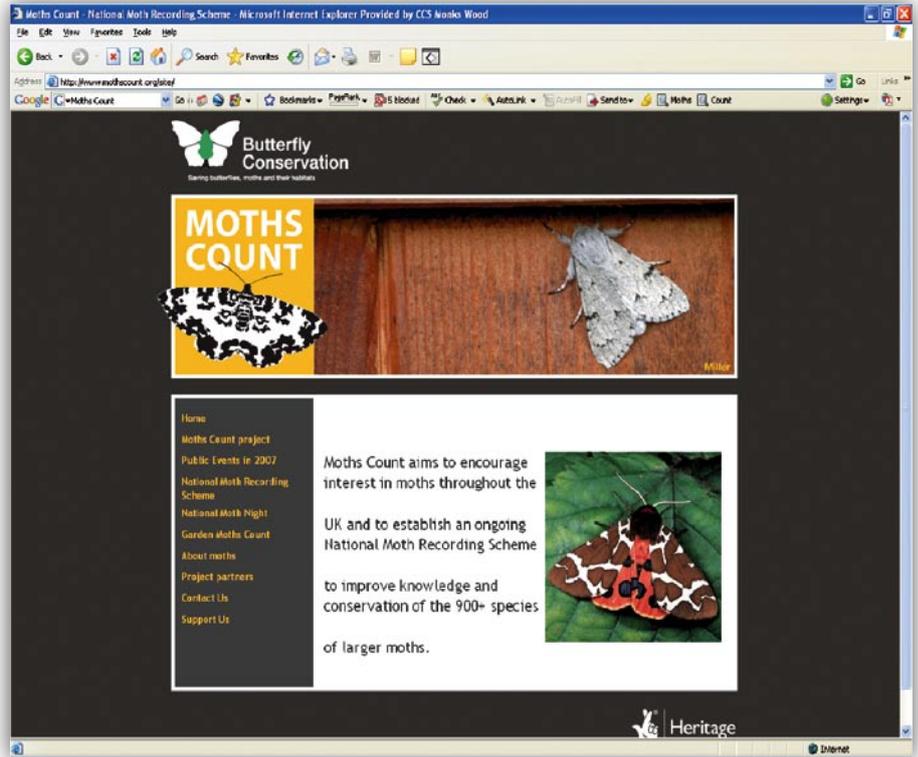
Newsletters and other publications

As with posters and handouts, the use of newsletters and information leaflets can be very effective, as long as the expected audience is targeted carefully. Newsletters are obviously primarily aimed at existing recruits, to keep them informed and to maintain ongoing support. However, the capacity to use newsletters to engage new recruits should not be under-estimated. Well-produced material like this can be especially valuable, because it is a shop window for the kind of work the scheme or society is doing.

Printed newsletters and leaflets are, however, expensive to produce and distribute. A new approach taken by some organisations has been to produce and disseminate these electronically, and to make these available as downloadable files on their own websites. A good example is the joint newsletter of the true bug (Heteroptera) recording schemes.

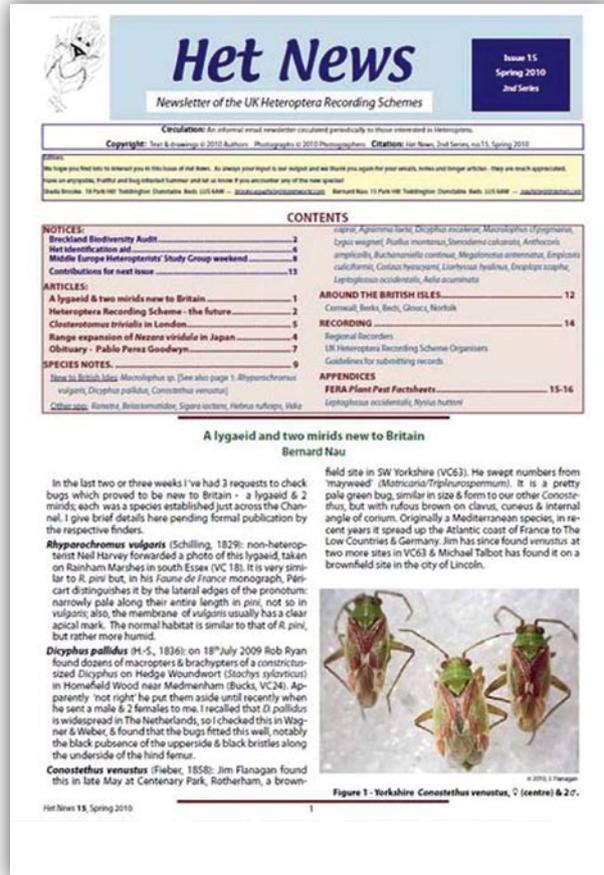
E-groups

Many societies and subject groups are also increasingly setting up e-groups or discussion fora. There are a wide range of these, although



▲ Screenshot of Butterfly Conservation's *Moths Count* project website home page

▼ Front page of an electronic issue of 'Het News'



finding out about them can sometimes be difficult. An example is the Beetles of the British Isles newsgroup, which can be subscribed to through 'The Coleopterist' website. Setting these up requires someone who is able to moderate material being uploaded.

Social media

A newly developed form of publicity is the world of social media. These include web-based networks such as Facebook and Twitter, which open up quite enormous opportunities for communication, as long as the organisation has the people that are in a position to make good use of them. An example of a Twitter feed from Butterfly Conservation is shown opposite

6.2 Recruitment and training

These are also areas that are dealt with in detail in the Tracking Mammals Partnership - NBN Trust guide *Engaging with Volunteers*, so only outline pointers are given here.

