Reserve Biodiversity

Scottish Wildlife Trust

an assessment of the habitats and species on Scottish Wildlife Trust reserves

The Scottish Wildlife Trust, 2011

About the Scottish Wildlife Trust

THE SCOTTISH WILDLIFE TRUST, established in 1964, has the charitable purpose to advance the conservation of Scotland's biodiversity for the benefit of present and future generations. With more than 36,000 members, over 120 reserves and a network of volunteers the length and breadth of the country, we are proud to say we are now the largest voluntary body working for all the wildlife of Scotland.

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Contents [click title to view section]

Please note

This report was compiled in November 2008, being published in 2011. In the intervening time, very little will have changed on Trust reserves and so the findings within this report are still valid.

Two reserves, Stormont Loch and Doire Donn were disposed of during 2010/11 as the respective landowners did not wish to continue with the management agreements. These reserves are still included within the findings of this report.

Cover images: Seaton Cliffs © Ann Kerrigan; Scottish primrose *Primula scotica* © Vilhjalmur Vilhjálmsson; Common darter *Sympetrum striolatum* © Neil Phillips.

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1. Executive summary

Species

Some 29% of the UK Biodiversity Action Plan (BAP) Priority Species present in Scotland[1] and 11% of Scottish Biodiversity List (SBL) species have been recorded on Trust Reserves, whilst the Trust only manages 0.25% of Scotland by area. In addition, 68% of the Scottish Natural Heritage Species Action Framework (SAF) species listed as requiring "conservation action" occur on Trust reserves. Only five Trust reserves have no important species present. UK BAP species are found on 106 (out of 123) Trust reserves; SBL species on 113; and SAF species on 50.

As with the 2007 report, the bias in surveying towards the larger organisms remains clear. However, this is true of the UK (indeed the world) as a whole and little can be done about this, without suitably trained specialists and the funding to support them.

Analysis is primarily focused on UK BAP Priority Species as this forms the basis of other lists. This list was sub-divided to remove those species over which the Trust has little control (birds, butterflies and moths, and marine species) to enable more relevant analysis. The status, monitoring and management of species recorded on reserves was investigated in detail:

- Of the 256 records in question, only around 30% are being monitored in some way.
- It is felt that Trust reserves are being managed adequately for Priority Species in 91% of cases.
- In cases where management is considered to be inadequate, only 52% are being monitored in some way.
- Only 6% of records are believed to be in a vulnerable or declining state. However, practical management is only being undertaken for 30% of these.

What is clear is a lack of correlation between management and monitoring. Presumably decisions are being made based upon casual observations. This process could be made more efficient and transparent by more careful, systematic recording of even casual observations which would then constitute simple monitoring.

Habitats

Of the 65 UK BAP Priority Habitats, 41 occur in Scotland[2]. Of these, 28 (68%) have been recorded on Trust Reserves. These habitats are found over 98 Trust reserves.

Trust reserves are dominated by upland heathland (45 % by area), due to the large northern reserves, such as Ben Mor Coigach.

Considering the focus of its work on conservation, the Trust can be said to be broadly representative of Scotland's habitats.

Invasive non-native species

Out of a total of 123 Trust reserves, 63 (51%) support invasive non-native species. In terms of the SNH Species Framework list, four out of the six listed occur on Trust reserves.

Perceived threat, monitoring and management data was collected and analysed:

- Of the 159 records of invasive non-natives, only around 54% are being monitored in some way. Only 22 (14%) pose a significant threat, however management is only being taken for 9 of these.

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- It is felt invasive non-natives are being managed adequately in 23% of cases, although including where non-intervention is considered appropriate, this figure rises to 78%.

Signposting

With so many species to consider, signposting appears to be the only realistic way forward. By assigning Priority Species to Priority Habitats on each individual reserve; monitoring, and where necessary, management, can be more easily and effectively targeted.

