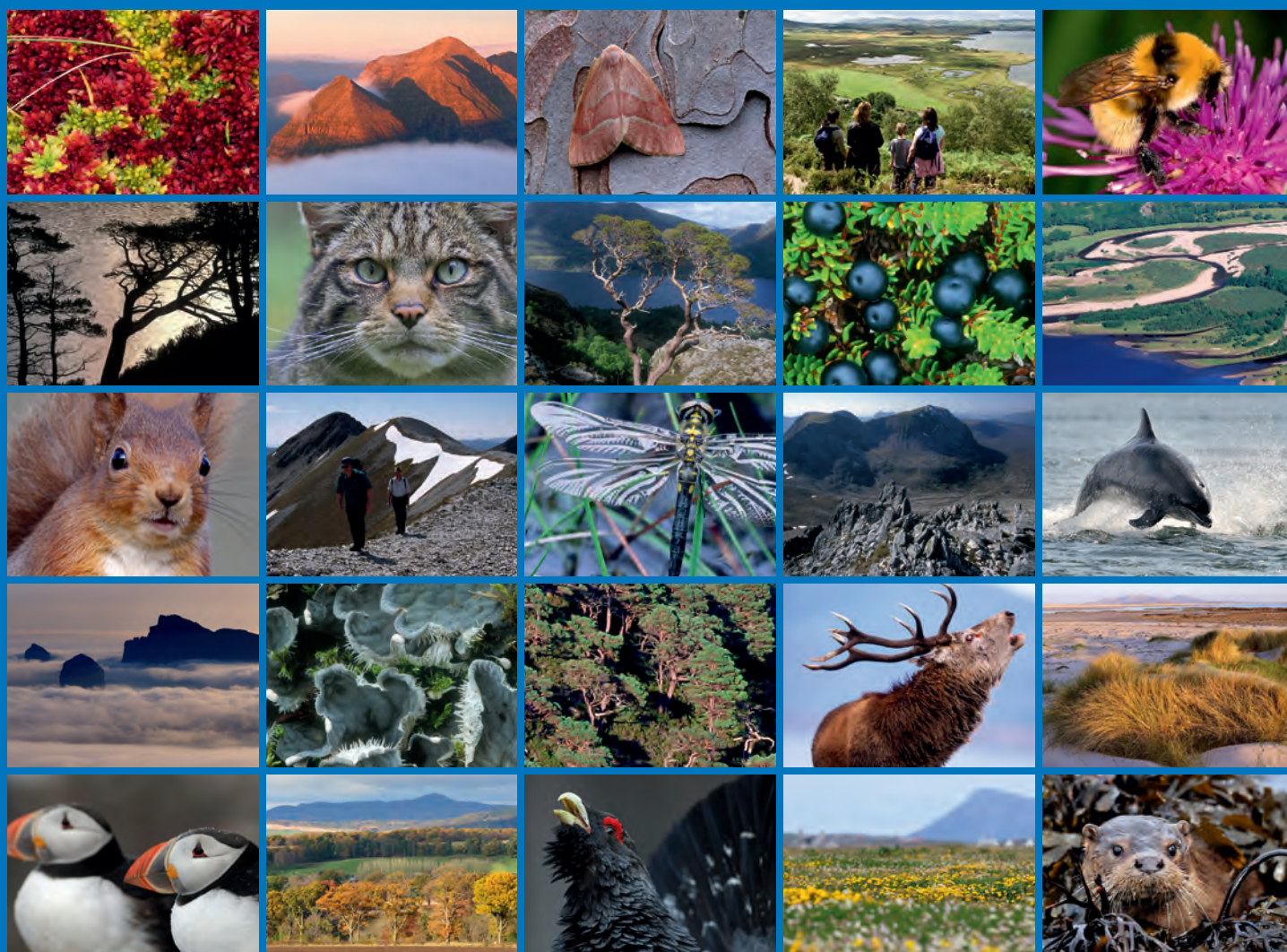


Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland





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COMMISSIONED REPORT

Commissioned Report No. 498

Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland

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COMMISSIONED REPORT

Summary

Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland

Commissioned Report No. 498

Contractor: Jonathan Willet and Murdo A. Macdonald

Year of publication: 2012

Background

The Habitats Directive requires that Member States shall undertake surveillance of the conservation status of specified habitats and species, and report every six years. Scottish Natural Heritage has responsibility for surveillance in Scotland. The Habitats Directive requires that surveillance should allow conclusions to be drawn on specified aspects of range and population. This work is directed at establishing the current level of surveillance for specified conservation-listed species in Scotland in order to inform the next cycle of reporting in 2013. The 'specified' species are those present in Scotland which are listed in the Annexes of the Habitats Directive, Birds Directive. Species listed in the UK Biodiversity Action Plan (UKBAP) are also included in this analysis. A questionnaire was sent out to contacts in relevant organisations. Questions were all related to the requirements of surveillance under the Habitats Directive.

Main findings

A number of improvements are needed in the surveillance of specified habitats and species in Scotland in order to meet the strict requirements of the EC Habitats Directive.

In particular these include:

- Clarifying the lead responsibilities for species or wider species (taxon) groups subject to surveillance.
- Putting in place clear structures and processes to allow coordination between the various organisations and individuals involved in surveillance.
- Securing appropriate infrastructure, funding, training and equipment to support the necessary levels of taxon skills, data collection and data mobilisation.
- Where appropriate, adding some species as notified features on designated sites.
- Securing resources and support on a long term basis to meet the demands of the six year reporting cycle.
- Establishing the level of surveillance appropriate for species not covered by the Directives, to allow best use of resources.

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1. INTRODUCTION	1
1.1 Background	1
1.2 Surveillance.....	2
2. METHODS	3
3. RESULTS	4
3.1 Responses	4
3.2 Summary of the responses	4
3.3 The Habitats Directive requirements	5
4. DISCUSSION	6
4.1 General.....	6
4.2 Practical problems with current surveillance activities	6
4.3 Current distributional data on NBN Gateway	7
4.4 Biological record mobilisation and surveillance.....	7
5. RECOMMENDATIONS	8
5.1 The context of surveillance.....	8
5.2 Specific recommendations	8
5.3 Other recommendations.....	9
Table 1. Attributes of Habitats Directive surveillance requirements which are met in the taxon groups	11
Table 2. Current capacity to fulfil Habitats Directive surveillance requirements, listed by taxon group	12
Table 3. Current capacity to fulfil Habitats Directive surveillance requirements, for Directive species only	13
Appendix 1. The Survey Questions	23
Appendix 2. Summary of the data and responses	25
Appendix 3. Organisations and respondents	27
Appendix 4. Full responses to Q 23	30

1. INTRODUCTION

1.1 Background

Article 11 of the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, usually known as the Habitats Directive¹, requires that:

Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.

Article 17 requires that

Every six years from the date of expiry of the period laid down in Article 23, Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include [...] evaluation of the impact of those measures on the conservation status of [...] the species in Annex II and the main results of the surveillance referred to in Article 11.

An amendment of 26 January 2009 assigned a statutory surveillance duty, including for inshore waters, to Scottish Natural Heritage (SNH).

The arrangements made by the Scottish Ministers [...] shall ensure that Scottish Natural Heritage implements a strategy for the surveillance of the conservation status of relevant habitats and species in Scotland [...] assess how and to what extent surveillance of the conservation status of relevant habitats and species needs to be carried out, having regard to [...] the conservation status of the habitat or species [...] ensure that surveillance is carried out on an ongoing basis.

This is coordinated at the UK level through an Inter-Agency Working Group, chaired by the Joint Nature Conservation Committee.

The Habitats Directive complements and amends the earlier Birds Directive (1979)². Although the Birds Directive sets up Special Protection Areas for birds on the Annexes and regular migrants, this report deals with species listed on the Annexes of the Birds Directive only.

It is also important to know the status of Biodiversity Action Plan (BAP) priority habitats and species occurring in Scotland, within protected areas and their wider extent. Scotland's 2010 biodiversity assessment demonstrated that, while it is possible to report on Biodiversity Action Plan priority habitats and species, the evidence base is incomplete and frequently based on expert opinion. The 2008 UK BAP³ report stated that surveillance to assess the status and trends of priority habitats and species was sufficient for just six habitats (13%) and 163 species (44%).

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>

² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1979:103:0001:005:EN:HTML>

³ http://www.incc.gov.uk/pdf/pub2010_UKBAPHighlightsReport2008.pdf

The Habitats Directive requires that surveillance should allow conclusions to be drawn on the following aspects of range and population:

- *Change of habitat range, structure & function, and status of its typical species.*
- *Viability of the species' population dynamics, range and habitat*
- *State of ecological coherence*
- *Effectiveness of conservation measures on Special Areas of Conservation*
- *Recording of incidental capture & killing of Annex IV*
- *Compatibility of exploitation of Annex V plants and animals with favourable conservation status*

This work is directed at establishing the current level of surveillance for specified conservation-listed species in Scotland in order to inform the next cycle of reporting in 2013. It is a key component of a Biodiversity Surveillance Strategy for Scotland (BSSS), in preparation by SNH. Habitat and marine aspects are dealt with elsewhere, although some marine species are included herein.

The 'specified' species are those present in Scotland which are listed in the Annexes of the Habitats Directive, Birds Directive and in the UK Biodiversity Action Plan (UKBAP). 699 taxa were identified as meeting these criteria⁴. The list included two supraspecific taxa: Cetacea as well as individual species, and *Hieracium* sect. *Alpestris*. Some infraspecific taxa were included in addition to the species for *Anser albifrons*, *Cygnus columbianus*, *Larus argentatus*, *Limosa limosa*, *Monotropa hypopitys* (2 spp.), *Tetrao tetrix*, and *Turdus philomelos*. Three species were represented only as two subspecies: *Troglodytes troglodytes*, *Cladonia arbuscula* and *C. ciliata*.

1.2 Surveillance

Surveillance in this context refers to systematic observation through recording schemes, recognising that completeness, coverage and permanency of recording vary from scheme to scheme. The Habitats Directive requires that surveillance is carried out on protected sites and also in the wider countryside.