Recruitment

An important element to bear in mind with recruitment is the need to work in collaboration with other interested organisations. Potential competition for membership is a problem to try and avoid, and therefore any proposed new scheme needs to work alongside other bodies, even if the scheme is covering slightly different ground. Often these peripheral organisations may be able to offer substantial help with communication. Initial production of publicity materials and their distribution through established networks is one element of this.

Recruitment has become a significant problem for many recording organisations, and considerable effort has been put in over the last few years to target the issue. There are a number of key points that have emerged from this work:

- The increasing age of many people already involved in recording and identification tends to make the business of recruiting younger people more difficult, as they may be put off by the existing community of people involved.

their own capacity more to recruit, train and support volunteers.

- In order to attract new people, more effort is needed to make contact with potential recruits, especially younger recruits, using mechanisms that they relate to, such as the internet and the media, and at venues they are more likely to frequent.
- Although wildlife is seen as attractive on existing media (such as television), the ability to attract and maintain support of potential recruits through such channels can present major resource problems for often small organisations.

Despite these issues, there has been some progress with supporting recruitment.

Examples include:

- Establishment of the Riverfly Interest Group, and expansion of its related Riverfly Recording Schemes (the joint Mayfly, Stonefly and Caddis-fly Recording Schemes).
- Launch of the National Amphibian & Reptile Recording Scheme.

for recording in the urban environment by Greenspace Information for Greater London (GiGL), the local records centre for London.

Training

Training is a topic well covered by the TMP-NBN Trust guide *Engaging with Volunteers*, and so only a few aspects are mentioned here.

Training will depend enormously on the level of existing expertise, the intended level of operation and focus of the recording activity or scheme, and the kinds of work involved.

It might include training in:

- Fieldwork and survey.
- Identification.
- Data management.
- Outreach and volunteer management.
- Publicity.
- Recording and the law.
- Health and safety.
- Use of equipment.
- Office management.
- Project management.
- Fundraising.

For many smaller schemes, the key needs are likely to be identification, fieldwork and field craft skills etc. Data management has increasingly become a key issue, with the complexity of electronic field data capture, data collation and databases, the development of websites, and the potential for interactive media use.

Some recently-developed schemes, such as the National Amphibian & Reptile Recording Scheme, have put a lot of effort into developing training packs to disseminate to outside groups wanting to take part. The NARRS groups then set up their own training programmes using the centrally-produced packs. The success of this was demonstrated by the involvement of up to 1500 people in training events in five months, and the recruitment of over 800 people to carry out surveys in the same period.

Training is also becoming available more effectively through other bodies, such as some universities and colleges that have developed training courses for various aspects, such as identification and survey techniques. Organisations like the Field Studies Council, the Institute of Ecology & Environmental Management and the Freshwater Biological Association run training courses that may be relevant. A few larger societies also offer direct training, such as the Botanical Society of the British Isles, the Mammal Society or the Bat Conservation Trust.

6.3 Volunteer support

Having recruited field workers, a society or recording scheme needs to be able to keep them and encourage their involvement. Voluntary societies and recording schemes will



- Increasingly, the general population is divorced from and therefore does not consider the natural environment, and does not feel involved with it.
- The loss of whole-organism biology in schools and many universities is resulting in a loss of understanding among the country at large about the skill of identification.
- At the same time the loss of key professional staff involved in these places, as well as in museums etc. is resulting in a dislocation of the capacity within subject areas that formerly encouraged and supported volunteer recruits.
- As a result, many scientific societies and related organisations are having to develop

- Setting up of the 'Moths Count' Project.
- Development of the British Dragonfly Society 'Dragonflies in Focus' Project.
- Setting up of the Tracking Mammals Partnership.
- Mass participation in the Ladybird Recording Scheme.
- Involvement of the public in iSpot and the OPAL (Open Air Laboratories) Project.

At the local level, many larger local records centres have been working with their local natural history societies to develop support, such as the developing partnership supported by the Hampshire Biodiversity Information Centre, and the work developing support

often aim to have facilities aimed at supporting their activities. These can range from major resources such as libraries and meeting facilities, through to the organisation of events, seminars and conferences, and the production of literature of one sort or another, aimed at supporting the continued work of those involved.

Support provided through voluntary societies

Support for volunteers through societies can include:

- Meetings and events, aimed at bringing people together.
- Field meetings to engage with active recording projects.
- Seminars aimed at training and development of skills.
- Production of literature.
- Development of information and other resources through websites.
- Provision of venues for recording-related activities.
- Library and reference collections.

Many recording schemes already operate under the auspices of one or more scientific societies, although many remain stand-alone, and may have to rely on informal links, unless they can become formally affiliated.

Individual scientific societies may have some facilities that can be made available to support recording activity. The largest will sometimes have an established base, offering conference and meeting rooms, as well as a library. An example is the Linnean Society of London. These are also sometimes made available to associated organisations, for example the Freshwater Biological Association has made its facilities available for others working in their subject area. The BENHS has established its invertebrate reference collections as a venue for members and other groups, alongside meeting rooms.

At the local level, some long-established local natural science societies have had links with local museums etc., and can sometimes offer similar support as a result, although this has declined strongly in the last 30 years as many museums have lost their roles in natural history.

The difficulty for many more recent or smaller societies is being able to offer tangible benefits to members to maintain and develop their subject capabilities. They may be able to offer one-off events, seminars, conferences, etc., but otherwise may be limited, unless they have been able to secure an office base, for example the British Dragonfly Society. Some larger societies have been able to develop their secretariat on the back of other work, such as the conservation-related work of Butterfly Conservation.

