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Biological recording in the Highlands and Islands: strategy and proposals

Compiled from reports by Ian M Evans & Lorraine Mann

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REPORT

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CONTENTS

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Highlands and Islands, Highland, Western Isles, Orkney, Shetland, Argyll & Bute, Arran, Biological Recording, Local Records Centres, Networking.

Notes:

1. In this document the following convention is used. Recorder(s) in plain type refers to the individual(s) who make observations and thus create biological records. *Recorder* (in italics) refers to the software commonly used to manage biological records.

2. A wide variety of descriptive names have been used for organisations which manage biological records. In this document the term 'local records centre' is used as a generic name for such organisations.

1. ABSTRACT

1. The Highlands and Islands are a large, comparatively remote, geographically-dispersed area with a relatively sparse population. Information about biodiversity exists, but it is very patchy and, in many cases, its scope and extent is unknown to all but its originators. Only a small proportion of this information is held on computer.

2. Considerable demand for biological information exists in the area, from public bodies, private developers, educational bodies, tourists, and the general public. Meeting these needs would contribute to economic and social development (e.g. tourism and education).

3. Local Records Centres do not adequately cover the area, and where they do exist, they are understaffed and under-funded.

4. Initiatives scattered across the area show how the effectiveness of biological recording might be substantially improved, if a co-ordinated Highlands and Islands programme were developed. Current national initiatives and the availability of new information technology can assist this.

5. A vital part of this exercise will be to maximise the involvement of local naturalists and the general public as contributors and participants.

2. KEY PROPOSALS

1. A three to five year programme for a Highlands and Islands Local Records Centres network should be established under the direction of a partnership group including Local Authorities, Scottish Natural Heritage (SNH), Scottish Environment Protection agency (SEPA), University of the Highlands and Islands (UHI), non-governmental organisations (NGOs) and representatives of the biological recording and business communities.

2. The programme should aim to establish a network focussed on five new or enhanced LRCs, comprising Shetland Isles, Orkney Islands, Western Isles, Highland, and Argyll. The programme should also ensure that network services and co-ordination are provided.

3. The programme should consist of four themes:

   - support to Local Records Centres and recorders
   - development of a Highlands and Islands network, including provision of some services to Local Records Centres
   - development of products to meet user demand, utilising basic record data
   - integration or linkage with data held in national and regional data sets.

   It is anticipated that these proposals will cost approximately £4-500k over three years. Of this, up to 50% could be sought from EC Objective 1 funds. The remainder would need to be raised by public and private sector partners.

2.1 Local Records Centres

Shetland, Orkney, Argyll, Western Isles, and Highland Council areas should each have one lead centre. In some areas there could be additional linked centres run by voluntary or other bodies, perhaps with a particular local or specialist role. The lead centres would build on existing provision in Highland and Orkney, though in the other areas new centres will be required. The rate at which this can be done will depend on the wishes of the local partners, particularly the relevant local authority. The programme should be designed to support these developments when the time is ripe, so long as initial start up can be completed within the funding period.

LRCs should have at least one full time member of staff, premises where the public can access information, facilities for volunteer recorders, IT equipment and communications, and in many cases space for collections of voucher material. The LRC staff would be responsible for support to volunteer recorders, through training and other development programmes which will be assisted through the Highlands and Islands network.

2.2 A Highlands and Islands Network Hub

A network hub could provide central services, and act with national and regional bodies on behalf of the Local Centres. It would establish generic training and development programmes which can be implemented locally through the Local Centres. It would hold and manage some regional data sets, and may organise data capture work to reduce costs to Local Centres. Local Centres will exchange information with the network mainly using IT facilities, probably via the Internet. The network hub will also co-ordinate the survey activity undertaken locally, and seek to maximise the consistency and coverage of priority subjects. The hub will provide advice on standards, IT applications, issues peculiar to the Highlands and Islands, and act as a lobby for funding and support on behalf of the whole network.

The network hub is likely to require a staff of at least two, and it could be co-located with a local centre, or with a separate organisation. This should be decided at an early stage of programme planning.

2.3 Biological Information Products

Information is more likely to be used if it is packaged in ways in which the users can understand. Products, such as information designed for schools, or targeted at tourists, should therefore be developed from the basic data held by the network. Local Centres may respond to local needs, or the network hub may act on a regional basis to develop a particular product. The programme should include an initial trial of products which can then be expanded in collaboration with users. Additional funding from outwith the programme will normally be required to turn the basic data held by the network into a user-friendly product, but the improved access to the data will greatly reduce these costs.

2.4 National and Regional Data Links

Access to information held at regional or national levels will be needed. The network hub must organise links with relevant data holding bodies such as the national Biological Records Centre and Recording Schemes. Some work under the programme may be required to organise existing data sets or capture them in databases.

2.5 Other developments

The final programme may include additional elements to enhance any or all of the above themes, depending on partner views and the availability of resources. One particular opportunity to explore would be the linkage of Local Authority remote information access points to products developed through the LRC.

3. INTRODUCTION

In January 1997 a group consisting of staff from Scottish Natural Heritage (SNH), Biological Recording in Scotland Campaign (BRISC), Highland Council (HC), Scottish Wildlife Trust (SWT) and the Convention of Scottish Local Authorities (CoSLA) met to discuss the potential for developing Local Records Centres (LRCs) in the Highlands and Islands in the light of a national bid for funding to the Millennium Commission, and the potential availability of funding from the European Regional Development Fund (ERDF) under the Objective 1 status of the region.

Two consultants were recruited in late January, with funding provided by SNH, to prepare proposals for a more detailed programme of action, including drafting an initial submission for Objective 1 funding, originally by 4 April 1997.

However, it was ascertained, shortly after the consultants had been engaged, that:

a) the application to the Millennium Commission for funding for development of biological recording across the UK had not been successful[1];
b) submissions for Objective 1 funding had been postponed until later in the year.

These developments reduced the potential availability of funding and delayed the time scale of the exercise.

This report was circulated in draft form at the end of February 1997, and the version that follows incorporates comments received. The report was used as background information to aid the production of Objective 1 bids for funding for Local Records Centres covering Orkney and Shetland. A further update and editing process was undertaken in mid 1998 as the report was prepared for publication.

3.1 Purpose

The purpose of the report is to

1. state the basic aims of biological recording;
2. describe how, in what form, and by whom, biological records are gathered;
3. describe the particular challenges of biological recording in the Highlands and Islands;
4. review sources of information and the state of biological recording;
5. suggest a strategy for the strengthening of existing biological record centres and their networks of contributors, and establishing new ones where they do not exist;
6. provide suggestions for a programme of development of their activities, if additional funding can be made available.

The area to which the report refers is that eligible for European Community (EC) Objective 1 funding i.e. Shetland Isles, Orkney Islands, Western Isles, Highland, Argyll and Bute (with all the southern Inner Isles), Arran and the Cumbraes.

3.2 Perspective

The significant and continuing contribution to biological recording in the U.K. of amateur naturalists is generally acknowledged (e.g. as the source of between 70 and 90% of existing species records).

[1] Subsequent note - The consortium backing the development of the National Biodiversity Network (NBN) subsequently redefined the project and prepared an application for funding by the Heritage Lottery Fund.

However, much of the recent discussion on the future development of recording, having acknowledged this contribution, rapidly moves on to questions of the information requirements of a variety of organisational users, at national or regional levels, to the management of data, and to the needs of those entrusted with interpreting such data to the 'general public' (including amateur naturalists).

An essential element in improving the effectiveness of biological recording, particularly in the Highlands and Islands, will be to involve as many people as possible in the gathering of information, at as local a level as possible.

The key to success at grassroots level is the development of personal relationships, between key individuals in the local community, whether land managers, countryside rangers, teachers or amateur naturalists, and the wider public in their area.

These key individuals must be able to relate to the staff of local record centres and, through them, to other professionals involved in the collection and management of data. The staff of biological record centres have a pivotal role in this regard.

4. BIOLOGICAL RECORDING: WHY?

Before reviewing the state of recording in the Highlands and Islands, and setting out ideas for its development, it may be as well to remind ourselves of its basic purpose.

As defined by the Co-ordinating Commission for Biological Recording in 1995, biological recording is:

> *'the collection, collation, storage, dissemination and interpretation of information, both in space and time, concerning kinds and numbers of wildlife, assemblages of organisms, and their biotopes, especially when the records are related to localised sites'*

As such, biological recording contributes towards the quality of life in four ways.

1. Environment. Biological records are an essential part of the information on which individuals, communities and organisations may base informed judgements about environmental issues, whether local, national or global.

2. Education. Personal involvement in biological recording is a powerful educational tool. It requires hands-on experience and promotes understanding of the environment, at all ages, both within and beyond the formal educational system.

3. Enjoyment. Our countryside and its wildlife are of major recreational interest. Some of those with this interest find additional enjoyment in noting and recording wildlife.

4. Economics. Visitors make a major contribution to the economy of the Highlands and Islands. Their enjoyment may be enhanced by information on the places they visit, in particular contact with people who know their locality and its wildlife. Effective communication and interpretation of all kinds depends on ready access to good up-to-date information, which biological recording helps to supply. Visitors who enjoy themselves are likely to stay longer and return.

5. BIOLOGICAL RECORDING: HOW AND WHO?

There are, essentially, two complementary and overlapping approaches to terrestrial biological recording. Marine recording and monitoring are here seen as special cases.

5.1 Area-based recording

This involves the mapping of plant and animal communities/habitats/biotopes. Information may be derived by remote-sensing (e.g. satellite images and aerial photographs), or ground level surveys (e.g. National Vegetation Classification (NVC) and 'Phase 1'). The purpose of the ground level surveys may be to generate primary data or to 'ground-truth' data derived from remote-sensing.

The level of identification skills involved in such work varies, but it requires at least the recognition of key components of the communities. Much of this work is undertaken by professionals, but there is a role for amateurs, particularly at the local level (e.g. SWT sites scheme).

A useful product of this type of recording is an alert map showing the location, boundaries, type and, often, level of interest of all sites of biological, ecological (and geological) significance in an area.

Information of this type is most effectively stored on Geographical Information Systems (GIS), of which a variety are in place or being developed in the Highlands and Islands (by Highland Council (HC), SNH, Forestry Authority and others).