The review will help to assess the surveillance coverage of the specified species; it will help to determine which species are sufficiently well recorded to report on their status and trends, and which are not. It will thereby inform a strategy for improving the utility and reliability of surveillance into the future.

The review will provide the basis for future work on the adequacy of existing surveillance schemes including Site Condition Monitoring, for example assessing if they satisfy the standards of the current surveillance requirements of the Directives.

⁴ In his response Brian Coppins pointed out two lichens not included in the list -*Catolechia wahlenbergii* (Sch. 8); *Cladonia trassii* [*C. stricta* auct. brit.] (Sch. 8). The first is scattered in the W of Scotland, the other confined to the Cairngorms, and both confined in the UK to Scotland according to NBN Gateway maps.

2. METHODS

The survey was carried out means of a questionnaire provided in an Excel workbook, containing records for all species relevant to the organisation or individual, and a series of questions designed to elicit the relevant information on current surveillance activities.

This was sent out to contacts in relevant organisations identified as those with primary responsibility for the conservation and survey of each taxon (usually as taxon groups, occasionally as single species or a subset of the main taxon group).

Questions were classed in themes as follows, all related to the requirements of surveillance under the Habitats Directive (see 2.1 above).

Questions 1-5 addressed generic organisation and data issues, namely

- established the role of the organisation for recording and conservation of the taxon;
- identified other relevant organisations who share responsibility;
- data quality standards, data sharing, and availability on NBN Gateway;
- constraints on data collection.

Questions 6-14 related to published material on range, identifying where targeted surveys or distribution atlases had been produced, their basis, and frequency of updating.

Questions 15-20 on population dynamics identified the degree of population estimations or other quantitative work on population ecology carried out or planned.

Question 21 asked if habitat monitoring was carried out.

Question 22 was relevant only to certain HD Annex species, asking about recording of capture and kill data.

Question 23 allowed respondents unlimited opportunity to add any relevant information not otherwise covered, and Question 24 confirmed whether the responses should be kept confidential or made available freely.

Responses were combined into an Excel workbook.

3. RESULTS

3.1 Responses

The questions put to organisations are given in Appendix 1. The taxon groups and responses are summarised in Appendix 2. Organisations and their contacts are listed in Appendix 3.

3.2 Summary of the responses

A summary of the responses to the questionnaire follows, with general comments where appropriate.

For only 252 taxa and 17 of the 34 original taxon groups did respondents acknowledge a lead role for the taxon. The reason for this is not clear, but there seems to be a general lack of clarity about overall responsibilities.

Many respondents mentioned other organisations involved in particular taxa, and some associated comments indicate a worrying lack of cooperation and coordination between bodies with similar interests. It is not in our remit to investigate this, but any lack of cooperation will clearly affect surveillance adversely.

Most respondents reported high standards of data quality, although sometimes these were not fully described, and vary between organisations.

The amount of data on the Gateway, and the degree of public access to the data varies enormously, from full public access to all fields at full grid precision, to none at all.

Practical constraints on data collection indicate some common (and predictable) themes. Lack of money, manpower, and taxon skills feature strongly, as would be expected. Many species live in difficult locations or habitats, or can only be studied in a small window of season or weather, imposing logistical problems.

The vast majority of taxa have not been the subject of targeted survey. Where one has been carried out, they may be targeted on a single species (Otter, Red Squirrel) or as part of a larger taxon group project (the current BTO/SOC bird atlas). Most, however are not the subject of special survey.

Most organisations do not maintain an atlas for the species of interest, although some groups have excellent national atlases (BSBI, BTO/SOC, BCS). Most organisations that maintain an atlas update it only infrequently though some present new data on their websites or NBN Gateway more frequently than they prepare formal atlases. Atlases differ widely in the survey base and level of detail of discussion of range and population. Some local societies and interest groups publish their own atlases, sometimes independently of national bodies (e.g. NE Scotland bird atlas, NESBReC dragonfly atlas, HBRG atlases of bumblebees, butterflies and mammals). The usual resource limitations on mapping and producing repeat atlases are mentioned.

Most respondents do not systematically measure population size and other aspects of population dynamics. In the few instances where they do, the survey base varies significantly.

Habitat assessment is not carried out for the majority of taxa.

The opportunity for free responses in Q23 was grasped by many respondents, and their extended comments contain many extremely useful ideas and information. The full text of all such comments is provided in the accompanying file '*Q23 full text.doc*' and as Appendix 3.

3.3 The Habitats Directive requirements

Table 1 lists all the taxon groups used in the study, along with some species, and indicates the current adequacy of surveillance. As might be expected, adequate data on range exceeds significantly that for populations and habitat condition reflecting the relative ease of hectad mapping and the difficulty of providing robust data on the other two aspects.

Table 2 looks at the main attributes of surveillance for broad taxon groups as required by the Habitats Directive and assesses the degree to which they are currently met. Of the 48 taxon categories in the table (some species, some wider groups), only 23% are assessed as having currently adequate surveillance data. 15% have partial adequate data, and the remaining 52% are currently inadequate in that regard.

The obligations to record Capture and Kill data, and to assess effects of exploitation, apply only to taxa in Annexes 4 and 5 of the Habitats Directive, and have been omitted from these tables as the activities are irrelevant to most species. Apart from cetaceans, where information is obtained through the UK Stranding scheme and the UK Bycatch monitoring project, the only species where data are collected are Natterjack Toad *Epidalea calamita*, Great crested Newt *Triturus cristatus*, Grey Seal *Halichoerus grypus*, Common Seal *Phoca vitulina*, Freshwater Pearl Mussel *Margaritifera margaritifera*, Wildcat *Felis silvestris*, Otter *Lutra lutra*. In most cases, the data are collected in a casual or partial way. Only for the Freshwater Pearl Mussel was there an unequivocal 'Yes' in response to the question.

Table 3 looks at the main attributes of surveillance for Habitats Directive species only. Of the 155 taxa, there was adequate range information on 134 (86.5%), population data on 76 (49%). The latter figure, however, includes 70 birds, so population data on anything other than birds is rare. Habitat information is available on only 3.9% of taxa.

Further quantitative analysis of the data in these tables is largely futile, as the categories are not comparable and are frequently not independent. For example, the figures derived from Table 3 are useful for casual illustration, but are heavily biased by the birds, all of which are surveyed intensively through essentially similar projects.

4. DISCUSSION

4.1 General

This study is intended to describe the current state of surveillance of specified taxa under the Habitats Directive as regards:

- *Change of habitat range, structure & function, and status of its typical species.*
- *Viability of the species' population dynamics, range and habitat*
- *State of ecological coherence*
- *Effectiveness of conservation measures on Special Areas of Conservation*
- *Recording of incidental capture & killing of Annex IV*
- *Compatibility of exploitation of Annex V plants and animals with favourable conservation status*

The general conclusion is that current surveillance is incomplete, its nature patchy and inconsistent, and for most taxa is not compliant with the demands of the Habitats Directive. Some aspects (ecological coherence, SACs, recording capture & kill, and monitoring exploitation) require specialist input, and can only be done directly by public agencies or funded by them. Data on species range and basic ecology, especially in the wider countryside, has traditionally relied on a large number of committed and highly experienced part-time amateur naturalists. Studies of habitat properties and population dynamics are sometimes carried out by these naturalists, but because it demands much more time and attention from the surveyor detailed amateur studies on population dynamics or habitat assessment are rare.

4.2 Practical problems with current surveillance activities

It is clear from the responses that resources (time, personnel, funding) are the main limiting factors for adequate surveillance.

4.2.1 Time

To carry out adequate surveillance on all the required aspects of surveillance is time-consuming as it will often require long-distance travel to remote or difficult areas within a limited window in the relevant active season.

4.2.2 Personnel

It is widely recognised that most of the wildlife expertise in Scotland resides in the voluntary involvement of naturalists who engage primarily as a hobby - though in a highly disciplined and scientifically reliable way⁵. This requires that four factors are recognised in the context of formal surveillance.

1 - there is, for many of the taxa of interest, a deficit for taxonomic competence. One example will suffice, the aculeates (in which MAM specialises) with 11 species listed. Apart from two species - *Bombus distinguendus* and *Formica exsecta* - no more than four people currently resident in Scotland have the competence even to identify the species reliably. The situation is similar in some other taxon groups.

2 - these specialists have other demands on their time, and cannot be expected to deliver surveillance data even if travel and subsistence costs are covered.

3 - as volunteer specialists, many competent naturalists have their own particular special interests which may be very focussed taxonomically or geographically, and may not wish to move into formal surveillance even if funded.

⁵ http://www.snh.org.uk/pdfs/publications/commissioned_reports/382.pdf

4 - many experienced naturalists do not have the training, competence or confidence to carry out formal studies in the field such as would be necessary for monitoring population density, habitat quality, or other quantitative properties.

4.2.3. Funding

Following from the points made above, substantial funding would be required to permit individuals or NGOs to undertake adequate surveillance activities.

4.3 Current distributional data on NBN Gateway

The policy of the Scottish Government and SNH is that biological data should be placed on the National Biodiversity Network Gateway and made available to the public by that route⁶. At 22 March 2011, the Gateway holds 540 separate datasets and 63,651,450 species records covering the whole of the UK⁷. It is not possible to determine the statistics for Scotland alone.

Despite these impressive numbers, not all datasets allow download of the essential fields, and data quality is variable. This reflects the fact that access is primarily in the control of individual dataset managers. Access can vary from complete download of all available fields, to a ban on even seeing the grid maps. Further, the same record may appear several times in a single dataset, or in different datasets with different access privileges.

The maps obtained in the Gateway are based on evidence of presence. Gaps in the maps are not evidence of absence of a taxon. Frequently, and perhaps more pertinently in Scotland than elsewhere in the UK, dots reflect the distribution of observers rather than the plant or animal, gaps their absence. For all these reasons, and the fact that many taxon datasets are not available at all on the Gateway, distributional information obtained from the Gateway alone may not be sufficient to underpin surveillance requirements of the Habitats Directive, and may require additional data collated from other sources, or new surveys commissioned to fill gaps.