Institutional support

While some of the largest long-standing societies may have an institutional base, others may have to rely on other institutions for their support. This is a part of the network of scheme and society support that is not acknowledged as

much as it might be, but is often vital for the subject support necessary to underpin recording.

Examples include:

- **The Natural History Museum, London.** This offers access to its reference collections specifically to members of major societies, e.g. the Botanical Society of the British Isles. Library and meeting facilities are also available, including in the Angela Marmont Centre.
- **Oxford University Museum.** This, with its major entomological collections in particular, is a major resource, open for use by the public.
- **Royal Botanic Gardens, Kew and Edinburgh.** Both these offer facilities to relevant societies, the former being a major centre for mycology, and the latter giving strong support for lichenology in particular, and to the Botanical Society of the British Isles
- **Regional Museums.** Some of the larger city and regional museums retain strong natural history departments, such as at Liverpool, and work alongside voluntary societies locally. Societies might usefully seek to set up more formal arrangements with key museums, and in so doing help the museum service justify its continued involvement with natural sciences.
- **Universities.** Where these retain an involvement with whole-organism natural science, they often offer some facilities to outside individuals and societies, including library and occasionally laboratory facilities.

For most national recording schemes, the primary institutional support has always been the UK Biological Records Centre, based from 1964 at Monks Wood Experimental Station, Huntingdon, but moved to the Centre for Ecology & Hydrology at Wallingford in 2008. This offers data management, some publication facilities, and more recently website design and development of online recording etc. It can also host meetings and seminars.

Feedback

Feedback should be one of the key activities of all recording schemes, of whatever size. It has been shown time and again to be vital in maintaining volunteer morale and engagement. Schemes or other organisations that receive records and do not acknowledge their receipt, or fail to thank their volunteers for their efforts, risk being regarded as a 'black hole', and will be avoided. A bad reputation for this is also hard to overcome.

Feedback is also one of the more difficult things for a scheme to sustain in the longer term, and is a particular problem for funded projects, where funding may have supported a project officer for a limited number of years, after which the burden falls back on volunteers. It is therefore necessary for such schemes and projects to have a planned exit strategy, to wind down the activity without losing core support.

Feedback can take a range of forms, and modern technological developments assist this. Feedback mechanisms can include:

- **Acknowledgments.** Simple one-to-one acknowledgments of the supply of information or records should be a regular practice of all recording schemes at whatever scale.

These are also an opportunity to encourage improvements in recording quality or coverage, as well as to ensure that the data supplier is fully aware of how the data are to be used by the recording scheme or survey.

- **Newsletters.** These have been mentioned above in relation to publicity, but their role as feedback is probably even more important, especially for voluntary bodies. A regular (if only once a year) news-sheet, with information about the previous period's activities, new sightings, unexpected discoveries etc., or information about developments in the subject, will help to keep people involved. They can be electronic or hard copy, although organisations need to remember that not all volunteers will have, or want to use a computer.
- **Published reports.** Many organisations produce such reports, locally as well as nationally. Acknowledgement of the source of records used in their production is an important element of the report, encouraging continued support for the recording effort.
- **Email feedback.** Some recording schemes use simple general emails as a means to maintain communication, although people not on email can be forgotten in this kind of process. The e:group is a more sophisticated mechanism for this, allowing participants to feed in comments of their own.
- **Web reporting.** Websites that are maintained regularly are an important, and growing means of communication, although the plethora of websites, even for a limited subject area, can sometimes mean that their messages do not get through as well as they might. One way that they can be used, especially if data are uploaded to a central database regularly, or through online recording systems, is to display feedback maps of coverage of a survey. A good example is the Hoverfly Recording Scheme website, which maps current coverage of species, as well as overall coverage, including gaps. Another example is the British Trust for Ornithology's 'BirdTrack' system, where contributors are able to see their data mapped soon after submission. This facility requires high levels of data management capability and linkage with a website, which may involve skills and manpower not readily available to most organisations. The advent of the National Biodiversity Network Gateway has offered this kind of facility to any organisation that can submit updated data on a regular basis to the Gateway, especially through use of its web services that can deliver tailored maps to organisations' websites allowing this kind of feedback to be effected automatically. Information about setting these up is available from the NBN website, or advice can be obtained from the UK Biological Records Centre. The new Indicia online recording toolkit also allows for setting up immediate feedback to those entering records online.
- **'Social media'** and similar web-based developments such as iSpot also allow for interactive communication through messaging and image upload facilities etc.

7. Making use of the Data



Image © Sussex BRC

Many long-established recording schemes may never have had a clear idea from the outset about how their data might be used or by whom, although they will usually have had a general goal to produce some form of distribution atlas or other publication at some unspecified date.

More recently, recording projects have been developed with the more clearly-stated aim to produce a particular publication or other output. Examples have included the *New Atlas of the British & Irish Flora* or the *Millennium Atlas of Butterflies in Britain & Ireland*.

Both these approaches can result in some problems if the data gathered have either been very loosely collected without any clear idea of the level of precision needed, or have been very specifically collected with only one potential use in mind. With modern data management capacity, the potential for the use of data in many different ways can be greatly enhanced.

7.1 The potential uses of biological records

However biological records are collected, it is always useful to bear in mind a range of potential uses, in addition to the one intended. These could include:

- Distribution studies (maybe at a different scale or for a different audience from the one for which the original project was intended).
- Taxonomic studies (e.g. enhancing understanding of range overlaps).
- Autecological studies (can the collected data provide useful information, e.g. on site occupancy, host-plant relationships etc.?).
- Conservation-related (are the data able to be used for site-specific conservation work?).