5.2 Grid-based recording

This is often loosely referred to as 'species recording' and involves the recording of the presence/abundance/habitat/associations of particular taxa of plants and animals in units of the National Grid, ranging from 10m. squares (conventionally referred to as an eight figure grid reference), through 100m., one, two, and five km. to 10 km. squares (two figure grid reference). At the local level, six-figure grid references are the most frequently-used method of 'pinpointing' locations; at the national level some mapping schemes only record presence or absence, for all but the rarest species, at 10 km. square level.

This approach to recording is often combined with site or area-based recording, in Phase 1 and site surveys, in the form of 'target notes' which detail significant taxa or assemblages of taxa from a defined site with a nominal grid reference. From data obtained in this way the significance of the presence of a species at a site may be put into a local, regional or national context.

The gathering of species distributional data is largely the preserve of amateur naturalists. Information of this type is most effectively stored in relational databases, of which *Recorder* is becoming the most widely-used.

5.3 Marine recording

Recording in and at the edge of the sea poses special problems, and the methodology is perhaps best exemplified by that carried out for the Marine Nature Conservation Review (MNCR). It combines elements of both area-based and grid based recording, proceeding from an assessment of major habitats, through communities defined by conspicuous species, to individual significant features or species.

Most of the work for the MNCR was carried out by professional marine biologists, but amateurs, especially divers, have made a contribution through programmes such as Seasearch and Oceanwatch.

5.4 Monitoring

All biological recording specifies the time at which data was collected. Repeat visits to a locality, using a standardised recording techniques for the assessment of the extent of a community or size of the population of a species, allow the monitoring of change in distribution or numbers and the assessment of the relationship of such changes in distribution or numbers to changes in the environment. Examples are butterfly monitoring transects, the Common Bird Census and its successor, the Breeding Bird Survey. These aspects of recording are carried out by both professionals and amateurs.

6. THE CHALLENGES

An examination of the state of biological recording in the Highlands and Islands must take into account the characteristics of the area, particularly its size, geography and sparse population.

6.1 Size of the Area

This report relates to areas within the boundaries of six local government authorities, from north to south: Shetland Isles, Orkney Isles, Western Isles, Highland, Argyll and Bute and parts of Ayr (Arran and the Cumbraes).

To give some indication of overall size, the distance from Muckle Flugga to the Mull of Kintyre is about 680 km. (420 miles), equivalent to that from Inverness to London.

6.2 Population base

As an example, Highland covers some 25,000 sq. km. (10,000 sq. miles), and stretches about 300 km. (190 miles) from Duncansby Head to the Sound of Mull. Substantial parts are more than 10 km. from any public road. The population is about 208,000, of which some 50,000 live in and around Inverness, and a majority of the rest on the eastern seaboard north of Inverness. Parts of Highlands are very sparsely populated, for example, the former county of Sutherland with an area of over 5,000 sq. km. (2,000 sq. miles) has a population of under 13,000 people.

It is estimated that half a percent of the resident population are sufficiently interested in wildlife to belong to a relevant organisation, national or local (discounting those who are professionally involved). Of this number, perhaps 10% may be expected to make an active contribution to biological recording.

This amounts to 100 recorders for Highland, or 1 per 250 sq. km., the majority of whom live on its eastern seaboard. The potential amateur work-force is both small and concentrated in one part of the area, which makes for considerable problems of coverage, communication and the co-ordination of recording. The figure of 100 active naturalists corresponds fairly precisely to the individual membership of the Highland Biological Recording Group (HBRG). In contrast, an English county with a population of 1,000,000 might be expected to muster about 500 active naturalists in an area of perhaps 2,500 sq. km., i.e. 1 per 5 sq. km.

Biological recording in Argyll and Bute also suffers from problems of size and remoteness. Parts of mainland Argyll are as remote from centres of population as any in Highland, and the islands have some of the advantages and problems of those further to the north, ameliorated by their greater proximity to the population concentrations in the central belt of Scotland.

Arran and other islands in the Clyde are in a more advantageous position so far as accessibility is concerned.

6.3 Repatriation of data from visitors

The lack of resident recorders throughout the Highlands and islands is offset, to some extent, by the attractiveness of the area to visitors, a proportion of whom may be expected to have a particular interest in the landscape and the wildlife it supports. Islands are a special case of this attractiveness to visitors, since their separateness and remoteness has always interested and appealed to naturalists. However only a small proportion of these visitors undertake any active recording on their visits, and unless they are specifically engaged in a

nationwide survey, the data are unlikely to be made available to local biological records centres.

6.4 Other problems

The challenges posed by the geography and demographics of the Highlands and Islands are compounded by a number of other factors.

6.4.1 Computerisation of data

Only a small minority of individuals and organisations concerned with recording are at present using computerised databases. For instance, in 1997 there were only two known personal users of *Recorder* in the Highlands and Islands (in Assynt and Caithness), and eight institutional users, of which three were SNH offices, four were local biological record centres (Orkney, Wick, Inverness and Arran), and one the John Muir Trust (JMT) office on Skye.

This was due, in part, to deficiencies in *Recorder*, which have, for example, prevented until recently the electronic transfer of data between existing users (some Highland butterfly data has been keyboarded three times!). Some individuals and organisations are using other systems (for example Paradox) - the transfer of data between these and *Recorder* is another challenge. Considerable progress has been made in the development of the new version, *Recorder* 2000.

6.4.2 Training opportunities

Even for those that are, or are contemplating, using *Recorder*, there has been a lack of accessible and affordable training. Although excellent training has been provided by for example Fife Nature, this involves a substantial fee and at least a double overnight stay for anyone from Highland or further afield.

6.4.3 Publications outlet

A further deficiency in the Highlands until recently, has been the lack of any recognised journal for the publication of papers and notes on the fauna, flora and ecology of the area. The field clubs in the Orkneys and Western Isles produce excellent journals, but material relating to the Highlands, where it exists, is dispersed throughout a wide range of more specialised and relatively inaccessible journals.

The Highland Biological Recording Group (HBRG) has recently begun to address this deficiency, with the support of Highland Council, by expanding the scope and size of its annual Newsletter. Resources are limited and the Newsletter still has a relatively limited circulation.

7. SOURCES OF INFORMATION

It is easiest to review these in terms of the types of organisations involved in collecting and collating biological records.

The time available for this report did not allow any assessment of the sources of records of inter-tidal and marine communities and organisms, other than to note those gathered in the course of fieldwork for the Marine Nature Conservation Review.

7.1 Individuals

Individuals are known to have substantial amounts of information gathered in the course of personal studies of parts of the Highlands and Islands. Examples are: research into many aspects of the flora, fauna and ecology of Colonsay; a tetrad survey of the flowering plants and ferns of the Sutherland parish of Assynt (see case-study of Assynt); a wide-ranging study of the caddis-flies of the Highlands; extensive bird records from South-west Ross and the Outer Isles; and many more. A proportion of this information is held on computer and summaries of some holdings have been published.

Individuals also function as Recorders for national societies, the best example being the Botanical Society of the British Isles (BSBI), which has an accredited Recorder for all of the 18 vice-counties into which the Highlands and Islands are divided for botanical purposes. Vice-county Recorders look after all the current and past records for their areas, and are responsible for co-ordinating the current mapping for Atlas 2000. They are being encouraged to use *Recorder* for this project, but some have already computerised their records using other programs.

7.2 Field Clubs

Local field clubs often act as a focus for recording in their areas and the resulting records may be held in manual or computerised form. There are general interest field clubs in Assynt, Orkney, South-West Ross, Tain, Ullapool and the Western Isles. Inverness has clubs with more specialised interests, the Highland Geology Club and the Inverness Botany Group, and there is also a Highland Badger Group.

There are, in addition, a number of ornithological groups, such as the Argyll Bird Club and the Shetland Bird Club, many of whose extensive records are held on computer.

7.3 Highland Biological Recording Group

The Highland Biological Recording Group (HBRG) was founded in 1986, with the objective, amongst others, 'to stimulate interest in biological recording in the Highlands, amongst both naturalists and the general public, by promoting and co-ordinating co-operative surveys'. The Group mounts three or more surveys a year (in 1996 the subjects were jellyfish, wasps, stoats and weasels, drinker moths, turkey oaks/oak marble galls) and publishes the results of these surveys in an annual newsletter, produced by Inverness Museum and Art Gallery (now part of Highland Council Cultural and Leisure Services).

The newsletter, which ran to 36 pages in 1996, also carries articles on other aspects of Highland natural history. Membership of the Group stands at 95, of whom 89 are personal members and 6 institutional members. Records from the Group's surveys are held on *Recorder* at the Inverness Museum Records Centre. A booklet entitled 'Biological Recording in the Highlands' issued by the Group in 1993, summarised its activities between 1987 and 1991 (Evans 1993).

7.4 Local Record Centres

7.4.1 Orkney

Orkney Biodiversity Centre was set up in 1974 under the aegis of the Orkney Field Club, which was founded in 1959. About 5,000 records have been entered, using voluntary labour, since 1990, on a system running on Windows. Substantial quantities of information are also held in manual form. *Recorder* was installed in 1995, but is not yet fully operational.

Orkney Field Club publishes a comprehensive summary of recent records, together with articles of more general interest, in an annual Bulletin. There is an excellent account, by Berry (1992) of the development of biological recording in general, and in Orkney in particular, in the Biological Records Supplement to the 1992 Field Club Bulletin.

7.4.2 Inverness Museum

Inverness Museum Records Centre was set up in 1976 at Inverness Museum and Art Gallery, which now forms part of the Cultural and Leisure Services of Highland Council. It is the responsibility of the Assistant Curator (Natural Sciences), who spends about 650 hours per year on this aspect of his work, together with a substantial amount of his own time. Its species database runs on *Recorder* and contains at present some 50,000 records, mostly gathered in the course of surveys organised by the Highland Biological Recording Group, based at the Museum.

The main taxonomic groups represented on the database are insects and mammals. Voucher material gathered in the course of surveys by the Group, organisations such as SNH and individuals, is curated by the Museum, whose natural history study and reference collections number some 35,000 specimens. The Natural Sciences section of the Museum has a comprehensive library of taxonomic works, a good coverage of historical texts, a substantial archive of manuscript natural history material relating to the Highlands and a reasonable selection of specialised journals.