The Gateway has the potential to be a very good repository for data that would allow at least partial assessment of species range and change in range, but to be useful in that respect the problems of recording effort, data quality, mobilisation of data, and access to full data on the Gateway must be addressed.

4.4 Biological record mobilisation and surveillance

The document referred to in 4.3 (footnote 6) was in response to a petition to the Scottish Parliament submitted by Biological Recording in Scotland (Public Petition PE1229⁸). The action recommended in this Report of the Biodiversity Science Group Sub-Group in December 2010 at paragraph 9, and agreed to by the Scottish Government states '*All Local Records Centres (LRCs) and Centres for Biological Recording should be encouraged to contribute their data to the NBN Gateway; this should be a specific condition and requirement of any ongoing or new SNH or Scottish Government funding*'.

The petition was raised because of concern about the deficit over much of Scotland of stable funded facilities for assembly, verification and mobilisation of biological data to the Gateway. Implementation of this and other recommendations should in the medium to long term assist in meeting the surveillance requirements of range changes by increasing the availability of high-quality taxon data over a greater geographic area and taxonomic spectrum.

⁶ Response to Recommendations in the Report of the Biodiversity Science Group Sub-Group in Relation to Public Petition PE1229, B4458277 14 December 2010.

⁷ <http://data.nbn.org.uk/>

⁸ <http://www.scottish.parliament.uk/business/petitions/docs/PE1229.htm>

5. RECOMMENDATIONS

5.1 The context of surveillance

Our recommendations are directed towards ensuring that the various components of surveillance can be achieved satisfactorily. Surveillance (see 2.1 above) should allow conclusions to be drawn on (for all species) change of habitat status; viability of the species; ecological coherence; and conservation measures on Special Areas of Conservation. Additionally, for Annex IV and V species respectively, incidental capture & killing must be recorded and exploitation shown to be compatible with favourable conservation status.

General requirements

An analysis of the requirements for successful surveillance follows.

Applies to:	Aspect	Data required	Provided by	Required skills or structures
Habitat	change of habitat range	Habitat composition, structure, relevant interrelationships.	Agencies, NGOs, skilled consultants.	Habitat assessment, taxon identification.
	structure & function, ecological coherence			
	status of its typical species.	At least vague estimates of frequency.	Agencies, NGOs, skilled consultants, volunteer naturalists.	
Species	viability of the species' population dynamics	Estimates of numbers/densities which are comparable over time.	Agencies, NGOs, skilled consultants	Taxon identification, quantitative ecological sampling.
	range	Evidence of both presence and absence over the whole of Scotland, and over time.	Skilled consultants, volunteer naturalists.	Taxon identification, mobilisation of data.
	effectiveness of conservation measures on SACs	All the above, but on relevant SACs specifically	Agencies, skilled consultants,	As above.
	recording of incidental capture & killing of Annex IV	Numbers of relevant capture & kill events.	Agencies, relevant commercial interests (e.g. fishing, sporting estates).	Method of recording, coordinating and reporting data.
	compatibility of exploitation with favourable conservation status	Data on habitats and species as above.	Agencies, relevant commercial interests (e.g. fishing, sporting estates), skilled consultants.	Habitat assessment, taxon identification, quantitative ecological sampling.

Most of these require the infrastructure and resources of agencies or other organisations, whether commercial or concerned with conservation; and by personnel skilled in field techniques (taxon-related, or quantitative ecological survey work). Many require assignation of specific responsibilities, and coordination between the various individuals and organisations involved.

5.2 Specific recommendations

1. Lead responsibilities for species or wider taxon groups subject to surveillance must be clarified. This will require liaison between SNH, other public bodies and NGOs (both local and national, corporate and voluntary). Some involvement of UK bodies (Biological Records Centre, JNCC) would be helpful to allow data exchange and to avoid duplication of effort.

2. Structures and processes are required to allow coordination between the various organisations and individuals involved in surveillance. Currently much coordination, especially involving amateur and voluntary organisations, is inadequate
3. Infrastructure, funding, training and equipment will be required to address deficiencies in taxon skills, data collection and data mobilisation. Some of these should be addressed if the recommendations in the response to PE1229 are implemented.
4. As reporting is to be repeated on a six-year cycle, provision of resources and support must be long-term, and training in taxon skills must be supported in the long term to compensate for the inevitable loss of skill and experience from the current naturalist community, which has a greater mean age than the general adult population.
5. The level of surveillance for species not covered by the Directives must be established, as this will have major implications for the resources required.

5.3 Other recommendations

5.3.1 Taxon lists

The amalgamated taxon list provided to the contractors contains entries which are inconsistent with wider UK usage. Inconsistencies in names causes problems if automated integration of files from different sources is attempted (by LOOKUP functions or in relational databases). We suggest that SNH compiles a standard taxon list based on the Natural History Museum dictionary⁹ and used by Recorder 6, the standard recording software for taxon recording organisations and supported by JNCC. The dictionary links with data on all relevant designations, and is subject to periodic updates by NHM.

5.3.2 Software

Microsoft Excel spreadsheets are not the most appropriate software applications to present complex data of the type assembled in this report. For many reasons, a relational database such as MS Access would be far more convenient for data handling, analysis and presentation, while being completely compatible with Excel. We suggest that consideration should be given to the use of such database software for future work of this kind.

⁹ <http://www.nbn.org.uk/Useful-things/Dictionaries/Species-Dictionary.aspx>

TABLES

Table 1. Attributes of Habitats Directive surveillance requirements which are met in the taxon groups. Y - satisfactory data; N - inadequate data; P- partial data; 0 - no information.

Table 2. Current capacity to fulfil Habitats Directive surveillance requirements, listed by taxon group.

Table 3. Current capacity to fulfil Habitats Directive surveillance requirements, for Directive species only.

Methodology for determining entries in Tables 1 and 2.

Table 1. Each attribute was classified as either having Y - satisfactory data; N - inadequate data; P- partial data; 0 - no information. The way the answers were determined are outlined below. There is quite a lot of subjectivity in the answers and interpretation of the raw data, as the exact requirements of surveillance was not clear at the time of drafting the table. Once this is agreed then the tables could be revisited and checked over again, but it would probably require contacting the key organisations again to get a final definitive answer to this question for each taxon group.

Range was classified Y if there was fairly comprehensive distribution data available, P if there was limited distribution data available i.e. just on protected sites for widespread species, N and 0 were very close together N denoting hardly any information too little to make any estimation of the range of a species.

Population was classified Y if there was fairly comprehensive population data available plus some idea of the status of the population, P if there was limited population data available i.e. just on some populations and no information on trends, N and 0 were very close together N denoting hardly any information or the wrong sort of information, too little to make any estimation of the population size and trend of a species.

Habitats was classified Y if there was comprehensive data available on the habitat of that population, P if there was limited habitat data available i.e. just on protected sites for widespread species, N and 0 were very close together N denoting hardly any information or the wrong sort of information. Y? was an entry only for marine species as it was possible that existing remote sensing data would be enough to fulfil the HD surveillance requirements.

Table 2. This table was relatively straightforward in how the answers were determined.

Adequate required all the answers in table 1 for that taxon group to be Y or Y? For some taxon groups only certain rare species had adequate information in this case the capacity was marked as being adequate but a note made saying for rare species only.

Partial required all the answers to be either all P or N? or a combination of these plus Y and Y?. Partial meant that there was some data fulfilling part or all of each attribute or there was information available that may or may not be sufficient to fulfil HD surveillance but in this case that entry was given the benefit of the doubt.

If there was a single attribute that was not being adequately fulfilled then this marked the taxon group as being inadequate, even if all the others were being fulfilled. For some taxon groups, Lichens and Spiders, they were marked as inadequate but of there was the suspicion that there were some that may have sufficient information then the comment, "Possibly adequate for rare species only" was added.

Table 1. Attributes of Habitats Directive surveillance requirements which are met in the taxon groups. Y - satisfactory data; N - inadequate data; P- partial data; 0 - no information.

Taxon Group	Relevant data on:			Comments
	range	populations	habitats	
alga	N	N	N	<i>A. nodosum</i> ecad is monitored on protected sites
amphibian	N	N	N	
Natterjack Toad	Y	Y	Y	
Great Crested Newt	P	P	P	Predictive mapping for GCN habitat requirements being developed will work for other amphibians.
Annelid	Y	N	P	SCM at the two known sites will have some habitat data.
bird	Y	Y	Y/P	Habitat data, Y for rare sp. 0 for widespread species.
bird (Goose/Swan)	Y	Y	Y/P	Habitat data, Y for rare sp. 0 for widespread species.
bony fish (Actinopterygii)	N	N	N	
bony fish (Actinopterygii) Marine	N	N	Y?	For all Marine species there is remote sensing information that could be used to create a habitat map of nearly all the seabed. Whether this would fulfill the HD Habitat status requirements is another matter
bony fish (Actinopterygii) Salmonid	Y	Y (salmon and trout only)	P	
cartilaginous fish (Chondrichthyes)	N	N	Y?	
Basking Shark	Y	N	N	
clubmoss	N	N	N	
coelenterate (=cnidarian)	N	N	Y?	
conifer	Y	Y?	N?	
crustacean (marine)	N	N	N	
crustacean <i>Austropotamobius</i>	Y	Y	P	
crustacean <i>Triops</i>	Y	Y	P	Known range and population.
fern	Y	N	N	Oblong woodsia is monitored at some (all?) sites through RBGE.
flowering plant	Y	N	N	Possibly Y to some of the rarest species.
fungus	N	N	N	
insect - beetle (Coleoptera)	0	0	0	
insect - butterfly	Y	P	P	
insect - caddis fly (Trichoptera)	N	N	N	
insect - hymenopteran	Y	N	N	Limited population data on <i>Formica exsecta</i> only.
insect - lacewing (Neuroptera)	P	N	N	
insect - mayfly (Ephemeroptera)	N	N	N	
insect - moth	P	P	P	For rare species Y, Y and 0.
insect - stonefly (Plecoptera)	Y	N	N	
insect - true fly (Diptera)	N	N	N	Y, Y, Y for <i>Blera fallax</i> and <i>Hammerschmidtia ferruginea</i> .
jawless fish (Agnatha)	N	N	N	
lichen	N	N	N	Probably Y, Y, 0 for the rarest species.
liverwort	0	0	0	
marine mammal (Cetacean)	Y	P	Y?	Discounting vagrants and rarities.
marine mammal (seal)	Y	Y	Y?	Discounting vagrants and rarities.
marine reptile	N	N	Y?	Vagrants, extra-limital migrants.
mollusc (FWPM)	Y	Y	Y	
mollusc (marine)	P	P	Y?	
mollusc (terrestrial)	N	N	P	
moss	0	0	0	
reptile	P	N	N	
spider (Araneae)	P	N	P	Possibly Y, N, Y for the rarest species.
stonewort	Y	N	N	
terrestrial mammal	Y	N	N	
terrestrial mammal (bat)	Y	N	N	
terrestrial mammal (Otter)	Y	P	N	
terrestrial mammal (Red Squirrel)	Y	P	N	
tunicate (Urochordata)	N	N	N	

Table 2. Current capacity to fulfil Habitats Directive surveillance requirements, listed by taxon group.