Signposting has not provided the perfect solution to having to consider a large number of species; some species will still require carefully targeted individual attention; however it would seem to provide a useful basis for future planning. Only by attempting to apply this in the field will it become clear just how useful this is.

Common blue butterfly *Polyommatus icarus* © Darin Smith ↑

Footnotes

[1] This is excluding 12 purely marine species that were merely observed from Trust reserves

[2] http://www.scotland.gov.uk/Publications/2007/10/08091435/4

2. Introduction

The Scottish Wildlife Trust (SWT) manages 123 reserves covering an area of more than 20,000 ha (at the time the detailed data was collated for this report, in 2008)[3]. These reserves range from inner city to remote wilderness areas and from the sea to the mountain tops. The Scottish Wildlife Trust defines the purpose of its reserve network as "a network of wildlife reserves to safeguard a broad representation of wildlife found throughout Scotland, and to act as examples to others and for the public benefit, including: enjoyment, information and education". The aim therefore is to manage a suite of reserves that are broadly representative of Scottish wildlife habitats. As well as presenting an overview of biodiversity on Trust reserves, this report also provides some indication of how closely the Trust is meeting this aim.

This report expands upon the report Biodiversity of Scottish Wildlife Trust Reserves 2007, and for the first time analyses data looking at the monitoring and management work undertaken on reserves with respect to priority species and habitats and invasive non-native species.

Utilising the revised UK BAP list, incorporating 10,000 more species records, and including the NVC data now available for 98 Trust reserves, this report supersedes all previous versions.

The introduction of a species and habitats recording database, Recorder 6, has significantly improved the management, access and availability of biodiversity data within the Trust. This is the national standard for this data and through dedicated volunteer and staff effort, over 90,000 species records are now on the system.

The report is divided into four sections, analysing the status and actions for: species; habitats; invasive non-native species; and "signposting" of species to habitats to aid prioritisation of management. This analysis was undertaken to: support a strategic review of Trust reserves; provide the Trust with a better understanding of what exists on our reserves; identify what is currently not represented within our network and to inform the Trust's new vision and strategic plan. This review also provides a useful baseline by which we can supplement records and monitor change.

The aim is to update this report periodically, to include new species records and reflect changes to the reserve portfolio.

The focus of this review is on priority species and habitats according to classifications used by the UK Biodiversity Action Plan process, the Scottish Biodiversity Strategy (SBS) List (SBL)[4], and the SNH Species Action Framework list. As a result, records for common species, though collated by the Trust , are not presented in this report.

A further task will be to look at designated features on Trust reserves and the subject of site condition monitoring and to what extent this can inform management.

A CD of this report and its associated annexes is available on request.

Footnotes

[3] See note on page 3.

[4] www.biodiversityscotland.gov.uk

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3. Review of species on Trust reserves

Methodology and constraints

The data on the important species present on each reserve has been collated from a number of sources: the Recorder database and Reserve Managers collating additional information from species lists found in management plans and reserve files. The data from Recorder includes existing surveys (carried out by Trust staff, volunteer groups, volunteer experts and contractors) and incidental records and sightings from staff, volunteers and visitors.

Throughout the history of the Trust surveying of species has not been systematic, due to a lack of time, funds and specialist knowledge. As a result, for some reserves there may be less species data available. It is also accepted that the available data is likely to be skewed towards the larger, more easily recognisable groups such as the mammals and birds, whereas smaller, less commonly recognised groups such as the invertebrates and lower plants are likely to be under-recorded/surveyed less frequently. There is also no capacity with this style of reporting to qualify the data; frequency of occurrence/ population size, etc. A single sighting weighs as much as a multi-year record; a single plant weighs as much as an established colony. The size of reserves, their range of habitats, prior land use of the site and the length of time a site has been managed as a Trust reserve will all impact the number and diversity of species present.

Of the three lists being considered, the UK BAP provides the most useful starting point as it relates to Priority Species, a large number of which have a detailed Action Plan and all have a Species Statement. Second to this could be the SBL; however, the more recent SNH Species Framework list indicates funding and positive action for a smaller number of species extracted from the two previous lists and therefore deserves some additional attention.