7.4.3 Northern Highlands

The Northern Highlands Biological Records Centre was set up in 1985 as the Caithness LRC. It was transferred in 1994 to Highland Regional Council, and became in 1996 the responsibility of the Cultural and Leisure Services of the Highland Council. It was housed in a building adjoining the Library and Archive Centre at Wick. A large quantity of manual records exist relating to invertebrate surveys of Caithness freshwater and terrestrial habitats made during the period 1985-1991, together with an archive of published and unpublished records relating to Caithness and other parts of the northern Highlands that were put together by a local naturalist. It is not at present staffed and is therefore not operational, but there is a possibility of the one of the Caithness Countryside Rangers being housed in the building in the summer of 1997.

The LRC has *Recorder*, carrying about 2,000 species records, and a good working library. It previously formed a very useful focus for recording and a centre for public enquiries in Caithness, and published 'A Checklist of Caithness Lepidoptera' in 1994.

7.4.4 Skye

The Skye LRC forms part of the Skye Environmental Centre at Broadford, an independent educational and conservation organisation, which also runs wildlife holidays and is the headquarters of a local Watch Group, Otter Watch UK, and the International Otter Survival Fund. Some 2,200 species records are held on computer (Filemaker Pro, run on Windows);

these comprise records of otters from the whole of the Highlands, and local records of bats, cetaceans, other mammals and basking sharks. The current staffing of the Centre does not allow it to take a more active role in general biological recording on Skye, but one of the partners is an active member of HBRG.

7.4.5 Islay

The Islay LRC is part of the Islay Field Centre, set up in 1984 at Port Charlotte by the charitable Islay Natural History Trust. It is run by a part-time employee answering to a local management committee, has accommodation for visiting naturalists and a reference room open to the public. It has a computerised biological database running on Paradox, which contains some 50,000 records, of which more than 70% relate to birds (with an annual increment of 1,000+ records), and the rest to higher plants, fungi and invertebrates. The centre also holds a few uncomputerised records for Jura. Data-entry is by volunteers. The Centre is seeking additional funding to allow visitor access to selected areas of the database and to expand its educational work.

7.4.6 Arran

The National Trust for Scotland (NTS) Ranger Service, based at Brodick Castle, runs a records centre covering Arran. However, due to lack of time, this was not investigated.

7.5 Government Agencies

Most of the information in this category appears to be held by SNH and HC, with some perhaps also held by other organisations such as the Forest Authority and SEPA. Time constraints did not allow any assessment of the geographical or ecological scope of any of these information holdings.

7.6 Non-Governmental Organisations

The Highland Office of the Royal Society for the Protection of Birds (RSPB) has large amounts of information in manual form, and has computerised its records of key species of breeding birds and their nesting sites.

SWT holds comprehensive records of the breeding birds of its Highland reserves, such as Coigach and Handa, together with a fair amount of casual information for those reserves on other animal groups such as mammals, butterflies and dragonflies. Plant records for the reserves are mainly held in the form of target notes derived from vegetation mapping, as also is the case with their Phase 1 surveys, and an older study of 'wildlife sites' in the Oban area. Area-based data from 'phase 1' surveys has also been collected for some parts of the Highlands and Islands.

7.7 Museums

A number of museums other than that at Inverness (see above under Inverness Museum Records Centre) also hold extensive series of biological records for the Highlands and Islands, either in the form of collections, or as archival material, including the personal records of naturalists. An example is Glasgow Museum, which has traditionally covered much of the Highlands. The Natural History Curator compiles an annual round-up of entomological observations for publication in the journal 'Glasgow Naturalist'.

The Department of Natural History of the National Museums of Scotland has extensive collections and supporting archives from the Highlands and Islands. The Initiative for

Scottish Insects is based at the Department and the Scottish Insect Records Index (SIRI) is housed there.

In addition, museum staff are frequently experts in particular groups, for which they may hold records relating to the area under consideration. Examples are: Forres Museum, whose Conservator is an expert on caddis-flies; Inverness Museum, whose naturalist is the Scottish Recorder for plant bugs; and Glasgow Museum, whose Natural History Curator specialises in tipulid flies.

7.8 Recording Schemes

BRISC has records from the area derived from its Scotland-wide surveys, some of which are computerised.

Most records from the Highlands and Islands are held by national mapping schemes housed or serviced by the national Biological Records Centre (BRC) or by national biological societies, such as the BSBI, Conchological Society and Mammal Society. These records have been summarised in a series of national atlases, mapped at the level of 10 km. square, from which a superficial impression may be gained of the extent of recording in the groups they cover. Computer printouts of certain categories of the records of groups such as flowering plants and ferns are available from BRC, but access to the original hard copy is difficult.

8. THE STATE OF BIOLOGICAL RECORDING

8.1 History

Biological recording in the Highlands and Islands dates back over more than two centuries, to the observations of the earliest botanists, for instance the celebrated tour of Thomas Pennant and John Lightfoot in 1772 and the work of George Low on Shetland (1774). Contemporaneous with them was James Robertson, whose tours in 1767-1771 are described in 'A naturalist in the Highlands' (Henderson & Dickson, 1994).

A more general starting point is provided by the accounts of individual parishes in 'The Statistical Account of Scotland' (Sinclair 1790-1798), but this is variable in the quality of observations relating to wildlife. Zoologists were a little later on the scene, one of the first and most notable being William MacGillivray (1796-1852).

Berry (1992) gives a most useful overview of the development of biological recording in the UK as a whole, tracing it from the 17th century works of John Ray right up to the 1988 report of the Linnean Society working party on 'Biological Survey: Need and Network', which he chaired.

The current state of biological recording is best described in terms of the two main approaches to recording.

8.2 Terrestrial, area-based

No attempt was made, in the time available for this report, to make any assessment of the comprehensiveness and contemporaneity of the records relating to the broader landscape or to specific communities/habitats/biotopes across such a large area and held by so many organisations.

Three examples give an impression of the variety and quantity.

- SNH holds extensive records relating to the protected sites. They have commissioned in the past wide-ranging landscape surveys, such as that recently completed on the vegetation of North-West Sutherland. There is also a survey of selected lochs across the Highlands, which has yielded important information on aquatic plant communities, but also contains substantial numbers of species records of aquatic animal life.
- The SWT Phase 1 surveys of Inverness, Nairn and the Black Isle have generated over 1,000 target notes.
- There are also ecological research projects, published and unpublished, by individual post-graduate students and research teams at Aberdeen and other universities, the potential of which has never been fully assessed.

8.3 Terrestrial, grid-based

The quality of the information about the distribution and status of individual species of plants and animals found in the Highlands and Islands varies enormously with the popularity of the group concerned, and, of course, the rarity and conservation significance of individual species.

Since no comprehensive directory of sources of species information exists for the area, a few examples of the levels of cover must suffice.

8.3.1 *'Popular' groups*

There is good overall coverage at the 10 km square level in nation-wide surveys of the most popular groups of plants and animals, such as flowering plants and ferns ('Atlas of the British Flora' (Perring and Walters 1962) published by the BSBI in 1962, with the current Atlas 2000 project to bring it up to date), birds ('Breeding and Wintering Bird Atlases', (Sharrock 1976, Lack 1986) published by the British Trust for Ornithology (BTO), with an ongoing Breeding Bird Survey in a random selection of 1 km squares), and dragonflies (Merritt, Moore and Eversham 1996).

Even in such popular groups, the apparent comprehensiveness of cover, especially in remote areas, sometimes conceals a singular lack of useful detail associated with the original recording cards. This is not the fault of the recorders, since, with the scarcity of resident experts, complete coverage even at 10 km. square level is a major achievement (and was once thought by pessimists to be quite impossible).

However, the summary provided by 10 km distribution maps at national level is often supplemented, in the case of flowering plants and ferns, by local county or vice-county floras, which contain more precise information about the status and distribution of at least the less common species and are backed-up by extensive archives. Recent examples are the 'Flora of the Outer Hebrides' (Pankhurst and Mullin 1991) and 'An Annotated Checklist of the Flowering Plants and Ferns of Main Argyll' (Rothero and Thompson 1994). There are also good local bird lists, such as 'Birds of the Outer Hebrides' (Cunningham 1990).

In less popular groups, or ones that are not so easily surveyed at the nation-wide scale, such as mammals, there may be good overall coverage of key species such as otter and pine marten, which have been the subject of specially-funded surveys. More representative of the general coverage are species such as the pygmy shrew, which although thought to be 'ubiquitous', is recorded from only 10% of the squares in the Highlands (see Figure 1). Similarly, a species of conservation concern such as the water vole, which exists in well-marked but very scattered colonies, is almost certainly under-recorded in those parts of the North-West where it still exists.

8.3.2 *'Specialist' groups*

In some groups which require specialised knowledge there have been strenuous attempts to map the nationwide distribution at 10 km. square level, with varying degrees of success.

Bryophytes and lichens are examples of an apparently good degree of coverage. However, in the introduction to the 'Bryophyte Atlas' (Hill *et al* 1991) it states that although '*much of western Scotland, including Argyll and Westerness is well-covered*'. Nevertheless '*any parts of the Highlands without high mountains are poorly known, including areas of Inverness and Ross*' and '*Caithness and East Sutherland are poorly known*'.

Similarly, although there is good general coverage of lichens, much of the Highlands still has fewer than 100 species records per 10 km. square, which must be on the low side. Even where the coverage at 10 km. square level is adequate, the fraction of the landscape that has been adequately surveyed is small and new discoveries are being made continually, nearly all by visiting experts.