Taxon Group	Current surveillance status			Comments
	adequate	partial	inadequate	
alga			X	
amphibian			X	
Natterjack Toad	X			
Great Crested Newt		X		
Annelid			X	
bird	X			
bird (Goose/Swan)	X			
bony fish (Actinopterygii)			X	
bony fish (Actinopterygii) Marine			X	
bony fish (Actinopterygii) Salmonid	X			Salmon and Trout only.
cartilaginous fish (Chondrichthyes)			X	
Basking Shark	X			
clubmoss				No information.
coelenterate (=cnidarian)			X	
conifer		X		
crustacean (marine)			X	
crustacean <i>Austropotamobius</i>	X			
crustacean <i>Triops</i>	X			
fern			X	
flowering plant		X		
fungus			X	
insect - beetle (Coleoptera)				No information.
insect - butterfly		X		
insect - caddis fly (Trichoptera)			X	
insect - hymenopteran			X	
insect - lacewing (Neuroptera)			X	
insect - mayfly (Ephemeroptera)			X	
insect - moth	X			Rare species only.
insect - stonefly (Plecoptera)			X	
insect - true fly (Diptera)			X	
jawless fish (Agnatha)			X	
lichen			X	Poss adequate for rare species only.
liverwort				No information.
marine mammal (Cetacean)	X			
marine mammal (seal)	X			
marine reptile			X	
mollusc (FWPM)	X			
mollusc (marine)		X		
mollusc (terrestrial)			X	
moss				No information.
reptile			X	
spider (Araneae)			X	Poss adequate for rare species only.
stonewort				No information.
terrestrial mammal			X	
terrestrial mammal (bat)			X	
terrestrial mammal (Otter)		X		
terrestrial mammal (Red Squirrel)		X		
tunicate (Urochordata)			X	

Table 3. Current capacity to fulfil Habitats Directive surveillance requirements, for Directive species only.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Acrocephalus paludicola</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Alcedo atthis</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Aquila chrysaetos</i>	bird	Y	Y	Y	Historical work done on some/ all ranges	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Asio flammeus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Botaurus stellaris</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Calidris alpina</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Caprimulgus europaeus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Charadrius morinellus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Circus aeruginosus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Circus cyaneus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Crex crex</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Falco columbarius</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Falco peregrinus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Gavia arctica</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Gavia immer</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Gavia stellata</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Haliaeetus albicilla</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Hydrobates pelagicus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Lanius collurio</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Limosa lapponica</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Loxia scotica</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Mergellus albellus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Milvus milvus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Oceanodroma leucorhoa</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Pandion haliaetus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Pernis apivorus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Phalaropus lobatus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Philomachus pugnax</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Pluvialis apricaria</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Podiceps auritus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Porzana porzana</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Pyrrhocorax pyrrhocorax</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Sterna dougallii</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Sterna hirundo</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Sterna paradisaea</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Sterna sandvicensis</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Sternula albifrons</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Tetrao urogallus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Tringa glareola</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Troglodytes troglodytes</i> subsp. <i>fridariensis</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anser albifrons</i> subsp. <i>flavirostris</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Branta leucopsis</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Cygnus columbianus</i>	bird (Goose/Swan)	Y	0	0	NON BREEDER			X	NON-BREEDER
<i>Cygnus cygnus</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Cottus gobio</i>	bony fish (Actinopterygii) Marine	P	P	P	Habitat answer same answer for all marine species		X		Habitat answer same answer for all marine species
<i>Euphydryas aurinia</i> form <i>aurinia</i>	insect - butterfly	Y	Y	P	Habitat monitored at some sites	X			

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Lampetra planeri</i>	jawless fish (Agnatha)	Y	P	P	Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species		X		Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species
<i>Petromyzon marinus</i>	jawless fish (Agnatha)	Y	P	P	Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species		X		Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species
<i>Petalophyllum ralfsii</i>	liverwort	N	N	N	No information, may be monitored on SSSIs but otherwise no known recording. Plantlife dossier at http://www.plantlife.org.uk/uploads/documents/Petalophyllum_ralfsii_dossier.pdf .			X	No information, may be monitored on SSSIs but otherwise no known recording
<i>Vertigo (Vertigo) genesii</i>	mollusc	P	N	Y	Some SNH surveys			X	
<i>Vertigo (Vertigo) geyeri</i>	mollusc	P	N	Y	Some SNH surveys			X	
<i>Vertigo (Vertilla) angustior</i>	mollusc	P	N	Y	Some SNH surveys			X	
<i>Buxbaumia viridis</i>	moss	P	P	P	No respondent, some surveys known of by the contractor			X	
<i>Hamatocaulis vernicosus</i>	moss	N	N	N	No information, may be monitored on SSSIs but otherwise no known recording			X	No information, may be monitored on SSSIs but otherwise no known recording
<i>Triturus cristatus</i>	amphibian	Y	P	0				X	
<i>Trichomanes speciosum</i>	fern	Y	P	P	No recent monitoring but only on 5 sites, some may be SSSIs		X		Sporophyte is only found on 5 sites, the gametophyte on many more
<i>Najas flexilis</i>	flowering plant	N	N	N	No information, but it has been surveyed in the past and a recent report identified all the known sites. May be monitored on SSSIs			X	No information, but it has been surveyed in the past and a recent report identified all the known sites. May be monitored on SSSIs
<i>Saxifraga hirculus</i>	flowering plant	N	N	N	No information			X	No information
<i>Phocoena phocoena</i>	marine mammal (Cetacean)	Y	P	P	Popn in Outer Moray Firth monitored, possibly others not enough information		X		
<i>Tursiops truncatus</i>	marine mammal (Cetacean)	Y	P	P	Moray Firth popn monitored for SAC, likewise the habitat in this area.	X			
<i>Lutra lutra</i>	terrestrial mammal (Otter)	Y	P	P	Habitat answer same answer for all marine species		X		
<i>Alosa alosa</i>	bony fish (Actinopterygii)	P	P	P	Only monitored in D&G		X		Not all populations monitored, but D&G thought to have the largest

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Alosa fallax</i>	bony fish (Actinopterygii)	P	P	P	Only monitored in D&G		X		Not all populations monitored, but D&G thought to have the largest
<i>Salmo salar</i>	bony fish (Actinopterygii) Salmonid	Y	Y	P	Monitoring by the local Fisheries Trusts collated by RAFTS/ Marine Scotland	X			Monitoring by the local Fisheries Trusts collated by RAFTS/ Marine Scotland
<i>Lampetra fluviatilis</i>	jawless fish (Agnatha)	Y	P	P	Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species		X		Outside of SCM this species may be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species
<i>Halichoerus grypus</i>	marine mammal (seal)	Y	Y	P	Habitat answer same answer for all marine species terrestrial habitat photographed	X			Already reported to Europe via JNCC
<i>Phoca vitulina</i>	marine mammal (seal)	Y	Y	P	Habitat answer same answer for all marine species terrestrial habitat photographed	X			Already reported to Europe via JNCC
<i>Margaritifera (Margaritifera) margaritifera</i>	mollusc	Y	Y	Y	Most on SACs	X			
<i>Alectoris rufa</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas acuta</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas clypeata</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas crecca</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas penelope</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas platyrhynchos</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas querquedula</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anas strepera</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Aythya ferina</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Perdix perdix</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Scolopax rusticola</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anser anser</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Anser fabalis</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Alauda arvensis subsp. arvensis/scotica</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Aythya marila</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Larus argentatus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Larus ridibundus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Limosa limosa</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Melanitta nigra</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Numenius arquata</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Streptopelia turtur</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Tetrao tetrix</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Turdus iliacus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Turdus philomelos</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Vanellus vanellus</i>	bird	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Anser albifrons</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information		X		Partial due to habitat data quality/ coverage uncertainty
<i>Anser brachyrhynchus</i>	bird (Goose/Swan)	Y	Y	P	Habitat info unclear as to quality and quantity may be no suitable information	X			Question mark over the habitat data quality/ coverage uncertainty
<i>Epidalea calamita</i>	amphibian	Y	Y	P	Unclear what information is gather for habitat condition may be adequate.	X			Small localised population.
<i>Balaenoptera acutorostrata</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Balaenoptera borealis</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Balaenoptera musculus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Balaenoptera physalus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Cetacea</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	Cetaceans are already reported on through the JNCC to Europe through NW Atlantic work
<i>Delphinus delphis</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER?
<i>Eubalaena glacialis</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Globicephala melas</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Grampus griseus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER?
<i>Hyperoodon ampullatus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Lagenorhynchus acutus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Lagenorhynchus albirostris</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Megaptera novaeangliae</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Mesoplodon bidens</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Mesoplodon mirus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species			X	NON-BREEDER
<i>Orcinus orca</i>	marine mammal (Cetacean)	Y	P	P	Photo ID work done on the resident Scottish Popn. Habitat answer same answer for all marine species		X		Only one breeding pod, the rest are migrants
<i>Physeter macrocephalus</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species		X		NON-BREEDER
<i>Pseudorca crassidens</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species		X		NON-BREEDER