Categories of biodiversity

To measure the biodiversity currently recorded on Trust Reserves, species data was compared with the current lists of species status information for Scotland. This data comes in a number of forms. This report focuses on three categories of species:

Those identified as "Priority Species" by the UK Biodiversity Action Plan (UK BAP)[5] (taken from the new list following the latest review) many of which have their own individual Species Action Plans (UK SAPs).

Those species identified as of "principle importance" by the more extensive Scottish Biodiversity Strategy (SBS) List (SBL)[6].

Those listed under the SNH Species Action Framework[7].

For the purposes of this report all such species will be referred to as "important species" as Priority Species specifically denotes species on the UK BAP list.

Footnotes

[5] Revised and extended 2007 – www.ukbap.org.uk

[6] Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland(2004) - http://www.scotland.gov.uk/Publications/2004/05/19366/37250

[7] SNH Species Action Framework - www.snh.org.uk/speciesactionframework/default.asp

Another level of important species is those identified as designated features on designated sites (such as SSSI etc) managed by the Trust . SNH Site Condition Monitoring is intended to show whether or not these are in favourable condition, and those that fail this test require particular attention. However, as the Site Condition Monitoring system is currently being adapted to show which features actually fall within the boundaries of Trust reserves (or those of other organisations), it remains difficult to address this. As a result, such features are considered to be beyond the scope of this report and will need to be considered once the new system is running.

UK BAP Priority Species

Priority Species are listed under the UK BAP, which was created (in accordance with the aims of the Convention on Biological Diversity, 1992) to describe the biological resources of the UK. Many of these species have an action plan, in order to provide information on the threats to that species and to set target actions for its protection. Priority Species are generally defined as species threatened on a global scale, which have been seen to decline in the UK, by more than 50% in the last 25 years (measured by range or population size).

In the UK as a whole, Species Action Plans were written for 391 species; this consists of both terrestrial and marine species. Since a review in 2007[8], though a large number of new species have been added, some of those previously on the list have been removed – there are now 1,149 species on the list. Though Action Plans may be produced for some of the new species in due course, it is unclear how many this might be. The UK BAP list has now been sub-divided by SNH for those species found in Scotland, as many species will not be found here due to range, climate and habitat required. There are 610 species on the Scottish list, 73 of which are marine. A few species with only "very dubious" records for Scotland were omitted from the Scottish list and "Not all of these species require conservation action in Scotland. For example at least 16 species are recent introductions for which conservation action is not considered appropriate. Many others only require survey/ monitoring and/or research"[9].

This category contains some of the rarest and most endangered organisms in Scotland; some have very small populations or restricted ranges such as: Lacerta agilis – Sand lizard (found in Scotland only on Coll); Hypocreopsis rhododendri – Hazel Gloves Fungus; and Bombus distinguendus – Great Yellow Bumblebee, making this a very stringent measure of biodiversity value.

Scottish Biodiversity Strategy list (SBL)

The Scottish Biodiversity Strategy (SBS), "Scotland's Biodiversity: It's in your hands" was published by the Scottish Executive in May 2004[10]. This sets out a framework for conserving biodiversity "for the health, enjoyment and well -being of the people of Scotland now and in the future". As part of this process, a list of "flora, fauna (and habitats) considered by the Scottish Ministers to be of principal importance for biodiversity conservation" was compiled. Although this includes marine species (and habitats), for the purposes of this analysis, these (except mammals, which are often spotted and recorded from Trust reserves) have been excluded as the Trust does not currently manage any truly marine wildlife reserves. The criteria for selecting species were as follows:

- All UK Priority Species that are present in Scotland
- Species for which Scotland, through the UK, has international obligations to safeguard species
- All species defined as nationally rare at a GB or UK level which are present in Scotland
- Species with populations present (resident, wintering or breeding) in 5 or fewer 10 km squares or sites in Scotland