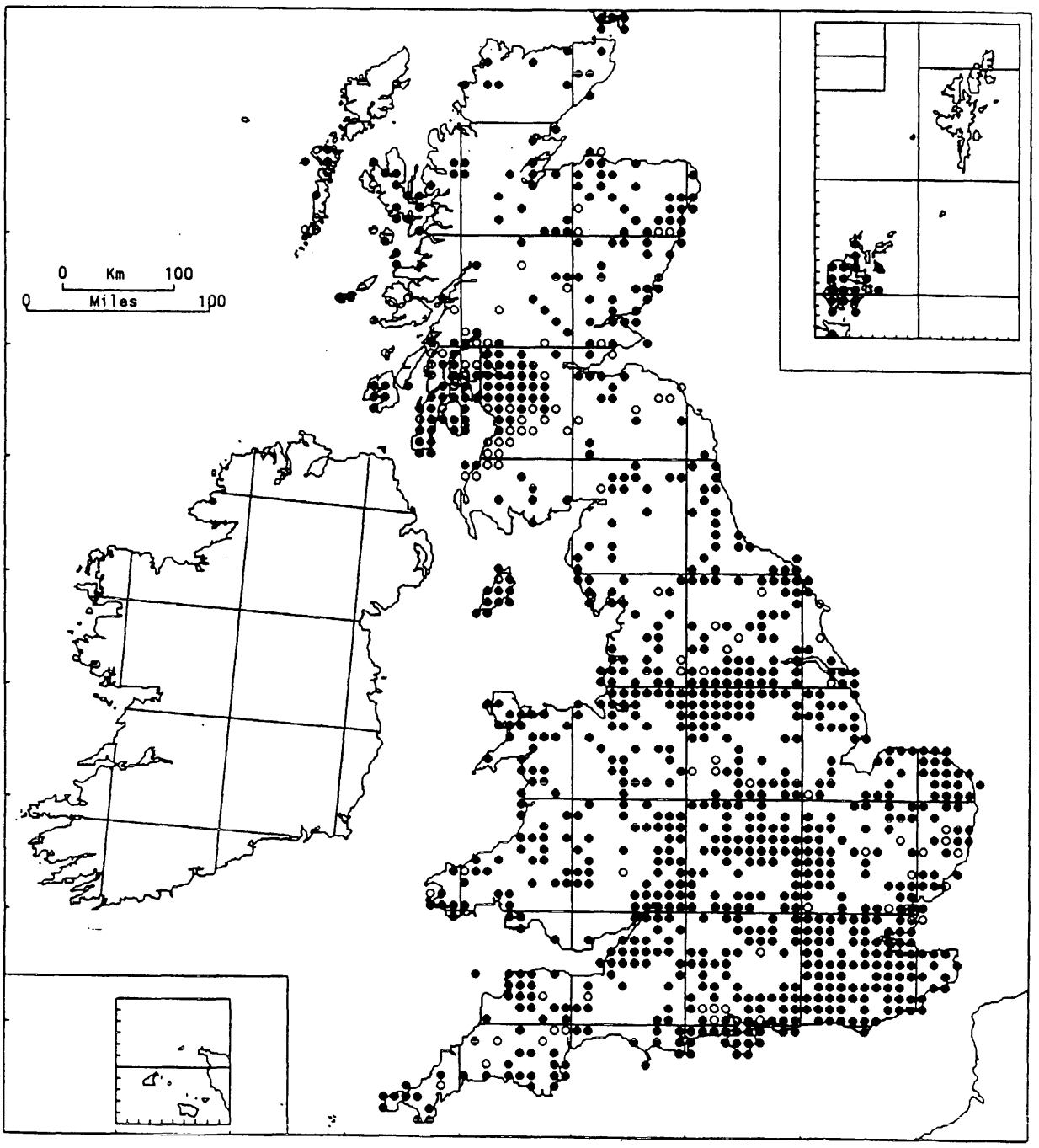
Other groups in this category are even more patchily recorded, if at all, in the Highlands and Islands, as may be seen from the distribution maps of their commonest and most widespread species. Examples are moths (for example the large yellow underwing *Noctua pronuba* (Heath and Emmet 1993), grasshoppers, harvestmen, and selected groups of beetles.

For some major groups, such as most fungi and algae, expertise is so thinly spread that no attempt has ever been made to map their distribution at the 10 km square level.

At the 'regional' level of the Highlands and Islands, there is much to be said for mapping relatively popular groups at 5 km. sq. level, even if species are actually recorded with six-figure grid references. The HBRG, for example customarily maps at this level the results of its surveys, with a supplementary map at 10 km. square level to show the pattern of recording effort (Figure 2).

Figure 1

Pygmy shrew

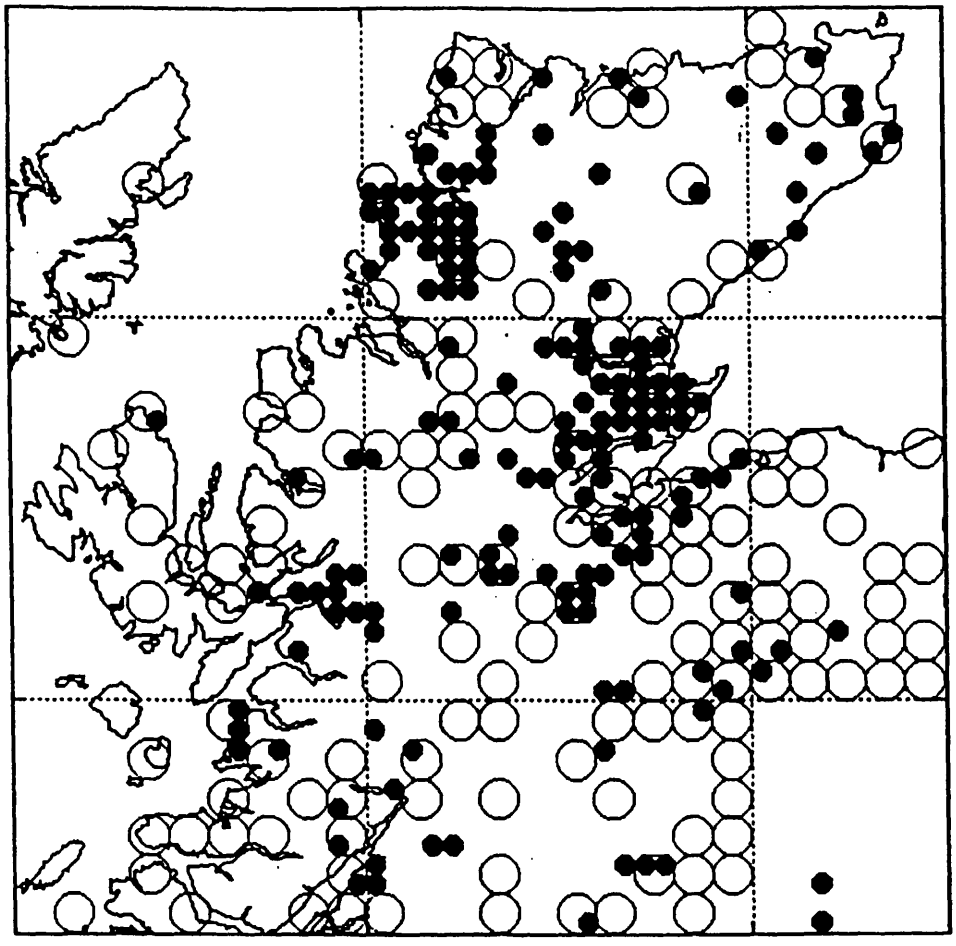


● 1960 onwards (Great Britain 958, Channel Islands 0)

○ Up to 1959 (Great Britain 109, Channel Islands 0)

From: Arnold (1993). *Atlas of mammals in Britain.*
(Reproduced with permission).

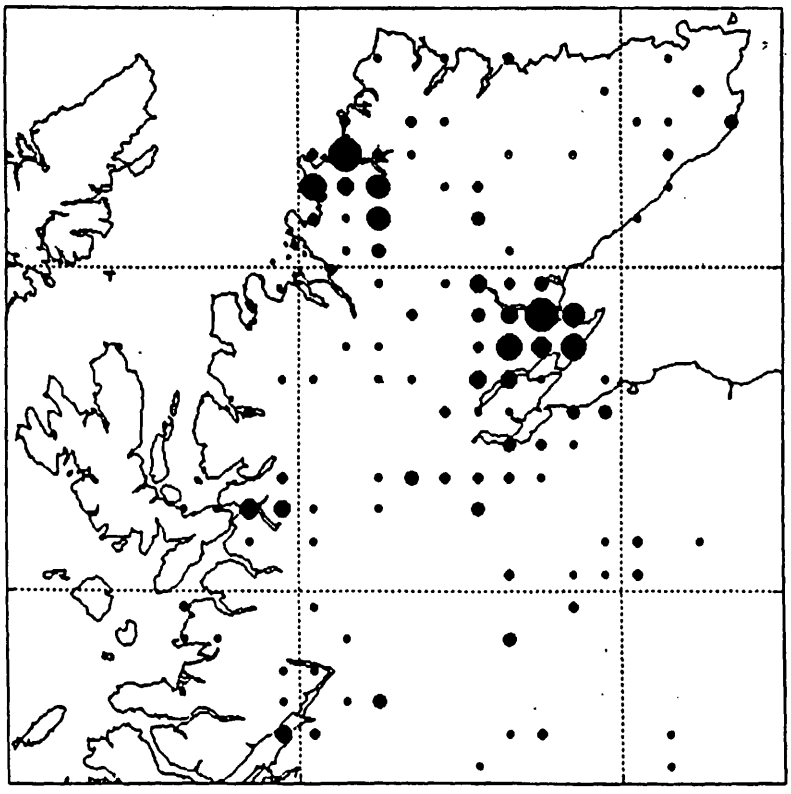
Figure 2



COMMON FROG
Rana temporaria

records from BRC Atlas (Arnold, 1983) 10km squ.

records 1983-1993 5km squ.



records in each 10km square 1 > > > 30

From: Highland Biological Recording Group Newsletter (1994), No 7

The dedicated efforts of one individual, the HBRG butterfly recorder for the Highlands, show what may be achieved at this level of recording. Although the results are still very patchy, he has in six seasons solicited sufficient records for the production of a provisional atlas of Highland butterflies (Stewart, Barbour and Moran 1998), published by HBRG, with help from Butterfly Conservation and others.

At the 'local' level within the Highlands and Islands, the appeal of insularity has been to the great benefit of biological recording in the major island groups, and individual islands elsewhere. The recording of less popular groups is sometimes as patchy as on the mainland, but there have been a number of special studies, symposia and semi-popular works which have greatly improved our perceptions of the state of play and, by highlighting the deficiencies, have encouraged further work in these areas.