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Stenella coeruleoalba</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species		X		NON-BREEDER
<i>Ziphius cavirostris</i>	marine mammal (Cetacean)	Y	P	P	Habitat answer same answer for all marine species		X		NON-BREEDER
<i>Dermochelys coriacea</i>	marine reptile	Y	N	P	Habitat answer same answer for all marine species terrestrial habitat photographed			X	Extra-limital migrants or vagrants, NON-BREEDER
<i>Felis silvestris</i>	terrestrial mammal	Y	N	P				X	
<i>Myotis daubentonii</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Myotis mystacinus</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Myotis nattereri</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Nyctalus leisleri</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Nyctalus noctula</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Pipistrellus pipistrellus</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Pipistrellus pygmaeus</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Plecotus auritus</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Lithothamnion corallioides</i>	alga	0	0	0				X	
<i>Phymatholithon calcareum</i>	alga	Y	P	P	P - information only on protected sites		X		information only on protected sites
<i>Rana temporaria</i>	amphibian	Y	0	0				X	Widespread popn
<i>Hirudo medicinalis</i>	annelid	Y	0	Y	Habitat info not specifically for the leech but for SSSI quality. Both sites are a SSSI.			X	
<i>Coregonus albula</i>	bony fish (Actinopterygii) Salmonid	P	P	P	May be monitored locally by the fishery trusts			X	May be monitored locally by the fishery trusts
<i>Coregonus lavaretus</i>	bony fish (Actinopterygii) Salmonid	P	P	P	May be monitored locally by the fishery trusts			X	May be monitored locally by the fishery trusts
<i>Thymallus thymallus</i>	bony fish (Actinopterygii) Salmonid	P	P	P	May be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species			X	May be monitored locally by the fishery trusts, but this is a guess as there was no respondent for this species
<i>Lycopodium annotinum</i>	clubmoss	P	0	0	No response			X	No response
<i>Lycopodium clavatum</i>	clubmoss	P	0	0	No response			X	No response
<i>Lycopodium lagopus</i>	clubmoss	P	0	0	No response			X	No response

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Scientific Name	Taxon group	Information on:				Compliance with HD/BD requirements			
		range	population	habitats	Comments	adequate	partial	inadequate	Comments
<i>Cladonia arbuscula</i> subsp. <i>arbuscula</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia arbuscula</i> subsp. <i>squarrosa</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia ciliata</i> var. <i>ciliata</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia ciliata</i> var. <i>tenuis</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia mitis</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia portentosa</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia rangiferina</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Cladonia stygia</i>	lichen	Y	P	P	Just about all monitoring on SSSIs or SACs			X	Just about all monitoring on SSSIs or SACs
<i>Leucobryum glaucum</i>	moss	N	N	N	No information, may be monitored on SSSIs but otherwise no known recording			X	No information, may be monitored on SSSIs but otherwise no known recording
<i>Sphagnum</i>	moss	N	N	N	No information, may be monitored on SSSIs but otherwise no known recording			X	No information, may be monitored on SSSIs but otherwise no known recording
<i>Lepus timidus</i>	terrestrial mammal	Y	N	P				X	
<i>Martes martes</i>	terrestrial mammal	Y	N	P				X	
<i>Mustela putorius</i>	terrestrial mammal	Y	N	P				X	
<i>Luronium natans</i>	flowering plant				No information				No information
<i>Chelonia mydas</i>	marine reptile	Y	N	P	Habitat answer same answer for all marine species terrestrial habitat photographed			X	Extra-limital migrants or vagrants, NON-BREEDER
<i>Eretmochelys imbricata</i>	marine reptile	Y	N	P	Habitat answer same answer for all marine species terrestrial habitat photographed			X	Extra-limital migrants or vagrants, NON-BREEDER
<i>Lepidochelys kempii</i>	marine reptile	Y	N	P	Habitat answer same answer for all marine species terrestrial habitat photographed			X	Extra-limital migrants or vagrants, NON-BREEDER
<i>Pipistrellus nathusii</i>	terrestrial mammal (bat)	Y	N	0				X	
<i>Vespertilio murinus</i>	terrestrial mammal (bat)	Y	N	0				X	

Appendices

Appendix 1. The Survey Questions.

Appendix 2. Summary of the data and responses.

Appendix 3. Organisations and respondents.

Appendix 4. Full responses to Q 23.

Appendix 1. The Survey Questions. These were provided as an MS Word document and in a spreadsheet.

General questions

Q 1 Please indicate the species or wider groups for which your organisation has a lead role (in Scotland) in terms of data collation and database management.

Q 2 Please list below any other organisations you know of that also collect and/or manage data on these species in Scotland (and indicate whether their data is incorporated into your database).

Q 3 What are your quality standards for a) taxonomic accuracy and b) location accuracy? Are there any barriers to achieving high data quality?

Q 4 Are your data fully, partially or not available via the National Biodiversity Network portal?
Full Partial Not available Any qualifying comments?

Q 5 What practical constraints (if any) apply to collecting data for your species? Do you have any suggestions for how these might be addressed?

Targeted surveys

Q 6 Have you organised targeted distribution surveys of any of the species listed? Please specify.

Q 7 Are you planning targeted distribution surveys of any of the species listed in the future? Please specify.

Range and Area of Occurrence

One of the main ways in which changes in a species distribution can be assessed is through the periodic production of atlases. The following questions will help us understand how useful your atlas will be for this purpose.

Q 8 Does your organisation maintain an atlas? YES, go to Q9. NO, go to Q14.

Q 9 Approximately how frequently is your atlas updated?

Q 10 When was your atlas last updated? What date ranges does your atlas cover? Does your atlas contain descriptions of range or population changes? YES NO

Q 11 On what is your atlas based?:

- a full survey by defined geographic areas e.g. 10km squares or vice-counties?
- a partial survey of a subset of defined geographic areas?
- records with no systematic survey?
- a combination of the above?

Please provide details below.

Are your records from: protected sites only? the wider countryside only? both?

Q 12 Do you have comments on the value of your atlas towards assessing changes in species distribution in Scotland? If so, please expand.

Q 13 Do you anticipate any changes in your organisation's capacity to update your atlas in the future? If so, please provide details.

Q 14 Do you think your organisation's data could be used to publish an atlas in the future?
YES Please indicate a date for this. NO Are there any barriers to this?

Population dynamics

In addition to understanding how the range and area of occurrence of species change over time, it is also often important to understand what changes are occurring to individual populations of a species. For example, a species may have a stable range, but locally populations may be in decline. The following questions aim to find out whether your data can contribute to an assessment of changes in species populations.

Q 15 Have you systematically surveyed the size of populations of any of the species over time (e.g. number of individuals, area of colonies, 'repeat photography' etc.)?

YES, go to Q16.

NO, go to Q21.

Q 16 For each species where this is applicable, please indicate whether the survey was:
Of the entire known Scottish population.

A partial survey of a subset of the known Scottish population.

Is the survey for: protected sites only? the wider countryside only? both?

Q 17 For partial surveys please indicate how this sub-sample was chosen e.g. the biggest population, random sample, stratified random sampling etc.

Q 18 And again for partial surveys, please give an indication of the proportion of the Scottish population included in the survey.

Q 19 For many species the size of the total Scottish population will not be known, but it may still be possible to determine trends in species population dynamics if a standardised method of survey has been employed i.e. by constant survey effort.

For each of your species, do you think this may be the case? YES NO

Q 20

How frequently do you collect population data for species?

Do you plan to maintain this frequency and when do you plan the next survey? YES NO

Are there any future changes or barriers to your population data collection (if so, please specify)?

Habitat distribution, quantity and condition

For some species it is more appropriate to indirectly survey the distribution, quantity or condition of a species' habitat rather than the species itself. E.g. quantity of deadwood, area of raised bog etc.

Q 21 Does your organisation collect information on the distribution, quantity or condition of habitat for your species of interest? Please provide as much information as possible (e.g. frequency, spatial extent).

Incidental capture and kill data

The following two questions are only applicable if the species your organisation deals with are on Annex IVa of the Habitats Directive (listed at end) and Annex V.

Q 22

Do you collect data on incidental capture and kill of species? YES NO

If yes, please provide details.

Comments and what we can do with your responses

Q 23 At this stage, do you think there is anything important that we have not asked you about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?

Q 24 We may need to share your responses with our partners other stakeholders. Please let us know if you are not happy with any aspects of your response being made public.

(In the Word version, a list of Annex IV and V species followed.)

Appendix 2. Summary of the data and responses.