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- Species present in Scotland for which a decline of 25% or more in abundance or range, (defined by number of sites where appropriate) has occurred in Scotland over the last 25 years or other appropriate time period
- All species that are endemic to Scotland
- Any sub-species or race, that is widely recognised and accepted by the scientific (or other relevant) community and that is endemic to Scotland, if it also meets one of the other criteria
- Natural and semi-natural habitats that are known to be particularly important for supporting assemblages of plant or animal groups that are data deficient, such as fungi, bryophytes, lichens, algae, invertebrates.
- In addition, a social criterion was used in order to take into account the views of people at a local level: non-domestic species and habitats identified as important by the Scottish public

Eleven of the 1,825 species on the SBS list were included purely due to public interest; many species selected as important to the Scottish public were already incorporated by the above criteria.

Species (and habitats) were excluded according to the following criteria:

- Escaped or introduced species that are not known historically to be naturally occurring in Scotland should be excluded from the list unless they are of recognised conservation value. (Applied to species and habitats selected on the basis of both scientific and social criteria.)
- Species, habitats and species groups where data was insufficient to allow rigorous application of at least one of the scientific criteria listed above.

The Scottish Biodiversity Strategy list was intended as "a tool for public bodies and others doing their Biodiversity Duty". As such it is useful to compare the list of species found on Trust reserves with this.

SNH Five Year Species Action Framework

Following the processes of compiling the UK BAP and SBS species lists, SNH produced a five year Species Action Framework[11] in 2007 focusing on a smaller number of the most threatened species (for which conservation action was possible), as well as: invasive non-native species that pose particular threats to biodiversity; species where conflicts of interest occur; and species for sustainable use. The aim is to target efforts and resources where they are most needed. As such this framework, in conjunction with the Trust's latest biological data, will enable the Trust to prioritise actions and focus its work on key areas that will provide the greatest benefit to the most threatened species. It will also enable the Trust to address the threat of invasive non-native species (see below).

Species/communities of interest

This category includes all of the species considered of value at a reserve/local level, which do not have Priority or SBL status. These may include LBAP species (native species added to individual Local Biodiversity Action Plans, considered to be of local importance).

Footnotes

[8] See UK BAP website - www. ukbap.org.uk

[9] ACG 1 – paper 4 – Mapping Priority Species into new structures August 2008. SNH.

[10] *Scotland's Biodiversity: It's in your hands*. 2004, Scottish Executive (www.biodiversityscotland.gov.uk)

[11] A Five Year Species Action Framework: Making a Difference to Scotland's Species. 2007, SNH.