- Land-use planning etc. (can the data be used for site assessments, or for environmental policy development?).
- Environmental monitoring (are the data able to assist with monitoring other aspects of the environment?).
- Public information (e.g. site or landscape interpretation).
- Education (data might be able to be used in relation to either formal teaching or for informal educational outreach at different levels and for both children and adults).
- Research analysis (can the data be useful for other research, such as environmental attribute analysis, or climate change studies?).
- Inter-disciplinary studies (e.g. landscape history).

All of these might be possible or otherwise enhanced if the data have been collected with a breadth of capability in mind, and the way the data are disseminated or presented may help these as well.

Use of the resulting data could therefore benefit directly from early discussions with at least some other potential users. For example, data collected for a distribution mapping scheme designed to provide data at one geographical scale might be of use for environmental assessments if they are collected at a higher level of resolution, or with extra details.

Some of the most recent projects have had consultations carried out extensively before initiation, such as the National Amphibian & Reptile Recording Scheme, where detailed assessment of the needs for monitoring of species, as well as engagement with volunteers, was carried out before the project was launched, so that incoming data are being recorded both systematically (with statistically-sound levels of sampling) and with a broad capacity to be used for a wide range of purposes.

In considering potential uses of data, there are also a number of other things that can usefully be borne in mind, depending whether data are to be used for analysis and published in some form, or if the actual data are to be disseminated for use by others:

- Data formats for optimum use.
- Potential data applications.
- Interpretation of data and the limitations of particular datasets.
- Data access policies.
- Data use agreements.
- Data partnerships.
- Sensitive data and their handling.
- Intellectual property rights over data and permissions to use.
- Copyright.

7.2 Data dissemination

For many organisations and schemes until recently, direct dissemination of raw data to third parties was carried out mainly by someone else on a one-to-one basis. For most national recording schemes, data submitted from the scheme were handled through the UK Biological Records Centre and passed out to relevant researchers etc. as necessary. This process continues.

At the local level, a local records centre may also operate in the same way, collating data and managing them for internal use, and also for key clients, to whom selected data are communicated as needed.

Increasingly, scientific societies and others running recording projects will not only be analysing the data directly themselves, but also potentially passing down data direct to others for their use. Accordingly, these organisations are becoming increasingly aware of a range of issues that need to be addressed as a part of this process. The NBN Trust has made some effort to document these, and detailed guidance is available on data access issues, policies and agreements from its website. For the purposes of this guidance, the following pointers may help:

Data access policies

It is very useful for any organisation that is preparing to hand out data to others to have a properly thought-out data access policy, so that everyone involved is clear about the way data are to be made available and used.

The NBN Trust has advocated a set of basic Data Exchange Principles that can serve as a basis for such a policy (available from its website). These are founded on the underlying principle that, wherever possible, environmental information should be freely available for use, and that, where this is not possible for whatever reason, the reasons should be clear and based on one or a number of identified criteria. These principles also underlie the Government's Environmental Information Regulations 2004, which in addition have allowed for some exceptions with public authorities supplying information. In summary these could be:

- The data are sensitive on the grounds of environmental protection, according to defined criteria.
- The data are the subject of ongoing research, or for a specific product, not yet publicly available.
- The onward supply of data to third parties might jeopardise the future availability of data from others.

For some, especially voluntary organisations, concerns over the commercial use of data by third parties have tended to restrict access to records, partly to secure funding for the organisation supplying the data. In these cases, the NBN Exchange Principles have sought to

uphold the need for bodies to have secure funding, while at the same time emphasising the need for them to endeavour to make as much data as freely available as possible.

Disseminating data through the Web

One-to-one data dissemination can be fairly straightforward, because both the supplier and the recipient know what the data represent, but the advent of Web technology has allowed people to disseminate data more widely, and more effectively. However, this has also required people to think about how they do this, and some of the problems that can develop.

Among these might be:

- Ensuring that people who might access the data remotely know how to use and interpret them properly.
- Having some control over the onward dissemination and/or copying of data into other systems, avoiding data duplication, and keeping track of their use.
- Ensuring data quality is upheld, both for the data being supplied, and also through its onward transmission.
- Working with other people to ensure that data are being provided via the most effective and sensible routes, thereby reducing duplication and upholding data quality.
- Maintaining the intellectual and other rights of those that provided the data in the first place, or the rights of those doing the data dissemination.

The Web can be used to disseminate data in different ways:

- **Email** is one simple mechanism. Simple datasets can be directly supplied in a suitable format to known recipients, including multiple ones. The *Recorder* database has the facility for data to be emailed direct to users.
- **E:groups** and **Web fora** can also be used in a similar way, if the system is able to accept or download files.
- **Database synchronisation.** Microsoft's *ACCESS* has the facility for different users to have their databases "synchronised" through Web communication, enabling direct exchange of data. The *MapMate* database system makes use of this facility, enabling the setting up of "hub" systems for two-way or one-way data communication, depending on the set-up and agreed protocols.
- **Website downloads.** Data can be loaded into website-linked databases, able to have data extracted, edited or downloaded by others with the right levels of access. There are also free internet facilities which are available to facilitate this, e.g. Google Accounts.
- **Online access to databases.** With sophisticated databases, it is now possible to enable direct online use of data. This can offer very useful means of communicating

data direct without duplication, but access controls and firewalls need to be very effective.