Taxon Group	Species	Entries	Respondents	Comments
alga	6	6	1	
amphibian	4	4	1	
annelid <i>Hirudo</i>	1	1	1	
bird	93	186	2	
bird (Goose/Swan)	9	27	3	
bony fish (Actinopterygii) Migratory	4	4	1	Partial response only.
bony fish (Actinopterygii) Marine	22	22	1	
bony fish (Actinopterygii) Salmonid	6	6	1	
cartilaginous fish (Chondrichthyes)	12	25	3	One response dealt with <i>Cetorhinus</i> only.
clubmoss	4	4	1	
coelenterate (=cnidarian)	7	7	1	
conifer	1	1	1	
crustacean (marine)	3	3	1	
crustacean <i>Austropotamobius</i>	1	1	1	
crustacean <i>Triops</i>	1	2	2	
fern	5	9	2	
flowering plant	105	105	1	
fungus	39	78	2	
insect - beetle (Coleoptera)	10	10	1	Information entered from Internet sources by MAM.
insect - butterfly	12	12	1	
insect - caddis fly (Trichoptera)	1	1	1	
insect - hymenopteran	11	11	1	
insect - lacewing (Neuroptera)	1	1	1	
insect - mayfly (Ephemeroptera)	1	1	1	
insect - moth	83	83	1	
insect - stonefly (Plecoptera)	1	1	1	
insect - true fly (Diptera)	12	12	1	
jawless fish (Agnatha)	3	3	0	
lichen	98	98	1	

Taxon Group	Species	Entries	Respondents	Comments
liverwort	17	17	0	
marine mammal (Cetacean)	21	24	3	One response dealt with <i>Phocoena</i> and <i>Tursiops</i> only.
marine mammal (seal)	6	6	1	
marine reptile	5	5	1	
mollusc (FW)	1	1	1	
mollusc (marine)	2	2	1	No response for <i>Ostrea</i> .
mollusc (terrestrial)	6	6	1	
moss	45	45	0	
reptile	5	5	1	
spider (Araneae)	10	10	1	
stonewort	5	5	0	
terrestrial mammal	7	22	4	One response for Wildcat only.
terrestrial mammal (bat)	10	10	1	
terrestrial mammal (Otter)	1	1	1	
terrestrial mammal (Red Squirrel)	1	1	1	
tunicate (Urochordata)	1	1	1	
Totals:	699	885		

Table A2. Taxon groups, species, and numbers of responses. Some taxon groups have been altered slightly to correspond to the groupings appropriate to the responses received. Entries refer to the main worksheet in the Master Workbook. Where a taxon was included in more than one response, all responses are included, so some taxa appear more than once in the worksheet.

Appendix 3. Organisations and respondents.

The number in the first column refers to the organisation code used in the Master Workbook.

Code	Organisation	Respondent
1	The Association of British Fungus Groups, Harveys, Alston, Axminster, Devon EX13 7LG.	Michael Jordan mj@abfg.org 01460 221788
2	Amphibian and Reptile Conservation, 655A Christchurch Road, Boscombe, Bournemouth, BH1 4AP, Dorset.	Dr. John W. Wilkinson johnw.wilkinson@arc-trust.org 01202-727990
3	British Lichen Society, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, U.K.	Brian Coppins lichensel@btopenworld.com
4	International Otter Survival Fund, 7 Black Park, Broadford, Isle of Skye IV49 9DE	Grace Yoxon grace@otter.org 01471 822 487
5	Riverfly Recording Schemes (Ephemeroptera Recording Scheme/Plecoptera Recording Scheme), Balallan House, 24 Allan Park, Stirling FK8 2QG.	Craig Macadam info@ephemeroptera.org.uk 01786 447504
6	Scottish Natural Heritage, Battleby, Redgorton, Perth PH1 3EW.	Athayde Tonhasca Athayde.Tonhasca@snh.gov.uk 01738 444177
7	Scottish Natural Heritage & Malloch Society, Battleby, Redgorton, Perth.	Iain McGowan
8	The National Trichoptera (Caddisfly) Recording Scheme, National Museums Liverpool.	Ian Wallace www.liverpoolmuseums.org.uk 0151 478 4385
9	British Arachnological Society (Spider Recording Scheme)	mike.davidson55@btinternet.com
10	BWARS/Hymettus	Murdo Macdonald mamacdonald@syrphus.fsnet.co.uk 01997 421797 (home)
11	Sea Mammal Research Unit, Gatty Marine Laboratory, University of St Andrews, St Andrews, Fife KY16 8LB.	Phil Hammond psh2@st-andrews.ac.uk 01334 462630
12	SNH	iain.sime@snh.gov.uk
13	Highland Biological Recording Group	Ro Scott ro.scott@care4free.net 01381 600392 (home)
14	Mammal Society	Ro Scott ro.scott@care4free.net 01381 600392 (home)
15	WWT Caerlaverock Wetland Centre Eastpark Farm, Caerlaverock, Dumfriesshire, Scotland DG1 4RS	Dr Larry Griffin, 01387 770200, larry.griffin@wwt.org.uk
16	None	Jonathan Willet, from comments by Peter Maitland info@tarbh-nathrach.co.uk 01349 861994 (home)

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Code	Organisation	Respondent
17	Rivers and Fisheries Trusts of Scotland, Capital Business Centre, 24 Canning Street, Edinburgh EH3 8EG.	Callum callum@rafts.org.uk 0131 272 2797 Sinclair
18	Scottish Ornithologists' Club, The Scottish Birdwatching Resource Centre, Waterston House, Aberlady, East Lothian, EH32 0PY.	Clive mail@the-soc.org.uk 01875 871 330 Mackay
19	Sea Mammal Research Unit, Gatty Marine Laboratory, University of St Andrews, St Andrews, Fife KY16 8LB.	Callan c.duck@smru.st-andrews.ac.uk 01334 462636 Duck
20	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
21	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
22	British Mycological Society, City View House Union Street Manchester M12 4JD.	Paul p.kirk@cabi.org 0161 277 7638 / 7639 Kirk
23	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
24	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
25	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
26	Saving Scotland's Red Squirrels	Mel mtonkin@swt.org.uk 0131 312 4733 Tonkin
27	Personal, Buglife and Recording Scheme experiences.	Craig info@ephemeroptera.org.uk 01786 447504 Macadam
28	Scottish Natural Heritage, Cameron House, Albany Street, OBAN, Argyll, PA34 4AE	James James.Thorburn@snh.gov.uk 0300 244 9360 Thorburn
29	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Laura laura.clark@snh.gov.uk 01463 725237 Clark
30	Wildfowl and Wetland Trust, Slimbridge, Glos, England, GL2 7BT.	Richard richard.hearn@wwt.org.uk 01453 891185 Hearn
31	Scottish Natural Heritage, Mariner Court, 8 South Ave, Clydebank Business Park, Clydebank, Dunbartonshire G812NR	Colin colin.bean@snh.gov.uk 0141 951 4488 Bean
32	Aberdeen University, Lighthouse Research Station, Lighthouse Cottages, George Street, Cromarty, IV11 8YR.	Prof Paul lighthouse@abdn.ac.uk Thompson

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Code	Organisation	Respondent
33	Scottish Natural Heritage, Battleby, Redgorton, Perth PH1 3EW.	Chris Leakey Chris.Leakey@snh.gov.uk
34	Butterfly Conservation Scotland, Mill House, Mill Road, Kingussie, Inverness-shire PH21 1LF.	Tom Prescott tprescott@butterfly-conservation.org 01540 661469
35	BSBI, Botany Department, The Natural History Museum, Cromwell Road, London, SW7 5BD.	Murdo Macdonald mamacdonald@syrphus.fsnet.co.uk 01997 421797 (home)
36	Bat Conservation Trust, The Attic, Scottish Churches House, 1 Kirk Street, Dunblane FK15 0AJ.	Anne Youngman (Scottish Officer) ayoungman@bats.org.uk 01786 826 792
37	JNCC, Inverdee House, Baxter Street, Aberdeen AB11 9QA.	Eunice Pinn Eunice.Pinn@jncc.gov.uk 01224 266550
38	British Trust for Ornithology (BTO)	Ms Chris Werham chris.werham@bto.org.uk 01786 466560
39	Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW.	Rob Raynor, Mairi Cole
40	Personal comments	Peter Maitland
41	Marine Conservation International, 5 Lang Rigg, Flat 6, South Queensferry EH30 9WN.	Dr. Mauvis Gore mauvis@saveourseas.com 0131 319 1042
42	Royal Botanic Garden Edinburgh, 20A Inverleith Row Edinburgh EH3 5LR.	Heather McHaffie h.mchaffie@rbge.org.uk 0131 552 7171
43	None	Murdo Macdonald mamacdonald@syrphus.fsnet.co.uk 01997 421797 (home)
44	British Bryological Society	Murdo Macdonald mamacdonald@syrphus.fsnet.co.uk 01997 421797 (home)
45	Cairngorms Wildcat Project	Dr David Hetherington, Cairngorms National Park Authority, 14 The Square, Grantown-on-Spey PH26 3HG davidhetherington@cairngorms.co.uk 01479 873535

Table A3. Responding organisations and individuals. The number in the first column refers to the organisation code used in the Master Workbook.

Appendix 4. Full responses to Q 23: ‘Do you think there is anything we have not asked about your organisation’s data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?’. The organisations and respondents are listed in Appendix 3