Examples are the New Naturalist volumes on Shetland (Berry and Johnston, 1980), Orkney (Berry, 1985) and Hebrides (Boyd & Boyd, 1979), the Symposia volumes of the Royal Society of Edinburgh for the Outer Hebrides (Boyd, 1979) and Inner Hebrides (Boyd and Bowes, 1983) and the unusually comprehensive survey of the flora of Mull undertaken by the Natural History Museum in the 1970s (Jermy and Crabbe, 1978).

There are no such works for the considerably greater area of the Highlands, and finding out what is already known in any particular field is a major challenge for the enthusiastic naturalist coming new to the area, or for visitors.

Recently intensive recording of particular groups has been initiated at an even more local level. Examples are: the tetrad survey of the flowering plants and ferns of Assynt; the recording of the Strathaird Estate on Skye, recently acquired by the John Muir Trust, the plants on which are being mapped at 1 km square level; and a 1 km. square survey of the higher plants of the Black Isle.

8.4 Marine

Lack of time has prevented any assessment of the state of play in this area of the biodiversity of the Highlands and Islands, other than to note that marine algae have been mapped on a national scale by the British Phycological Society and marine molluscs by the Conchological Society.

9. PROPOSALS

A basic principle must be affirmed, that, given competing claims for limited resources, now and in the foreseeable future, we must build on what already exists. This applies both at the level of Local Records Centres and their relationships with the major potential funding organisations, and throughout the network of other organisations and individuals on which such centres depend for their data, down to grassroots level.

It is also as well to remind ourselves that, although Local Records Centres may be seen as 'centres of expertise for collecting, managing and sharing information', their effectiveness is entirely dependent on the quality of their relationships with the individuals, professional or amateur, who provide the records.

9.1 Potential for Partnership Support

It is clear that while constraints on public sector finance poses considerable problems, a Highlands and Islands network of Local Records Centres will be a valuable strategic tool and educational asset. The establishment of a network of Local Records Centres will provide a foundation upon which an increasing proportion of the work undertaken by a variety of agencies, businesses and non-governmental organisations can be built. It is already vital to a number of the functions of organisations in the public sector and is likely to become more so in the future.

There are a huge number of potential uses and users of biological information across the spectrum of public, private and voluntary bodies. Examples include tourists who want to know where to go to watch particular birds, developers whose plans need to take into account impacts on natural vegetation, and teachers and students who rely on local data for environmental studies; all use biological information. In particular, biological records will be fundamental to the development of Area Biodiversity Strategies and Local Agenda 21. These are cross-cutting activities which depend crucially on high-quality information.

The providers of the information are also diverse. Public bodies hold data related to their responsibilities, such as water quality control, nature conservation and game management. Large NGOs also have their own data about their field of interest. Volunteer recorders are especially important through their work in surveying wildlife and contributing to recording schemes and the work of Local Records Centres.

It is clear from the review undertaken that there are problems in organising and gaining access to biological data at the local level, and in the flows of information between those who collect and those who use data. The opportunity now exists to improve on this situation, driven by a combination of national policy commitments under the UK Biodiversity programme, and the requirement of the EC Objective 1 Programme for the region to improve access to environmental information.

9.1.1 Potential partners

The Local Authorities which cover the area in this proposal are:

- Highland Council
- Orkney Islands Council
- Shetland Islands Council
- Comhairle nan Eilean (Western Isles Council)
- Argyll and Bute Council
- North Ayrshire Council
- Moray Council.

The committee and departmental structure of the Local Authorities varies from Council to Council; however, the aspects of local authority work which could be enhanced by access to biological records are: Planning; Development; Land Use; Protective Services; Environmental Services; Education; Culture and Arts; Museums and Libraries; and Leisure and Recreation.

SNH is clearly a key potential partner, both as a provider of information and as a key user of the proposed network. Its ability to respond to requests for advice on its broad remit is linked to the quality and speed of access to information at its disposal. Biological records are of great value both for work on designated sites and species and for putting this work into context in the wider countryside. In addition, the provision of public information to increase awareness and enjoyment of the countryside falls within SNH's remit.

Both the North and West regions of SEPA are involved in the area covered by these proposals. As with SNH, SEPA has both supply side and user requirements for biological records, particularly in relation to pollution issues, waste management and sustainable development.

The University of the Highlands and Islands has a clear interest in biological recording through its Environment and Heritage Faculty (to be based at Thurso), and through the work of the Dunstaffnage Marine Research Laboratory.

Many NGOs, for example RSPB and SWT, require biological information to take their work forward. BRISC has a key role to raise standards of biological recording.

9.1.2 Suggested Partnership Group

To take these proposals forward will require the involvement of a great many interests. A partnership group will be need to be sufficiently large to be representative, and small enough to be manageable.

It is suggested that a core partnership should include representation from:

- Local Authorities
- SNH
- SEPA
- UHI
- SWT
- BRISC
- Tourism
- Business.

Local management groups should be established for each local records centre with input from local naturalists and community membership as appropriate.

9.2 Main local record centres

9.2.1 Location

The geographical realities of the Objective 1 area, together with the pattern of unitary authorities within it, point to a minimum of five separate primary centres. These should be located as follows:

- Shetland
- Orkney
- Western Isles
- Highland
- Argyll and Bute.

The Clyde islands, outwith the Objective 1 parts of Argyll and Bute, require further consideration in the light of other provision in that part of Scotland.

These primary centres should provide a full range of facilities, and their main links will be with the organisations and individuals involved in biological recording in their areas, and other organisations and individuals involved at the Highlands and Islands, Scottish and UK levels.

It is not envisaged that there will need to be large scale movement of information between these primary centres though they may all need to have access to remotely held information at regional or national levels. Some of these data might be held by individual centres on behalf of the others. Similarly, remote access to local data may be needed. In addition, the centres will need to develop common goals and common standards in matters relating to the special circumstances that obtain in the Highlands and Islands, and they could benefit, in particular, from shared information technology expertise (training, servicing and trouble-shooting) located in one of the proposed LRCs. This expertise may have to be provided on a contractual basis at the end of the period of any start-up funding. During the establishment of these centres it may be possible to reduce costs by establishing a common data capture programme across the centres.

The order in which these five primary centres are developed will depend on the circumstances of the areas they serve, in particular existing levels of staffing and funding.

Orkney Isles Council has given its support in principle for an application for Objective 1 funds to appoint a Centre Manager, at least on a temporary basis, and for contract data-entry[2].

Highland Council acquired responsibility, in the recent re-organisation of local government, for both the Inverness Museum LRC and the Northern Highlands LRC at Wick. Both are now administered by their Cultural and Leisure Services Department.

It is at present unclear where a LRC for the Western Isles might be based.

The natural location for a LRC serving mainland Argyll and the southern islands would appear to either in the vicinity of Oban (with its connections to Mull and Colonsay) or of Lochgilphead. The Scottish Association of Marine Science's facility at Dunstaffnage and the Sealife Centre might provide, in the vicinity of Oban, a focus for marine recording. Relationships with The Minches project, which is based at Stornoway and Ullapool, and with work in the Eastern Firths would need to be clarified.

[2] Subsequent note - Orkney Biodiversity Records Centre was successful in bidding for ERDF funds in late 1997. A Memorandum of Agreement between Orkney Islands Council, Orkney Enterprise, SNH, RSPB and Orkney Field Club has been signed, and a local records centre manager has been recruited.

Shetland Biological Records Centre was also successful in bidding for ERDF funds in 1997. A Memorandum of Agreement between Shetland Islands Council, Shetland Isles Enterprise, Shetland Amenity Trust and SNH has been signed, and a local records centre manager has been recruited.

9.2.2 Staffing

The Highlands and Islands Local Records Centres network will require staff resources to initiate the development programme, manage continuing development, and act on behalf of all the centres in relation to external bodies and funders. These resources could be provided by the allocation of specific tasks to individuals in the five primary centres, though the staffing requirement in each would obviously increase as a result. Alternatively, one of the LRCs could act on behalf of the others by taking on these tasks and additional staff to do them. Finally, another organisation within the Highlands and Islands could provide the facilities for dedicated network staff to be located outwith the LRCs, but acting on their behalf. Appropriate levels of administrative, clerical and local IT back-up will also be required.

The partnership group (section 9.1) will need to consider the logistical and economic advantages of these three options and decide between them.

9.2.2.1 Orkney, Shetland, Western Isles

The minimum effective staffing for a LRC in Shetland, Orkney and the Western Isles, at least in the start-up phase, is probably one full-time biological records officer, with funding for contract data-entry. This level of staffing is considerably less than the minimum proposed for a 'lowland' centre in the report of the Co-ordinating Commission for Biological Recording (1995), but it takes into account current funding stringencies and cutbacks, at both local and national level.

9.2.2.2 Argyll & Bute

The same level of provision might be appropriate for that part of Argyll and Bute in the area under consideration, with the proviso that an additional post might be required for any special responsibility for marine recording.

The level of provision appropriate to a LRC serving the Clyde Islands requires further assessment of the role of the existing centre on Arran and its relationship to services provided elsewhere on the adjacent mainland.

9.2.2.3 Highland

Any development of a LRC within Highland should build on the sound foundation already provided at Inverness Museum where the present (part) post has responsibility for the important voucher, study and reference collections and natural history archives, for the scientific content of displays, travelling exhibitions and other interpretative and 'front of house' services provided by the museum. Additional staff resources would be required to fulfil the roles of Centre manager (liaison with other bodies and funding) and Database Co-ordinator.

9.3 Networking and outreach

The five proposed primary LRCs will need to involve recording from as many individuals and organisations as possible. The purpose of this section is to suggest some prime targets for networking and outreach, although the form that co-operation might take will be determined to a large extent by local circumstances.

9.3.1 Existing Records Centres

There are LRCs with a restricted geographical coverage at Wick (Caithness) and Broadford (Skye), Islay and Arran. Those at Wick and on Arran are the responsibility of local authorities, those on Skye and Islay of private and charitable organisations.

The Wick LRC is at present inactive, owing to lack of staff, but given at least part-time staffing (by a Countryside Ranger perhaps), it could be a very useful component of any network set up within Highland, providing an access point for the public of Caithness and concentrating on recording in that former county. There is also the possibility of links with the projected environmental information service at Thurso College (as part of the University of the Highlands and Islands).