Regardless of the way that the internet is used to disseminate data, the same kinds of issues will tend to come to the surface. Some organisations will want to use their own website as the sole means of accessing data, in which case, quite tight control over some aspects is possible, but the communication mechanisms may be limited. However, for many this is not practicable, as it requires a high degree of competence in maintaining a website. Others might be happy to allow just a limited number of people to have direct access to datasets through Google Accounts. However, none of these mechanisms can integrate data from multiple sources at the point of use – each data source remains essentially separate.

Data dissemination through the National Biodiversity Network Gateway

The National Biodiversity Network was set up to provide a freely-available mechanism for people wanting to go down the route of providing data through the Web without necessarily wanting to set up their own stand-alone system. It also allows data from multiple sources to be integrated at the point of use.

At the same time, the NBN Trust has endeavoured to provide free guidance (available from its website etc.) and other materials for all of the issues listed above.

These include:

- Templates for standard "metadata" (information about individual datasets), which describe the data in the dataset, identifying any shortcomings and problems of interpretation. Metadata also clarify who "owns" the data, and lay down any specific conditions on their use.
- Standard terms and conditions developed for people both putting data on the Gateway and making use of them. These are a form of binding agreement, which can assist with potential problems.
- Provision of flexible Web-based controls to data disseminators over the way particular datasets are accessed by users.
- Provision of online data validation facilities for data providers
- Providing guidance on ways to improve and ensure data quality, for use by data providers; as well as encouraging the use of standard metadata to define the level of confidence in particular datasets for the benefit of data users.
- Providing guidance on issues of copyright and intellectual property rights etc., so that data use agreements can take proper account of these during the process of data collation and management.

Further work on some of these areas is planned, particularly regarding data flows.

Check-box 10.

Putting data on the NBN Gateway

- Be clear what the Gateway can do for you first. Check it out, see how it works.
- Register yourself and your organisation on the Gateway (organisation level of access allows data providers to grant access to all relevant organisation members at one go).
- Refer to the Data Provider Pack on the NBN website.
- Sort out data into a format that the Gateway can work with (including ensuring it passes automated NBN Gateway validation routines, using the NBN Record Cleaner tool available from the NBN website.
- Think through data access policies and make sure that the way the data are to be presented through the Gateway matches these (in terms of levels of resolution for different kinds of user, whether or not they can be allowed to download data etc.).
- Bear in mind that allowing at least 10km resolution access for people to be able to download data from the Gateway automatically allows the Gateway to make your data at that level available through the international Global Biodiversity Information Facility (GBIF) – a world-wide portal that delivers biodiversity data for use by anyone, of which the NBN Gateway is the principal 'UK node'.
- Make sure there are people available to be able to manage the dataset(s), or arrange for someone else to do so.
- Compile the standard metadata required to go alongside the dataset (pro-forma available on the NBN website).
- Communicate with the NBN Data Access Officer about timing of uploads, supply and checking of datasets/metadata etc.
- Supply the dataset and metadata file (email or on disc).
- Once the dataset is loaded (you will have been informed of this), you or others will then be able to administer the dataset, using the dataset administrator level of access when logged on – go to "My account – Datasets you manage".
- Check out requests for better access by users on a regular basis.
- Think about your timescale for updating the dataset.

In addition, the NBN Trust asks people to think about the timescale and frequency they might want for updating their datasets. This will require people to consider the way they communicate with their own recorders, and how they collate and manage their own databases. It might also need to be tied in with a recording scheme's timescales of recording

for a particular project, or the production of an atlas etc. The Gateway itself is updated on a regular basis, and some data suppliers send in updated datasets on a very regular basis. Others might supply extra tranches of data once or twice a year at most, or only after completion of an atlas project. With the advent of online recording using Indicia, the facility will also exist for enabling semi-automated uploads of validated data on a regular basis to the Gateway, direct from Indicia.

Data use agreements

Why should we want to control how other people use wildlife data?

Data use agreements have at times been used as a mechanism for trying to tie down who uses data for what. This has sometimes stemmed from cases of the deliberate misuse of information by people, either for personal gain, or to further other agendas. However, these cases are quite rare, and one of the most important reasons for the NBN Trust encouraging as free access to wildlife data as possible is that knowledge about wildlife is of far greater potential benefit than ignorance.

Data use agreements, used properly, can in fact greatly help with data exchange and use. They:

- Are of great potential benefit in freeing up access to data. By setting out in advance how each party is to be supplied with data, under what circumstances, and what they might get in return, they enable the parties to be clear about the benefits to them of granting access to their data.
- Need to be used within a framework of data access policies established by all parties. These can define issues like sensitive data and how they are to be used by either party.
- Allow either party to have confidence in what the other is going to do with data.
- Enable people to decide in advance on any reciprocal help they might also want to offer to the other party, in addition to use of data.
- Clarify what, if any, funding issues need to be taken into consideration.
- Can specify time limits on data use and other aspects of the partnership operation.

Setting data use agreements up can seem like an onerous duty, even if the rewards can be significant. The NBN Trust has sought to help with this by providing model licences and agreements, including a standard exchange agreement template, that people can use in either setting up their own agreements with others, or ensuring that data provision is made within an agreed framework of permissions to use data etc. Model agreements and advice on their use are available through the NBN website, or from NBN Trust officers.

7.3 Publications

Production of a book or atlas etc. from the results of a survey or recording scheme is often seen as a primary objective. The involvement of volunteers in the work of the survey is also a spur to publishing data, as a basic recognition and reward for their contribution.

Published results of biological recording can take a range of forms:

- Distribution maps (national and local).
- Summary taxonomic accounts with distribution maps.
- Analytical accounts of species or species communities.
- Inventories (most often at a local or site level).
- Interpretative material.

Check-box 11.