Organisation code (see Annex X)	Full responses to Q 23: ‘Do you think there is anything we have not asked about your organisation’s data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?’
1	<p>You have asked whether CATE2 data is available via the NBN Portal and the answer is negative. The CATE2 database has now passed half a million UK fungus records, assembled in less than 3 years, and we consider that direct access is the most effective way of delivering the enhanced data analysis capability that CATE2 now offers. The Gateway is not a quality control mechanism beyond that it requests a basic minimum range of data to go with a record. The NBN Trust states: “We make no representation and give no warranty that any material, data and/or information is accurate, up to date or complete.” So it’s not a vetting process and getting data onto NBN Gateway does not amount to any form of accreditation. The Gateway was set up to provide online access to a range of UK wildlife datasets that were otherwise not readily accessible to the wider world. Going onto most wildlife conservation websites, you will not find online access to a database, or if you do, it will at best have a fairly limited capacity for anything beyond simple viewing and selecting. Creating a dynamic inter-relational database online requires a high degree of technological know-how, a specialised broadband provider, fairly sophisticated web hosting, and therefore a major investment. The NBN Trust set out to provide free access to small and in some cases not-so-small disparate datasets through a facility that allows a basic level of analysis. CATE2 doesn’t match the criteria because it already has, online, far more advanced analysis, built-in recording facilities, and what NBN has described as ‘fantastic mapping’. It is a database that no agency, no LRC, no recorder, certainly in the UK, is now unaware of. And it is also deceptively simple, even for the non-computer literate, much simpler to access directly than through the Gateway. There would be very little point in duplicating CATE, merely so that it can be accessed by a more basic and more convoluted third party route. There are now other drawbacks to the ABFG copying to the Gateway, which revolve around the technology. CATE has moved away from analogue. All CATE2 data is now stored in digital form, none of it as text. The NBN Gateway still operates on analogue, and it would be quite a task to convert the full CATE data set, at regular intervals, back into analogue, and could hardly be justified if the only reason was to supply it as a copy of what is already fully available in a more advanced form than the Gateway can deliver. The Gateway is a route. It’s not a panacea. I should add that if the Gateway arrangements at some time include the provision of a simple link to the database the position will be re-examined.</p>
2	<p>I’m not sure our answers are really adequate - we’re unclear as to whether or not the “lead role” equates to the BAP Lead Partner role as was... Essentially, there is annual surveillance of natterjack populations and we’re very involved in status monitoring of gcns with SNH, including arranging surveys and describing status (a report due any time). We’ve also been doing predictive mapping of gcn pops and habitat that will/can be applied to other species. For all terrestrial herps, we organise the NARRS scheme (see www.narrs.org.uk) and attached interim report. Suggest you ask if need clarification but won’t be able to respond until Feb. We don’t hold data on marine turtles.</p>
3	<p>Missing species: <i>Catolechia wahlenbergii</i> (Sch. 8); <i>Cladonia trassii</i> [<i>C. stricta</i> auct. brit.] (Sch. 8)</p> <p>The biggest constraint on data gathering is shortage of suitably experienced and qualified personnel, and the time that those persons have available to them for recording, in addition to their other work and commitments. Amateur recorders with suitable skills are even fewer, but can be trained to recognize a few key species in their patch - e.g. a former RSPB officer has recently been finding new or confirming old site for, e.g. <i>Schimatomma graphidioides</i> and <i>Sclerophora pallida</i> in NE Scotland. Furthermore, it should be said, that such amateurs are invariably retired professional from the fields of conservation or forestry, and so have a good eye for a habitat. I could expand on these matters if needs be, and there are the additional problems of site remoteness and access and permissions for access to undertake survey work and the time/cost implications.</p> <p>The BLS has not undertaken regular monitoring of any of the listed species in its own right, but some such monitoring has been carried out (under contract to SNH) during SCM of selected SSSIs and for <i>Nephroma arcticum</i> at Beinn Eighe NNR.</p> <p>There are currently no formal data exchange agreements between the SSLD and any Local Biological Record Centres, some preliminary discussions have been made to this effect.</p> <p>The SSLD is a sites-based database, such that population information on individual species is often summarised, even though more detailed information may be present elsewhere in reports (site surveys, SCM reports, EIAs, etc.). For the present, there is no Threatened Lichen Database for Scotland, which could handle such detailed information more adequately.</p>
4	<p>One of the problems with otter surveying is that it is based mostly on spraint and this just tells you that an otter has passed by - it doesn’t mean it is resident or breeding. It also gives no indication of numbers. For example if an otter home range is say 20km of river and now spraints are being found further afield, we don’t know if that means there are now 2 otters or that the 1st has to travel further to meet its requirements.</p>

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Organisation code (see Annex X)	Full responses to Q 23: 'Do you think there is anything we have not asked about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?'
5	Nigrobaetis niger is now known as Baetis niger. The Riverfly Recording Schemes are run on a voluntary basis. The Ephemeroptera Recording Scheme is interested in developing monitoring for Baetis niger. Further monitoring of Brachyptera putata would be relatively easy to achieve at fixed sites.
6	[No response]
7	I don't know why Doros is included on your list - I think that it is just an occasional vagrant in Scotland so no data attached for it.
8	Yes, you have not asked what sort of survey work I might feel was appropriate if there were funds or staff time of others. At the present time I do not know if the species is still present where recorded in the past let alone exactly where on those sites. The questionnaire is poor in some areas in that having said that at this time I did not have an Atlas I missed out on being able to say all the things I would hope to have covered if I had answered yes. You might have also asked what additional information was the scheme planning on publishing - which it is in the form of a Scarce and Threatened Caddis Review and also a review of BAP species via the Riverfly Group and Buglife. You might also have asked if I knew if the species was being monitored or was threatened in other countries.
9	One of the main aims of the recording scheme is to provide up-to-date data on the distribution of spiders in Britain. The data available on the website have been gathered by the Spider Recording Scheme (SRS) since 1987. The distribution maps and summary charts on this website are generated from the latest data available to the recording scheme. Data are periodically uploaded to the NBN but the most up to date data will be found on the SRS website. It should be noted that the NBN also carries datasets which have not been validated by the SRS and should be used with caution. There is collaboration with SRS members working on Agroeca cuprea in England.
10	The main factor restricting the knowledge of aculeates in Scotland is the lack of competent observers, and the lack of resources to allow the few specialists to carry out the work in distant and difficult terrain. The sensitivity of the bees to temperature means that systematic survey and monitoring is difficult, as it must be carried out on warm days suitable for their activity. Data will be very noisy, especially as densities are generally low. Attempts to devise suitable monitoring of Colletes floralis under the B. distinguendus SAF project raised opposite problems, as these nest in very large and dense aggregations whose size and density are not easy to determine. Monitoring of Formica exsecta will be easier as the nest mounds are relatively static, can be marked, and can be assessed in any weather. Some monitoring has been taken place at the three main centres (not by BWARS or Hymettus), but results have not always been made widely available. Assessments of range changes in all species is influenced by variable and unsystematic effort over decades. For details of F. exsecta monitoring, see SWT (Jonny Hughes).
11	[No response]
12	Overall, the difficulty in maintaining survey information about pearl mussel populations in non-designated sites is the major omission from our datasets. For most of those populations we have only one set of monitoring data, invariably collected in 1997. Therefore it is very difficult to produce informed trend information for the status of the species across Scotland.
13	No. Our dataset is a contribution to the overall picture. We are not a big enough organisation to carry out the kind of statistically rigorous sampling which would be necessary to monitor the status of these species to any degree of accuracy. - But if someone else could provide the resources, we'd be happy to help!
14	I, as a local Mammal Recorder for Highland, am attempting to answer this questionnaire on behalf of the Mammal Society nationally. Whilst I think I have a reasonable grasp of what is going on in Highland, I cannot guarantee to know everything that the Society is doing in other parts of Scotland. For Q4 on the Datasets sheet, I have answered "Fully" - but this relates to the HBRG dataset. Areas of Scotland which have a Mammal Society Recorder (from Mammal Soc website 24/1/11): http://www.mammal.org.uk/index.php?option=com_content&view=article&id=283&Itemid=329#scotland
15	WWT are currently about to embark on an Esmee Fairburn Foundation funded project over the next 3 years which should enable targeted sampling and monitoring protocols to be developed within the core range in south-west Scotland and also UK-wide across its former range. Alongside this WWT will continue to work closely with Glasgow University to establish sampling protocol and hatching strategies
16	JW's opinion, but it is in keeping with Peter's tone in the BRISC article on this species: There is no surveillance scheme, no indication on the presence or absence of this species on the two known sites since 1996, no idea of the population size or its status. It should be a notified feature on the SSSI it is on a subject to SCM, arguably the same should happen to the other site it is found on i.e designate the site, notify H.m as a feature and monitor it.
17	[No response]
18	The data we collect are spread across the whole country, for all bird species and for all seasons. But the SOC does not generally organise systematic surveys. The exception to this is where local SOC bird clubs have organised tetrad breeding and wintering atlases of birds - e.g. in Lothian, Borders, Clyde, Ayr and Fife. Also SOC is a partner in the current BTO/SOC/IWC national bird atlas, but this survey is organised by the BTO.

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Organisation code (see Annex X)	Full responses to Q 23: 'Do you think there is anything we have not asked about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?'
19	SMRU provides advice to Scottish and UK government annually (http://www.smru.st-and.ac.uk/documents/341.pdf). We report all issues requested here through a number of different channels. This almost invariably involves SNH as they are one of our main 'customers'. Our data are used specifically for all reporting of harbour and grey seal SAC site condition. All this information has been documented in Charting Progress 2, State of Scotland's Seas etc etc. There seems to be an awful lot of reiterating the same information in ever so slightly different formats. We do not produce an atlas but we produce updated distribution maps. We do not provide data to National Biodiversity Network but the information should be available on request. It is not appropriate to include the Arctic seal species listed here as they are rare visitors at best. About as sensible as a monitoring programme for snowy owls.
20	SNH do not routinely survey or monitor specific species. Work is instead concentrated within specific areas of interest with the monitoring of specific designated features within SACs and SSSIs. Species marked on the datasets page as PMF mean that they are on the Scottish priority marine features list. These features are helping to deliver the new MPA programme and a new geodata base has been created for these features.
21	SNH do not routinely monitor and survey specific species. Our work is concentrated on monitoring specific designated features within SACs and SSSIs. Species marked on the datasets page as PMF mean that they are on the Scottish priority marine features list. These features are helping to deliver the new MPA programme and a new geodata base has been created for these features.
22	none that I am aware of
23	SNH do not routinely survey or monitor specific species. Work is instead concentrated within specific areas of interest with the monitoring of specific designated features within SACs and SSSIs. Species marked on the datasets page as PMF mean that they are on the Scottish priority marine features list. These features are helping to deliver the new MPA programme and a new geodata base has been created for these features.
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26	1. Red squirrel distribution data in Scotland is inextricably negatively associated with grey squirrel distribution data, except for areas of overlap during the period of replacement of reds by greys. In is therefore essential to collect grey squirrel distribution records in order to make sense of red squirrel records. 2. Nationwide systematic surveillance of both squirrel species is desirable, but beyond the scope of the SWT red squirrel conservation partnership projects, which are localised within broad regions (Grampian, Tayside, Mid-Argyll & Trossachs, Borders, Dumfries and Galloway). Casual sightings data is collected from right across Scotland, however, for inclusion in the Scottish Squirrel Database, which is now held by SWT.
27	[No response]
28	The post ends on the 25th of March, but it is hoped that funding for the post will continue and James Thorburn is hoping to continue research by undertaking a PhD when the post finishes. Data gathering is based on anglers data and there are many gaps in it. Of the Sharks and Rays listed only the Skate, Tope and Spiny Dogfish are covered by the tagging programme as they are readily accessible to anglers. Other species are either oceanic or deep water species. Data for deeper water species is relatively hard to come by while data on basking sharks and porbeagle would be easier to source.
29	SNH do not routinely survey or monitor specific species. Work is instead concentrated within specific areas of interest with the monitoring of specific designated features within SACs and SSSIs. Species marked on the datasets page as PMF mean that they are on the Scottish priority marine features list. These features are helping to deliver the new MPA programme and a new geodata base has been created for these features.
30	[No response]
31	It might have been worth asking what level of resource would be required to establish a surveillance strategy for these species. This would help other to appreciate what can be achieved for a relatively modest amount.
32	Almost certainly, but this needs some further thought and understanding of how the information is being integrated and used.
33	Data - Fisheries Research are now Marine Scotland Science, who are in main charge of Marine and fisheries data and collecting it. NBN - not great on Marine data due to volume of it and also suitability with the RECORDER platform. JNCC UK Sea Map and Mesh use topographical and sediment data to inform predictive habitat mapping products. Data/GIS layers of, for example, SeaZone, BGS or Admiralty charts can be expensive and has licensing conditions attached.