Development of the LRC at Broadford would depend on the extent to which the Skye Environmental Centre that houses it might be interested in extending its role in recording on Skye and beyond. At present it seems that the LRC and others actively involved in recording on Skye are all working independently, with their main allegiances at 'regional' level, through HBRG, and to national mapping schemes.

The Islay Field Centre has taken an active role in the gathering and computerisation of bird records for that island, with some Manpower Services Commission funding in the past and continuing reliance on volunteers for data-entry. This is a situation where a modest input of external funding could make very good use of a sound foundation.

9.3.2 Field clubs and other voluntary organisations

Active field clubs and Watch groups cover, at present, only a relatively small proportion of the Highlands and Islands, but where they do exist they can serve as a very useful local focus for biological recording. Their membership is often relatively small and their capacity for serious fund-raising limited. This means that the publicisation and organisation of surveys and the dissemination of the results would put a serious strain on their finances. One of the areas of mutual co-operation that the primary LRCs might explore is a modest degree of assistance with the funding of such work, in return for access to the information generated.

9.3.3 Key individuals:

9.3.3.1 Professional

Area and field officers of national organisations such as SNH and SWT have played a key role in the promotion of those aspects of biological recording related to the responsibilities of their organisations.

In addition, many of them have been and no doubt will continue to be actively engaged in recording in their spare time. However, the proportion of their working time that they can devote to recording, particularly on the broader public front, is seriously restricted.

In Highland, the Countryside Rangers are central to the development of biological recording at the local level in many areas. It is appreciated that this only forms a small part of their responsibilities, and that they will have local priorities relating to the management and interpretation of areas in the vicinity of where they are based. However, they have the great advantage of direct contact, on a daily basis, with the general public, particularly visitors. They also benefit from living in the communities they serve, an advantage shared with the staff of the John Muir Trust's relatively recently acquired properties on Skye and in Sutherland.

9.3.3.2 Amateur

An important role at the local level may be performed, where they exist, by what may be termed 'naturalists in residence'. These may be former professionals or others with an interest in the natural world, who may have retired to the Highlands and Islands. They may be active in the local field club or recorders for national mapping schemes. They have the great advantage, together with some professionals, that they live in and are part of the local community.

They are therefore well-placed to record the casual, but nonetheless often valuable, observations made by members of that community who have a general if unfocussed interest in wildlife, and may be very observant without being knowledgeable. Such observations are particularly important in groups such as mammals, where many records are the product of chance encounters.

The contribution that such 'naturalists-in-residence' make to biological recording may be encouraged by LRCs in a variety of ways. They may well be interested in training courses to enhance their identification skills. It may also be worth considering support for increasing the computing skills of recorders, if as in some cases they are already storing their records on *Recorder* or other systems. They can be given a wider role in the area served by a LRC by being designated the official Recorder for a particular plant or animal group. This works well in Fife, where there are 13 such Recorders, each with *Recorder* on their own personal computer, collecting and feeding into the central data-bank records for their group.

'Naturalists-in-residence' also have a special role in the Highlands and Islands, where much specialised recording is done by visiting experts, whether singly or on organised field meetings by national societies. Here they could act as a contact point for such visitors, employing their knowledge of the local landscape to ensure that the very best use is made of the experts' restricted time.

Such people, like anyone else, thrive on encouragement. The best is knowing that their interest and expertise is being put to good use, but some incentives in the form of assistance with the lease/purchase of computer software or hardware may be appropriate use of funds (the BSBI has already embarked on equipping its vice-county recorders in this way).

9.3.4 Support groups

In Highland, the dispersed nature of the area's rural population poses a particular problem for individuals with an interest in biological recording who are too far distant from anyone else with similar interests to meet on anything but a very occasional basis. Encouraging such individuals is the role of organisations such as the Highland Biological Recording Group. Back-up for this Group has been, in turn, an important part of the role of the Inverness Museum LRC, and should be equally important to any successor.

There is, similarly, but on a wider scale, a important role for BRISC, in ensuring that examples of best practice continue to be brought to the attention of all those involved in biological recording in Scotland, and in extending their accreditation scheme to new centres as they are established.

9.4 Funding

An estimate of the likely costs suggests a total for a 3 year project of £400-500k. This excludes the costs of premises. Judgements about the scale and speed with which the programme can proceed will have to await discussions with potential partners. Fifty per cent of the funding might be available from the Objective 1 Programme, leaving £200-250k, say

£75k p.a., from public agencies and private bodies. It may be possible for some contributions to be made in kind, for example the use of premises and administrative support.

It is harder to identify the longer term costs and funding sources for the network, and it may therefore be better to go for a longer development programme supported by EC funds. This would maximise leverage and at the same time give the network more time to demonstrate its value and place amongst local services. Further discussions with potential partners are required in this area.

10. APPENDICES

10.1 Potential projects

To establish themselves, the five primary LRCs proposed will need rapidly to build up a foundation of significant data-sets and services, reflecting the needs and interests of as many as possible of the contributors to and users of biological records in the areas they serve. Their data holdings and level of service will need to achieve, within the period of any start-up funding, a 'critical mass', after which, hopefully, their utility should be self evident to potential funding bodies.

The projects that follow are examples which relate specifically to Highland, since that is the largest and in many ways the most neglected area, but many of them will be equally relevant to the other areas. They are concerned mainly with priorities for grid-based or 'species' recording, since that is the approach to recording in which the proposed LRCs can make the greatest immediate impact.

The projects have been sorted into two main categories: 'capacity-building' and 'pilot'. The latter are more exploratory in nature, but there is overlap, and some of the 'pilot' projects are already up and running. Within these two main categories, projects have, for convenience, been further split into three stages: collection of data; management of data; and communication of data. Some of the projects have elements of two or three of these stages.

Projects aimed at increasing the involvement in biological recording by both amateur naturalists and by the public at large are a vital element of the work of the existing and projected LRCs. They do not fit tidily into any of these categories, but are perhaps most appropriately included under communication of data, which takes into account the requirement for dialogue involved.

It is suggested that these projects form elements of a three-year programme. The potential role of record centres in holding records of geological sites, particularly those designated as Regionally Important, should also be noted, as should the potential for records centres to act as centres of expertise for all types of environmental data. This might be a longer term aim of the network proposal.

10.1.1 Capacity-building projects

10.1.1.1 Collection of data

1. A directory of all major databases/sources (meta-database) of data on organisms and habitats/biotopes, published and unpublished; ordered by major taxonomic group (down to level of order in insects, for example), habitat/biotope, and geographical scope (down to level of vice-county). To be compiled to the standard required for publication and/or dissemination via the Internet and in such a way that it can be periodically updated.

2. Data capture of the species information from a major survey of a significant biotope, sampled over as wide an area and range of taxonomic groups as possible. A good example would be the SNH Freshwater Loch Survey, from which much of the plant data has already been captured, but none of the faunal data. It also has data on water chemistry and other physical variables. This would provide an opportunity to integrate species data with area-based data on a Geographic Information System (GIS).

3. Data capture of the species information from a an important site managed by SNH, SWT or RSPB. This would involve the development of protocols for the exchange of information with the organisation concerned, the integration of historic information and a preliminary look at the relationship of species data to that relating to management, past and present (e.g. records in the Countryside Management System).

4. Data capture of information relevant to the Highlands and Islands of one of the major data-sets carried by the national Biological Records Centre or a national mapping scheme. This would be a vital exercise in the 'repatriation' of data, and could involve not only that which might be readily captured by electronic means, but also a copy of the primary archive material from which the data-set was derived. Consideration of how the material will be looked after in the long term is essential.

5. Careful thought will have to be given to the *quid pro quo* which might persuade the organisation holding the data to devote the resources of manpower to make it available. The taxonomic group selected should be one that would make a significant contribution to a section in a Highland Red Data Book (see below).

6. Data capture from a wide-ranging monitoring study. An example might be the Common Bird Census held by the BTO, or its successor the Breeding Bird Survey. Here the quid pro quo might be the good offices of the LRC in increasing the rather sparse coverage of the survey in the Highland area.

10.1.1.2 Management of data

1. A forum/partnership group to foster and co-ordinate the future development of recording in the Highlands should be created. The relationship of this forum to the management groups for individual LRC will need to be clear.

2. Investigation with BRISC, SWT and others of the merits of and need for networking data throughout Scotland.

3. Development, in association with the Scottish *Recorder* User Group, of a common methodology for designation of 'sites' within *Recorder*. The broad scale of the landscape of the Highlands does not lend itself to the tidy designation of 'sites', and the few users of *Recorder* in the area have resorted to various systems of 'dummy sites', such as 10 or 2 km. squares. This exercise could usefully lead to closer links between existing institutional and individual *Recorder* users in the Highlands and Islands, and a more widespread use of *Recorder*, especially by individuals.

10.1.1.3 Communication of data/public involvement

1. Production of a Red Data Book for the Highland area. This would be a useful exercise in the integration of data derived from national, 'regional' and local sources.

2. Preparation of specialist check-lists for Highlands. This might be a spin-off of the work involved in the project above.

3. Development, in consultation with LRCs and national mapping schemes/societies, of a network of 'official' Recorders for particular groups in the Highlands. This would allow the preparation of a directory of specialists willing and able to vet material collected by beginners.

4. Documentation of relevant general and specialised literature. This might include extracts from appropriate sections of the meta-database mentioned above.

5. Development of special interest groups (e.g. for those interested in moths).

6. Data-capture and publication of information about three popular animal groups e.g. mammals, herptiles and dragonflies. This should include comparison of different means of disseminating information e.g. published as provisional atlases, popular leaflets, or on the Internet.

10.1.2 Pilot projects

10.1.2.1 Collection of data

1. Data-capture of all readily available information for three pilot areas. Choice of key areas, for the integration of area-based and species data, should involve the greatest possible variety of individuals, communities and organisations. Areas to be about the size of a parish. One area in a well-populated east coast area, with extensive agriculture and some development pressures; the second a sparsely populated west coast area, with tourism as a major source of income and conservation sites of NNR. status. The third area should be one that had substantial marine interest, perhaps an island. In one at least of the pilot areas there should have been minimal recording at the local level. i.e. starting from scratch. Particular attention should be paid to involvement of the formal educational system, at primary level (west coast), secondary level (east coast) and distance-learning facilities, and to means of maintaining a continuing interest in recording.