Publications: general things to consider

For any sort of publication, there are generic requirements to consider, alongside the production of the text, data for maps etc., whether or not the publication is a part of an overall project. These may include:

- Production of a publication plan (timescale, formats, style, audience).
- Design of the publication.
- Financing the publication.
- Contracting the production (if a private publication).
- ISBN number allocation (if a private publication).
- In-publication cataloguing information.
- Sourcing or commissioning illustrative material.
- Production of indexes.
- Acknowledgements.
- Copyright agreements and permissions (where necessary).
- Ordnance Survey or other publication licences.
- Proof reading.
- Distribution and sales (or finding a publisher to do this).
- Review copies.
- Submitting copies to copyright libraries:
 - British Library;
 - Bodleian Library, Oxford;
 - University Library, Cambridge;
 - National Library of Scotland, Edinburgh;
 - Library of Trinity College, Dublin;
 - National Library of Wales, Aberystwyth;
 - Library of Queen's University, Belfast (not a statutory deposit library, but expected to receive books concerning Northern Ireland).
- Advertising.



Distribution maps and atlases

The most obvious product from biological recording is some form of distribution map or atlas. Most national recording schemes have produced one or more national atlases since they were set up, usually in collaboration with the UK Biological Records Centre. At the local level, many regional and county distribution atlases have been produced in a similar way.

These 'dot-distribution' atlases, based on the Ordnance Survey grid, might be at

- 10km square (usually for UK atlases)
- 5 x 5 km ('pentad') (often used by groups with few active field workers, or for difficult taxa)
- 2 x 2 km ('tetrad') (adopted mostly at County level)
- 1 x 1 km ('monad') (sometimes at County level, or smaller areas)

Which level of sampling is used also depends on the available resources for the original recording. Some (especially bird) atlases have also developed the method to show different levels of abundance, or time-periods of occurrence, using symbols of different size, colour or shape. Many of these atlases have been generated using the *DMAP* distribution

mapping programme, developed by Dr A. Morton, which is able to take co-ordinate data from other data sources, and uses these to plot maps at any scale required, with a range of available symbol forms. Some dedicated biological recording databases also have (sometimes limited) internal mapping capabilities that are able to produce print-quality maps, and some organisations have utilised geographical information systems (e.g. ArcGIS or MapInfo) to do likewise, although these require licences for using Ordnance Survey data and expertise in utilising GIS.

An important element in the production of any dot-distribution map is the need to be clear about what is actually being shown. The time-scale over which records have been accumulated, and the nature, coverage, intensity and accuracy of the survey(s) that have been carried out to accumulate data are important information for users in understanding the meaning of the maps, just as they are in understanding data disseminated through the NBN Gateway. Other ancillary information, such as geology, topography, habitat distribution etc. may also be relevant – modern atlases have been able to incorporate GIS geological or topographical information into their distribution maps.

The form and content of atlases has changed over time. The BRC originally aimed at generating simple 10km dot-distribution atlases; issuing “preliminary” and “provisional” atlases in a basic format to encourage further recording, before attempting to produce a “full” atlas. Not all national schemes, however, have attempted to produce “full” atlases, partly because it has become clear over time that more than just a 10km atlas is needed in many cases to do full justice to distribution data, but also that a “complete” view of the distribution of species is not actually possible, especially in the face of environmental change.

Taxonomic accounts with distribution information

Accounts of this kind are increasingly being produced by recording schemes as a product of funded surveys, or as an extension to what would formerly have been regarded as a “full” atlas. Examples of these include *The new atlas of breeding birds in Britain and Ireland: 1988-1991*, and the *Ladybirds (Coccinellidae) of Britain and Ireland (2011)*, which is both an atlas and a fairly comprehensive account of the biology and identification of species.

Production of these kinds of publications inevitably involves more effort, with the writing of text, and the finance to publish a full-scale book, and therefore may be more appropriate as a planned product of a funded survey, although the second of these examples was produced through the UK BRC as part of its normal publication programme, but in this case supported by the Centre for Ecology & Hydrology as part of its outreach work.

If such a publication is intended, it is usually important to have a proper publication plan, agreed with a publisher. More attention to details, such as creation of good quality indexes, sourcing of illustrations, and copy-editing may all be necessary.

Analytical accounts

Larger scale publications aimed at a scientific community may be appropriate, and some of these sorts of publications can also be appropriate for wider audiences, if they concern a particularly important or charismatic group. A good example is the *Millennium atlas of butterflies in Britain & Ireland*, which included detailed analysis of the data stemming from a major funded project, alongside standard taxonomic descriptions and distribution maps. The result was a publication of seminal importance in identifying issues concerning butterflies, as well as an attractive book for a broad readership.

This kind of book, in addition to the considerations relevant to other publications, listed above, may also require attention to the needs for advice on statistical analysis, as well as expertise in the presentation of computer-generated data.

Inventories

Local floras and faunas mainly fall into this group of publications, along with some national or UK-wide publications focusing on accounts of species occurrence, sometimes limited to specific habitats. Atlas maps may be a major or smaller part of such publications (occasionally lacking altogether).

The audience for this kind of publication needs careful consideration before commitments are made to fund them, as they may be of limited general interest and therefore limited potential sale. Sources of funding may also need to be specifically considered as a result, possibly including local sponsorship or grant funded from charitable bodies, local authorities etc.

Interpretative publications

This is not the place to go into detail about the development of educational programmes by societies and recording organisations, but it is worth highlighting that an increasingly important part of many larger societies' work is often education of one form or another. This may be both for children and interested adults. The use of biological record data in these should not be overlooked, as the presentation of results from existing work is a valuable tool for encouraging new recruits. It can also demonstrate to the wider public the extent of work an organisation is involved in very clearly, as well as being used for gaining resources for further work.