4. Species results

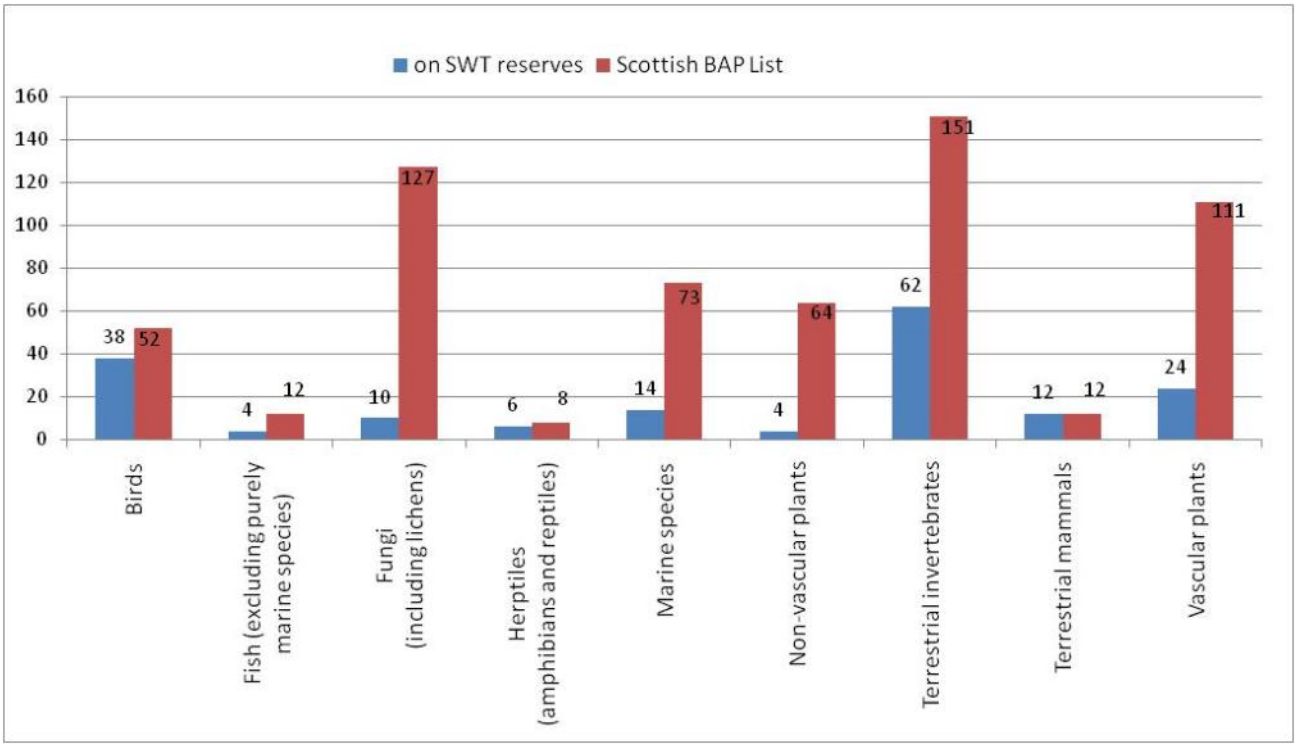
UK BAP Priority Species on Trust reserves

Of the 610 UK BAP Priority Species now listed for Scotland, 174 (29%) can be found on Trust reserves (figure 1). (This is excluding 14 purely marine species that were merely observed from Trust reserves. See appendix 1, table 5.)

With the revision of the UK BAP list and such a large number of species (1,149 for the UK) it becomes useful to break this list down to some extent. As a result, as well as removing marine species, birds, butterflies and moths were separated out so that they could be viewed in isolation during analysis (see appendix 1, tables 3 and 4). Birds, butterflies and moths are highly mobile, unlikely to be relying on a single site or reserve and therefore need to be considered within the wider countryside. This is likely to involve liaison with existing organisations such as Butterfly Conservation and RSPB. These species have been removed from our analysis of the UK BAP list, and will be revisited through the signposting exercise in section 4, where species are linked to the habitats they are dependent upon. The original list of UK BAP (prior to its recent revision) butterflies found on Trust reserves was investigated in detail in regard to our management of these species and their habitats (appendix 4, table 11)[12].

Removing the 42 bird species, 55 butterflies and moths, plus the marine species leaves 77 UK BAP species to consider. Of these, those occurring on the greatest number of Trust reserves are European otter (40), brown hare (28), common toad (25), red squirrel (21), Pipistrelle bat

Figure 1: Comparison of the number of UK BAP Priority Species present in Scotland with the number found on Trust Reserves.



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(18) and water vole (16).

There are UK BAP Priority Species present on 106 (out of 123) Trust reserves.

Appendix 1, table 1 shows the breakdown by category of Priority Species on Trust reserves. For the full lists of UK BAP Priority Species found on Trust reserves, see Appendix 1, Tables 2-5.

As a true record of species occurring on Trust reserves, this is almost certainly incomplete as surveyor efforts tend to focus on certain groups over others. As can be seen, Priority Species of the lower plants and fungi in particular are poorly represented. However, at present this must be taken as a useful basis for further analysis.