2. Investigation of the resources required to make Ordnance Survey (OS) maps more readily available, especially for local survey work. The cost of maps, particularly at the very useful scale of 1:10,000, is a major disincentive to individuals and non-statutory organisations wishing to undertake recording in the field.

3. Investigation, for an appropriate taxonomic group, of the means and costs of attracting visiting specialists to key areas for survey.

4. Investigation of the practicality of obtaining global positioning systems for recording in the field and training for amateur naturalists in their use.

5. Investigation of means of encouraging local field clubs to take a more active role in biological recording. To include an assessment of the assistance necessary with organisation of local surveys, data-entry and the publication or other means of the dissemination of results.

10.1.2.2 Management of data

1. Organisation of short training courses in the use of *Recorder* or complementary biological recording systems. At basic or more advanced levels, according to demand.

2. Investigation of the potential for biological recording or the communication of data on the e-mail network that exists in HC schools, other educational institutions and council departments.

3. Investigation of a European dimension to the setting up and functioning of the proposed Highland Environmental Science/Records Centre.

4. Exploration of possible links with the University for the Highlands and Islands, colleges of further education, Farming Forestry and Wildlife Advisory Groups and SEPA.

10.1.2.3 Communication of data/public involvement

1. Assessment and costing of information requirements of a visitor centre manned by Countryside Rangers. To include input into sample range of publications, CD-ROM and other appropriate media, some of which would be interactive. Investigation of role of Rangers in stimulating public interest in recording at the local level.

2. Organisation via HBRG of three - six popular species/species group surveys across the Highlands. These should focus on fostering involvement and developing recording skills amongst the naturalist community and the general public. To include the development of recording packs.

3. Organisation of six identification workshops. Two each year at three levels: introductory, intermediate and advanced - on specific taxonomic groups.

4. Organisation of a workshop on 'how to record your area'. To include elements of Phase 1 and Phase 2 survey and species recording.

5. Investigation of means by which a local community might be encouraged to undertake the survey and assessment of the biodiversity of its own environment. This is a further development of the project above, and would involve both area-based and 'species' recording. It might be of particular interest to a crofting community contemplating a reforesting scheme. It has some affinities with the 'parish map' approach of Common Ground in England, only in this case the appropriate area might be a single township. It could run alongside current initiatives in the recording, particularly in Gaelic-speaking areas of the Highlands, of place-names not shown on the OS maps.

6. Organisation of annual one-day conferences on biological recording themes particularly relevant to Highland. These would be a development of the present HBRG annual meetings.

7. Investigation of economics of up-grading the HBRG Newsletter to 'Highland Naturalist' and of a variety of means of publication, including the Internet.

8. Investigation of the economics of acquiring, equipping, staffing and touring a 'wildlife recording bus'. To be taken out in the spring or summer term to schools in the remoter parts of the Highlands and perhaps also in the main holiday season to visitor 'honey pots'. Activities on tour to include talks to local communities in areas not served by Countryside Ranger service.

10.2 Assynt: a case study in biological recording at the parish level

10.2.1 Location, extent, population

The parish of Assynt is situated in the south-west corner of Sutherland. It stretches 40 km. (25 miles) from the point of Stoer in the North-West to the Cromalt Hills in the south-east and has an area of 474 sq. km. (183 sq. miles) (Figure 3). It ranges in altitude from sea-level, along its extensive western and northern coastlines, to 986 m. (3234 ft.) at the summit of Conival, which is part of the Ben Mor Assynt massif, on its eastern boundary. The well-

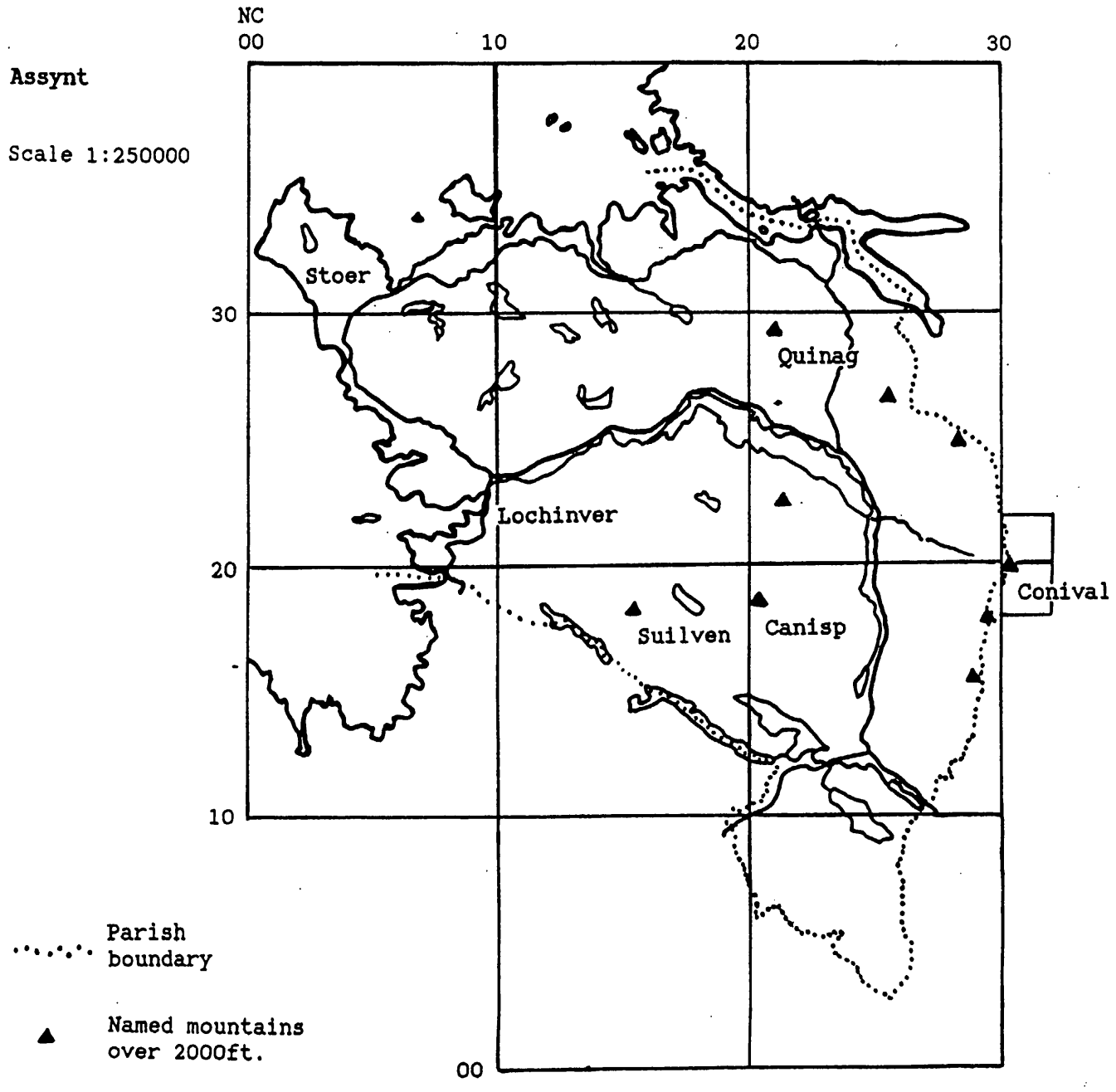
known hills of Quinag, Canisp and Suilven lie within the parish. The underlying rocks include Lewisian gneiss, Torridonian sandstone, Cambrian quartzites and limestones.

The population is about 900, concentrated in small crofting settlements around the western and northern coasts and the fishing port of Lochinver.

10.2.2 Manpower

The parish has an active Field Club, with a mailing list of 100, which holds monthly meetings throughout the winter (with an usual attendance of around 20), and a mixture of field meetings and open meetings (specially suited for visitors) are held in the spring, summer and autumn. The Field Club issues three programmes a year which incorporate seasonal natural history notes. It organises one recording project a year, recent examples being an amphibian survey (1993), Assynt Nature Calendar (phenological observations, 1995 and 1996) and a garden bird survey (1997). Copies of the programmes, with details of current surveys, are reproduced in the local news sheet, the Assynt News; this has resulted in useful publicity throughout the local community for the Field Club's activities.

Figure 3


Assynt
Scale 1:250000
NC
00
10
20
30
Stoer
Quinag
Lochinver
Suilven
Canisp
Conival
Parish boundary
Named mountains over 2000ft.

Those on the mailing list of the Field Club include seven active field naturalists and at least another 30 who contribute to the surveys or occasional observations. The active field naturalists comprise:

- the manager of a local mini-market (an ornithologist with a special interest in raptors, member of SOC and Highland Raptor Study Group);
- a retired husband and wife team of former professional naturalists (general naturalists, with special interests in botany and assorted vertebrate and invertebrate groups);
- a recently appointed Countryside Ranger and his wife (crofters and general naturalists, with special interests in bats and birds);
- a mature student, who has recently completed a zoology course at Aberdeen University (crofter, with special interest in butterflies, moths and dragonflies);
- a crofter (with special interest in ascomycete fungi);
- a consultant who runs an environmental monitoring agency based in Assynt, with a powerful geographical information system.

The more obviously interesting or accessible parts of Assynt have been explored by visiting naturalists for over 200 years, especially its coasts, mountains and limestone areas. This tradition continues.

10.2.3 Current and recent projects in biological recording

Flowering plants and ferns. The retired husband and wife team (under her leadership) started on holiday in 1988 a tetrad-based survey of this group. All but 4 of the 164 tetrads (distributed in 13 10 km. squares) have now been visited at least once and fieldwork should be completed in 1998. 'Common species' (324 in all) are recorded by tetrad, all occurrences of others by six-figure grid reference. Records are stored on *Recorder* (22,000 so far, of which perhaps 90% are of 'common species'), and a voucher collection has been set up. In the course of the survey some 20 species have been added to the known flora of vc. 108 (West Sutherland) and, as an example, the number of known localities for pyramidal bugle *Ajuga pyramidalis*, a nationally scarce species, have increased from 17 to 105. Work on the flora survey has provided opportunities for the casual recording of a wide range of other groups of plants and animals.