The resources needed to produce interpretative material are often quite large, given the need for high-quality design and production if they are to be successful. There may be a number of organisations that can assist smaller bodies to produce this sort of publication, such as:



Example of a high quality interpretative publication for gaining support for a recording project

- Field Studies Council.
- Local wildlife trusts.
- Large biodiversity organisations with related interests, e.g. RSPB, Buglife.
- Environmental studies organisations.
- Local authorities, if they have countryside sections, or run country parks etc.
- National Park authorities.
- Museums.
- Local records centres.

E-publishing

Apart from paper-based publications of all kinds, some organisations have recently published some or all of their data electronically. A product which has become popular for this is the data CD, often issued alongside a published book, holding either the basic data on which the book's maps are produced, or extra maps etc. not included in the publication, e.g. the Botanical Society of the British Isles *New Atlas of the British & Irish Flora*. Occasionally, data are issued solely as a stand-alone CD, such as one issued for free by the Hoverfly Recording Scheme in 2002, which enabled users to have direct access to all of the scheme's then current data. Production of these CDs (or DVDs etc.) may also require planning for commercial production and publication, including attention to details such as copy protection and licensing.

8. Glossary of Terms

The following are definitions/explanations of most of the more specialised terms used in the handbook



Image © Trevor James

Aggregate: (*of species*)

a group of closely-related *taxa*, often difficult to distinguish, which may be treated as a single entity, especially for field recording purposes.

Attribute(s): (*of records*)

any other precise information associated with a basic record of a *taxon* at a place, at a time, recorded by a person.

Autecology:

study of the relationship between an individual *taxon* and its natural environment.

BAP:

acronym of a Biodiversity Action Plan for the conservation of species or habitats.

Biotope:

a more-or-less uniform broad-scale natural environment within which *taxa* occur.

Critical species/groups:

individual species (or other *taxa*) or groups of species that are particularly difficult to identify, usually requiring confirmation through the naming and retention of a voucher specimen by an expert.

DAFOR system:

(*of abundance measurement*)
an acronym derived from the terms used to define estimated abundance of biological *taxa* within a defined area: dominant, abundant, frequent, occasional, rare.

Data access policy:

(*relating to biodiversity data*)
a publicly available document outlining the basis upon which sectors of the public will be granted access to biodiversity data by a data provider.

Data use agreement:

a formal agreement between two or more bodies as to their mutual receipt and use of biodiversity data.

Determination:

(*of biological specimens*)
the formal allocation of a taxon name to a particular biological specimen, often by a taxonomic expert.

DINTY recording system:

an alpha-numeric notation system used to identify individual 'tetrads' within an Ordnance Survey 10km square.

DOMIN scale: (*of abundance*)

a system of abundance measurement of biological individuals using pre-defined bands, based on a scale of percentage frequencies within a sample.

NBN Gateway:

(*of the National Biodiversity Network*)
the internet website and data sharing system freely available to NBN partners for disseminating biodiversity data in the UK.

GIS:

geographical information system(s)
software that enables geographical spatial information to be integrated using digital mapping tools.

Habitat:

the co-occurring features of the natural environment which a *taxon* normally inhabits.

Indicia:

a NBN-developed web toolkit for setting up tailored online recording systems, using open-access software, developed under the OPAL Project.

iSpot:

web-based interactive system developed by the Open University under the OPAL Project to engage new recruits to biological recording through identification of species from photos submitted online, using peer review and mentoring.

Local records centre:

an organisation whose function is to collect, collate, manage and disseminate data and other information relating to the natural environment of a defined geographical area within the country. Often run through a partnership of different interested parties.

Glossary of Terms

Metadata:

structured information concerning various characteristics of a dataset. Often defined according to a metadata standard.

Micro-habitat:

the precise environmental characteristics of a location occupied by an individual of a biological *taxon*.

Monad:

a single 1km Ordnance Survey grid square, used for biological recording or sampling purposes.

Monitoring: (of biodiversity)

the continuous or regular observation of the activities or performance of individuals of a species, or of habitat parcels in specific localities.

NBN:

the National Biodiversity Network, comprising all bodies and individuals in the UK that take part in biodiversity data sharing activities in accordance with the published NBN data exchange principles. Overseen by the NBN Trust.

Online recording:

Internet-based systems for submitting biodiversity records direct to remote databases operated by another organisation.

OPAL:

The Op[en]-A[ir] L[aboratories] Project, a Big Lottery funded project led by Imperial College, London, and involving multiple partners, that worked from 2007-2012 to increase public involvement with their environment. Included a number of biodiversity-related activities and projects, including development of iSpot and the NBN Trust's Indicia online recording toolkit.

Pentad:

a quarter sub-division of an Ordnance Survey 10km. square, used for biological recording or sampling purposes.

Point quadrat:

a biodiversity sampling tool with a number of 'pins' arranged in a measured row along a bar, used to count the number of individuals contacted of different (usually plant) species at a selected sample point.

Priority species:

species identified by the UK Conservation Agencies through the BAP process as specifically of conservation concern. Replaces earlier terms, such as 'Species of Conservation Concern' or 'Red List'

Provenance: (of a record or set of records)

the documented source and subsequent pathway of transmission of a record or set of records.

Quadrat:

a standard sample area, usually defined by a square of fixed size. Also, the practical tool used to define these.

Random sample:

a sample whose location has been determined by a random numerical allocation, usually performed with a computer algorithm.