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

<p>Organisation code (see Annex X)</p>	<p>Full responses to Q 23: 'Do you think there is anything we have not asked about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?'</p>
<p>34</p>	<p>Firstly I have not entered anything against the 71 species of widespread and common but declining moths. These are in a single action plan for RESEARCH only and not relevant for this exercise. Also the individual species do not warrant UKBAP status and therefore their own line on your spreadsheet or any list of UKBAP species – I have informed SNH of this on several occasions but they still persist in retaining these on list as if they each merit UKBAP status. They just dilute the true UKBAP species on the list – sorry rant over! Also Small Heath is also a RESEARCH only species. I think the issues are similar for most species – we have good info on distributions for both butterflies and macro-moths mainly from casual recording. Good monitoring of annual pop changes (mainly through transects) for most of the butterflies but could be better, only have this for some of the v rare moths. Systematic surveys are desperately needed for some of these species eg Chequered Skipper not been a national survey since 1997 and that was only a partial survey. We promote recording of some of the UKBAP species but very dependent on availability of suitable volunteers. We are also very reliant on our volunteers to collect and verify this data. As always it comes down to resources – ideally we need paid volunteer co-ordinators to train, encourage, cajole, provide feedback etc to our volunteers. Also considerable resources required within BC to analyse data, produce atlases and provide data to NBN etc</p>
<p>35</p>	<p>Jim McKintosh, j.mckintosh@rbge.ac.uk, replied 'Have a look at our website – and particularly the TPP pages for a list of 50 species that we are looking at in more detail'. MAM has filled in the Flowering plant, Conifer and Fern rows from data there and from the BSBI dataset metadata on NBN Gateway. Many questions could not therefore be answered with authority, and BSBI is not responsible for any of the entries I have made. Also from K.J. Walker, D.A. Pearman, R.W. Ellis, J.W. McIntosh & A. Lockton 2010. Recording the British and Irish flora, 2010-2020. Botanical Society of the British Isles, London.</p>
<p>36</p>	<p>Parti-coloured bat is a vagrant species in the UK with a small number of records each year. Although protected under the Habitats Directive it isn't a resident species in the UK and would be unlikely to be subject to survey and/or monitoring. The common name used for <i>Nyctalus leisleri</i> in the UK is Leisler's bat. The NBMP was originally set up to monitor population trends for species at a UK level, but reporting at finer scales is possible, providing the sample size of sites exceeds certain thresholds. Power analysis completed in 2001 showed that a core of 30-40 sites need to be surveyed annually in order to enable trend estimates to be calculated. Currently it provides trends for 11 of the UK's 17 resident species of bat from a number of different survey methods including colony counts, field surveys and hibernation surveys. This includes the Scottish species: Daubenton's bat, whiskered / Brandt's bat (considered together in NBMP analysis), Natterer's bat, noctule, common pipistrelle, soprano pipistrelle and brown long-eared bat. The only survey showing sample sizes close to this threshold is the Waterways Survey for Daubenton's bats. Increases in the number of repeat sites sampled would be required in Scotland to allow population trends to be calculated for all Scottish bat species. This could potentially be achieved if resources were available to provide a larger number of volunteer surveyors that could be recruited and trained to complete surveys across Scotland, and potentially provided with equipment (bat detectors) required to carry out those surveys, plus the support needed to ensure continued participation in the surveys annually. The NBMP data can be used to contribute to distribution information, as a by product of the data collected for the calculation of population trends. However, there will always be some biases in this type of distribution data as it is not collected in a systematic way. There is an unevenness in recording effort, particularly in Scotland as surveyors tend to be sparsely distributed in some regions in particular. There will also be a bias towards species that are relatively easy to find, for example those that live in buildings, or detect for example pipistrelles. The surveys were designed to detect changes in population trends rather than either to calculate population size or distribution per se. This is mainly due to the challenges of surveying for bats and limitations on our ability to estimate population size. There has been some effort to estimate population sizes for bats in Harris et al. 1995 (A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC). More recently, the JNCC reported conservation status of bat species under Article 17 of the Habitats Directive (http://www.jncc.gov.uk/article17). Whilst these reports are at a UK level they provide updated information on the range and distribution of bat species in Scotland.</p>
<p>37</p>	<p>Cetaceans need to be considered at an appropriate biological scale. This means work focused on Scottish waters alone is limited for the majority of species (as is a solely UK approach). JNCC is working toward an international collaborative approach to the assessment of status (including distribution and abundance) through ASCOBANS and ICES. Main thing I'd say is that JNCC collate data from many areas to produce status assessments and the like. However, we are developing a surveillance and monitoring programme for cetaceans. The central part of this is the Joint Cetacean Protocol. This will be a web-based portal that data from a variety of sources can be input to (dedicated surveys, opportunistic surveys and NGOs). Funding has recently been secured to enable a full analysis for all species in UK waters where sufficient data exist. This will include density surface plots and assessments of trends over time. The time scale for this is 2012/3 - in time for the next FCS assessment. With regard to strandings and bycatch - JNCC provide day to day management of the CSIP on behalf of Defra and we are members of the Steering groups for both CSIP and the bycatch monitoring project.</p>

Appendices for Review of recording scheme surveillance information for specified terrestrial and freshwater species in Scotland.

Organisation code (see Annex X)	Full responses to Q 23: 'Do you think there is anything we have not asked about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.?'
38	<p>We have provided a lot of extra information here as the previous sheets are not the most useful for detailing the data holdings relating to BTO surveys, many of which are multi-species. Note that raptor surveillance is being reviewed by a separate contract to BTO from SNH (due to report by end of March 2011). Species with breeding population trends adequately monitored by the BTO/JNCC/RSPB Breeding Bird Survey (BBS) are flagged in the previous sheets (see www.bto.org/bbs and www.bto.org/sites/default/files/u31/downloads/details/breedingbirdsurvey.pdf for more details of this survey). Species with BBS in brackets have almost reached the minimum number of 1-km squares containing the species for trends to be produced. Habitat information is collected for each BBS square monitored. Species monitored in the winter by the BTO/RSPB/JNCC Wetland Bird Survey (WeBS) in association with WWT are also flagged in the previous sheets (see www.bto.org/webs, www.bto.org/sites/default/files/u31/downloads/details/webscorecounts.pdf and www.bto.org/sites/default/files/u31/downloads/details/webslowtidecounts.pdf for more information on WeBS). WeBS does not involve the collection of habitat information. BBS and WeBS run annually and will continue and be developed in the long-term, funding and volunteer numbers permitting. BBS and WeBS data are not currently available via NBN. For information on the Winter Gull Roost Survey see www.bto.org/sites/default/files/u31/downloads/details/wintergulls2004.pdf). For information on other BTO-led surveys (Nightjar, Woodcock etc) see www.bto.org/research-data-services/data-services/survey-details, which is undergoing ongoing development to add information. Presumably you have asked the Rare Breeding Birds Panel to contribute to your survey or will consult their website for information on the species for which they collect information on an annual basis. In terms of barriers to data collection under BTO-led monitoring schemes (your Qu.20c), the ongoing concerns are long-term funding and the long-term engagement and training of volunteers, into which the BTO puts a large resource on an annual basis. In terms of standards for taxonomic and location accuracy (your Qu.3), the BTO has implemented a whole range of safeguards for ensuring high quality data collection by our volunteers. These start from the field, with volunteers supported and selected by our network of Regional Representatives who can gauge skill levels and match volunteers to appropriate surveys. We have a range of training available to our volunteers, including bird identification training and training for specific survey methodologies. We have formal validation infrastructure for both identification and location build into the data capture process for some surveys (e.g. Bird Atlas 2007-11), whilst for others data comes in via Regional Representatives who can vet the records before submission. We can provide further information on all of these validation techniques if required. Our largest concern for terrestrial bird surveillance in Scotland currently is the difficulty of covering upland and montane areas of Scotland and we are considering ways of involving a wider cross-section of the public in bird recording and novel methodologies for increasing coverage.</p>
39	<p>Although we may hold individual sets of data, we do not lead on data collection or management of any of the species listed. Most are done through partnership funding and the data managed externally. We do not have the basis of a surveillance scheme for any of them. The spp list is incomplete, why does it not include the 8+ species of bat that occur in Scotland and Otter (all EPS)?</p>
40	<p>[No response]</p>
41	<p>The questionnaire is difficult to answer and may be prepared for terrestrial situations. The answers do not describe our situation fully and it is important that the information is available for SNH</p>
42	<p>HM provided limited information on the four rarest ferns in email of 26 March.</p>
43	<p>Limited information gleaned from Internet.</p>
44	<p>Limited information gleaned from Internet.</p>
45	<p>The camera trapping the Project conducts also throws up data on a number of other bycatch species. This will be retained and ultimately fed to biological record centres where it may be of use for assessing populations.</p>
<p>Table A4. Full responses to Q 23: 'Do you think there is anything we have not asked about your organisation's data that will be of value for species surveillance e.g. gaps in species coverage, temporal variability, potential changes to your current surveillance schemes etc.'. The organisations and respondents are listed in Appendix 3.</p>	

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