Bryophytes. There was a field meeting of the British Bryological Society at Lochinver in 1992, since when the recently-appointed UK Recorder for Mosses has paid regular visits to Assynt to record. He has so far visited and listed bryophytes in 52 one km. squares or tetrads, in ten of the thirteen 10 km. squares. Copies of the record cards and voucher specimens are held in Assynt and the records have been entered into *Recorder*. Some local recording of *Sphagnum* spp. also takes place.

Lichens. A field meeting in 1993 of the British Lichen Society to the North-West Highlands spent two days recording in Assynt. Since that time a member of the Society has visited Assynt on two occasions and has recorded in some seven localities. Further visits are planned, probably concentrating on the lichens of aquatic habitats. Copies of all recent records are held in Assynt, together with voucher specimens and the records will in due course be entered into *Recorder*. There has been extensive casual local recording of the larger corticolous species. Recent research in the parish by Dr. O.L. Gilbert and Alan Fryday has focussed, respectively, on the lichens of aquatic habitats on the limestone and montane habitats.

Fungi. The local mycologist has records of 200+ species of acsomycetes accumulated over some 15 years, mainly from the township in which he lives and neighbouring areas. The records are localised to 1 km. square or six-figure grid reference and held in manual form. It

is intended to put them into *Recorder* when time permits. The only recent systematic records of basidiomycetes are from an Upland Foray organised by the British Mycological Society in 1994, but there are some interesting casual records that have been verified by Dr Roy Watling at the Royal Botanic Gardens, Edinburgh.

Algae. Williamson published 'A survey of the desmid flora of Assynt' (Williamson 1996), which was based on 79 samples collected in the parish in 1993-4. Forty five of the samples were collected by local naturalists in the course of other botanical fieldwork, and the remaining 34 on a visit by the author. Two hundred and ninety one taxa were represented in the samples, some very rare and others newly recorded for the British Isles.

Jellyfish. Fifty one records of four species were contributed by eight members of the Field Club to the 1996 survey by the HBRG.

Molluscs. Some casual recording of land molluscs by a local naturalist has resulted in significant additions to the known distribution in Scotland of three species: *Candidula intersecta, Helix aspersa, Limax cinereoniger.*

Crustaceans. There has been some casual collecting and recording of woodlice, both by local and visiting naturalists.

Spiders. There has been casual recording by a local naturalist of the larger argiopids (including *Araneus patagiatus*) new to Sutherland), a contribution to the HBRG survey of house spiders in the Highlands in 1993-4) and some collecting in montane and other habitats.

Harvestmen. There has been some casual collecting of harvestmen by both local and visiting naturalists.

Centipedes and millipedes. There has been some casual collecting of both groups by both local and visiting naturalists.

Dragonflies. There has been extensive recording by two local naturalists, records being submitted to the Scottish Recorder. There are some 600 records of 10 species in the database, some of which have been entered into *Recorder.*

Grasshoppers and crickets. There has been casual recording of the three resident species by a local naturalist.

Beetles. There has been casual but extensive recording of the larger carabids by a local naturalist, together with some collecting, especially in montane habitats.

Bees, wasps and ants. Twenty four records of four species of wasps were contributed by eight members of the Field Club to the HBRG 1996 survey. Casual collections of ants made by a local naturalist have so far yielded just two species.

Neuropterans. Specimens of some ten species have been submitted by a local naturalist to the naturalist at Inverness Museum.

Fleas. A local naturalist made a start in 1996 collecting material for submission to the national scheme organiser. So far eight collections have yielded six species, one of them new to Sutherland.

Caddis flies. Collections from insect traps in two localities have been made by a local naturalist and submitted to an expert at Forres.

Lepidoptera. Over 500 records of butterflies, contributed by about 15 members of the Field Club, were submitted during 1994-96 to the Highland *Recorder* for this group, via two local naturalists. A moth trap has been run on a regular basis by a local naturalist for the last three years, and less regularly by three other lepidopterists. Over 2500 records are on file, of which 1000 of 150 species have been entered into *Recorder*.

Galls. Extensive casual records of local plant galls have been made by a local naturalist, with special attention to those on oak. *Recorder* does not at the moment have the facility for entry these records, due to the wide taxonomic range of the causative organisms.

Amphibians. The amphibian survey organised by the Field Club in 1993 yielded 148 records of three species from 15 pupils of three local primary schools and 25 local naturalists and vistors. These were all entered into *Recorder* at the Inverness Museum LRC and mapped both for Assynt and as a contribution to the HBRG survey across the Highlands. Casual recording since 1993 has yielded 200+ further records, but these have yet to be assembled from diaries and logs.

Reptiles. More than 50 casual records have been gathered over the last five years by members of the Field Club, but they have yet to be entered into *Recorder*.

Birds. At least four members of the Field Club make regular notes of birds seen, and the accumulated records must run into thousands. One member in particular has monitored bird of prey populations in Assynt for some 10 years, and holds a ringing licence for these and other species. Three members took on responsibility for three local 1 km. squares for the BTO Breeding Bird Survey in 1996. An annotated checklist of the birds of Assynt (Mainland and Evans 1998) has been published by the field club as the first of five projected titles on the local fauna

Mammals. Over 30 members of the Field Club and others have contributed an estimated 500+ records of 24 species of mammals (other than cetaceans) in the last five years. These are mainly casual sightings, with useful contributions by local cat owners and from owl pellets and discarded drinks cans. The records are being assembled with a view to entry into *Recorder* and the production of an annotated checklist.

Cetaceans. A survey of cetaceans was organised by the local Highland Council Ranger in association with the Field Club in 1998. One hundred and twenty nine sightings of 11 species were received and a report published.

10.2.4 Summary

The activities of a Field Club and a small number of resident and visiting naturalists, have resulted in a substantial contribution in about ten years to biological recording in one Highland parish, and in turn to Highland-wide recording schemes.

The resources of expertise available in Assynt are perhaps not typical; it undoubtedly has a particular appeal for visiting naturalists. However, the case study does give some indication of what may be achieved. A particularly gratifying feature has been the increasing contribution made by local people who would not regard themselves as 'naturalists'.

As a matter of policy, the Field Club does not have a formal membership. Its programmes are circulated to anyone who expresses an interest in its activities. Those attending meetings do however pay at the door as a contribution to expenses, and the open meetings in the summer, which have had attendances up to 80, are used for fund-raising. Although it meets its expenses, the Club does not have much money over for publication of the results of its recording activities. This is an area in which some modest financial assistance has

been particularly beneficial. Members would also benefit from the occasional workshop in the use of *Recorder* or the identification of some of the more challenging groups of plants and animals.

10.3 Consultees

Claire Belshaw	University of Aberdeen, Department of Zoology
John Blunt	British Mycological Society, Assynt
Elaine Bullard	Botanical Society of the British Isles; Orkney Field Club
Rob Cannell	Implex Environmental Systems Ltd.
Roger Cottis	Mammal Society of the British Isles, Skye
Colin Crooke	Royal Society for the Protection of Birds, Highland Bird Recorder
George Duff	Highland Council Cultural and Leisure Services, Countryside Section
Paul Gallagher	Scottish Wildlife Trust Habitat Survey Team, Highland Biological Recording Group
Richard Gulliver	Botanical Society of the British Isles vice-county recorder for Colonsay
Jenny Harris	Leicestershire and Rutland Wildlife Trust (Biodiversity Action Plan Audit)
Eva Leck	Joint Nature Conservation Committee (*Recorder)*
John Love	Curracag, Western Isles
David McAllister	Highland Biological Recording Group, Tain District Field Club
David Mellor	Biological Recording In Scotland
Keith Miller	John Muir Trust
Stephen Moran	Inverness Museum Local Records Centre
Brian Neath	South-west Ross Field Club, Highland Biological Recording Group
Catherine Niven	Inverness Museum and Art Gallery
Malcolm Ogilvie	Islay Field Centre and LRC
William Penrice	Fife Nature
Ian Robertson	Highland Council Cultural and Leisure Service Manager for Caithness
Gordon Rothero	British Bryological Society UK Moss *Recorder*, Argyll
Mike and Sue Scott	Plantlife, Marine Nature Conservation Review, Scenes
Alex Scott	Scottish Natural Heritage, West Sutherland
Ro Scott	Scottish Natural Heritage
Bob Shannon	Highland Council Planning
John Shepherd	Highland Council Planning
Andy Summers	Highland Council Ranger, Assynt
Kenny Taylor	Scottish Wildlife Trust, Northern Officer
James Williams	Scottish Natural Heritage
Grace Yoxon	Skye Environmental Centre

10.4 Glossary

BRC	Biological Records Centre (national, based at Monks Wood)
BRISC	Biological Recording In Scotland
BSBI	Botanical Society of the British Isles
BTO	British Trust for Ornithology
CoSLA	Convention of Scottish Local Authorities
EC	European Community
ERDF	European Regional Development Fund
FA	Forestry Authority
FFWAG	Forestry Farming and Wildlife Advisory Group
GIS	Geographic Information Systems
HBRG	Highland Biological Recording Group
HC	Highland Council
IT	Information Technology
JMT	John Muir Trust
LRC	Local Records Centre
NGO	Non-Governmental Organisation
NNR	National Nature Reserve
NVC	National Vegetation Classification
OS	Ordnance Survey
RSPB	Royal Society for the Protection of Birds
SEPA	Scottish Environment Protection Agency
SIRI	Scottish Insect Records Index
SNH	Scottish Natural Heritage
SOC	Scottish Ornithologists'Club
Spp	Species (plural)
SWT	Scottish Wildlife Trust
UHI	University of the Highlands and Islands

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Scottish Natural Heritage

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Our task is to secure the conservation and enhancement of Scotland's unique and precious natural heritage - the wildlife, the habitats, the landscapes and the seascapes - which has evolved through the long partnership between people and nature.

We advise on policies and promote projects that aim to improve the natural heritage and support its sustainable use.

Our aim is to help people to enjoy Scotland's natural heritage responsibly, understand it more fully and use it wisely so that it can be sustained for future generations.