Resolution: (of a biological record)

the level of geographical precision of the depiction of a biological record, based on the Ordnance Survey grid. May be at 10km (or larger), 5km, 2km, 1km or full (usually 6-figure) grid reference.

Sample: (of recording)

a collection of individual records and/or specimens of biological taxa and associated information, collected at the same locality at the same date/time by the same person.

Sensitive: (of biodiversity data)

biodiversity data relating to taxa or habitats that have been identified using defined criteria as being vulnerable to damage or loss if made widely known to the public. May also relate to data whose onward transmission to third parties may cause other problems of future data supply, or that have other restrictions on their dissemination.

Species Dictionary: (NBN)

the electronic name-server that collates taxonomic lists and enables synonymy between them to be matched automatically in the NBN Gateway and biodiversity database software.

Surveillance: (of biodiversity)

the focused repeat sampling of overall populations or groups of particular species in order to assess general changes over time.

Taxa/taxon:

group(s) of genetically distinct biological individuals, often forming a species, subspecies or named variety, but also including clones or hybrids or higher groupings such as families.

Tetrad:

a group of four contiguous 1km Ordnance Survey grid squares forming a square, used for biological recording and sampling purposes.

Transect: (for recording)

a measured linear route over a pre-determined distance, along which the occurrence of *taxa* are recorded for sampling purposes. Also the results from a recording operation using this method.

Validation:

the often automated checking of transcribed details of a record from an original source.

Verification:

the checking of the accuracy of the identification of things (*taxa* or other features) being recorded.

Vice-county:

standard division of Britain (and later Ireland), based on the administrative counties as they were at 1852, introduced through the Botanical Exchange Club by Hewett Cottrell Watson, and used for both recording purposes and documenting species distribution.

Voucher: (biological specimen)

a sample of a taxon retained for identification or confirmation purposes that is permanently preserved for future reference.

9. Contacts and Links

The following list of Web-addresses etc. is intended to help users find relevant material mentioned in the text, or to contact organisations that may have been mentioned. It is not a comprehensive list of societies, recording schemes etc.

Aditsite database software:

www.aditsite.co.uk

Amateur Entomologists' Society:

www.amentsoc.org

Bat Conservation Trust (BCT):

www.bats.org.uk

Bees Wasps & Ants Recording Society (BWARS):

www.bwars.com

Big Lottery Fund:

www.biglotteryfund.org.uk

Biological Records Centre (UK BRC):

www.brc.ac.uk

Botanical Society of the British Isles (BSBI):

www.bsbi.org.uk

British Birds Rarities Committee:

www.bbrc.org.uk

British Dragonfly Society (BDS):

www.dragonflysoc.org.uk

British Entomological & Natural History Society (BENHS):

www.benhs.org.uk

British Lichen Society (BLS):

www.thebls.org.uk

British Myriapod & Isopod Group (BMIG):

www.bmig.org.uk

British Trust for Ornithology (BTO):

www.bto.org

Buglife:

www.buglife.org.uk

Butterfly Conservation (BC):

www.butterfly-conservation.org

Charity Commission:

www.charity-commission.gov.uk

Coleopterist website:

www.coleopterist.org.uk

Dipterists Forum:

www.dipteristsforum.org.uk

DMAP: distribution mapping software:

www.dmap.co.uk

Esmée Fairbairn Foundation:

www.esmeefairbairn.org.uk

Field Studies Council (FSC):

www.field-studies-council.org

Freshwater Biological Association (FBA):

www.fba.org.uk

Global Biodiversity Information Facility (GBIF):

www.gbif.org

Greenspace Information for Greater London (GiGL):

www.gigl.org.uk

Hampshire Biodiversity Information Centre (HBIC):

www.hants.gov.uk/biodiversity/hbic

Heritage Lottery Fund:

www.hlf.org.uk/English

Herpetological Conservation Trust (HCT):

www.herpconstrust.org.uk

Het News website:

www.hetnews.org.uk

Hoverfly Recording Scheme:

www.hoverfly.org.uk

Information Commissioner's Office:

www.ico.gov.uk

Institute of Ecology & Environmental Management (IEEM):

www.ieem.org.uk

iSpot:

www.ispot.org.uk

John Ellerman Foundation:

www.ellerman.org.uk

Joint Committee for the Conservation of British Insects (JCCBI): details at:

www.royensoc.co.uk/InvLink/Index.html

Ladybird Recording Scheme:

www.ladybird-survey.org

Linnean Society of London:

www.linnean.org

Mammal Society:

www.mammal.org.uk

MapMate database:

www.mapmate.co.uk

National Amphibian & Reptile Recording Scheme (NARRS):

www.narrs.org.uk

National Biodiversity Network (NBN) and NBN Gateway:

www.nbn.org.uk

Natural History Museum, London:

www.nhm.ac.uk

Open Air Laboratories Project - OPAL

www.opalexplornature.org.uk

(ceases to exist as a project after 2012)

Oxford University Museum of Natural History:

www.oum.ox.ac.uk

Recorder database:

<http://jncc.defra.gov.uk/default.aspx?page=4592>

Riverfly Group:

www.brc.ac.uk/schemes/CAMSTARS/homepage.htm

Royal Botanic Gardens, Edinburgh:

www.rbge.org.uk

Royal Botanic Gardens, Kew:

www.kew.org

Royal Entomological Society (RES):

www.royensoc.co.uk

Royal Society for the Protection of Birds (RSPB):

www.rspb.org.uk

Tracking Mammals Partnership (TMP):

<http://jncc.defra.gov.uk/page-1757>

nbn.org.uk

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