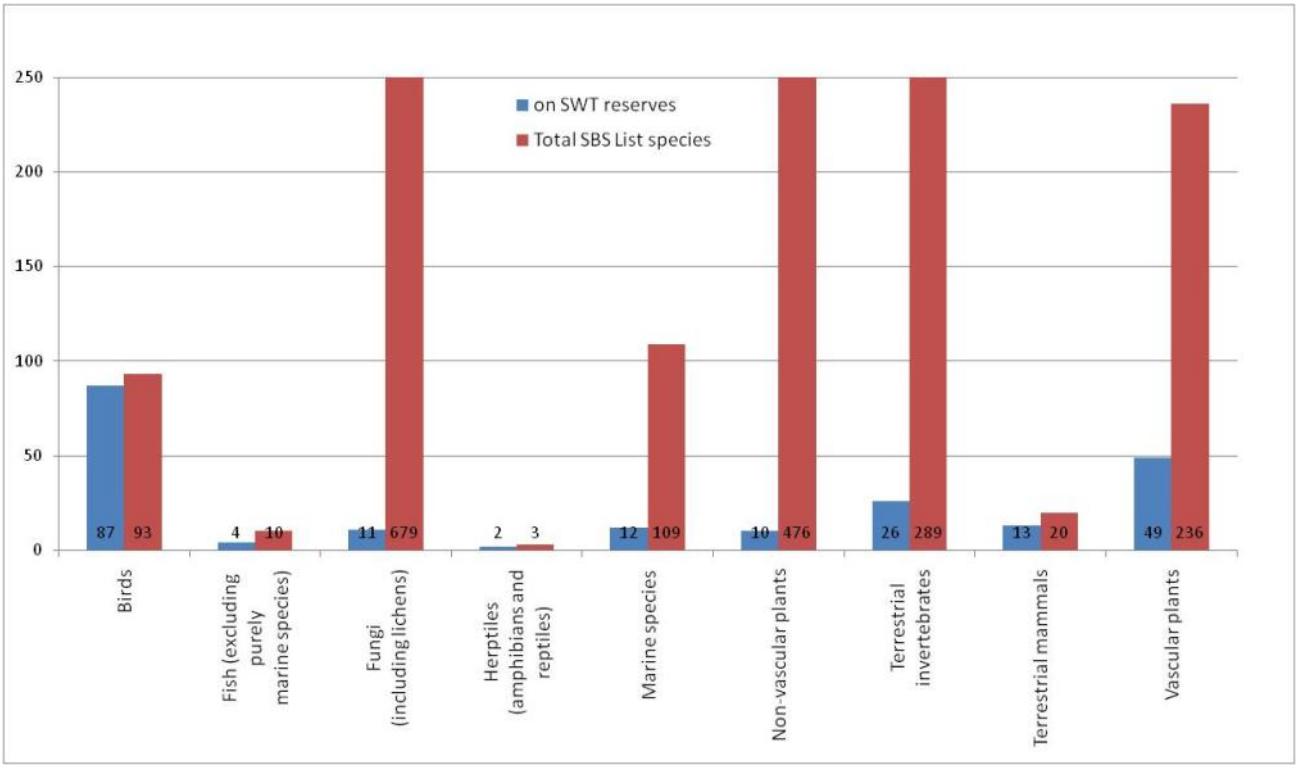
Footnotes

[12] Review of Priority Species of Butterflies and Moths on SWT Wildlife Reserves. Paul Gallagher – SWT Habitats and Species Officer. July 2007

Scottish Biodiversity Strategy List (SBL) species on Trust reserves

Of the 1,824 species on the SBL (excluding marine species), 215 (11%) can be found on Trust reserves (figure 2). Within this, birds at 88 of 93 species (95% of birds on the SBL), vascular plants at 49 out of 236 (almost 21%) and terrestrial mammals at 13 out of 20 (65%) are the best represented; no doubt due to the fact that these species are more easily identified. However, due to low numbers, in terms of percentages, fish at 4 out of 10 species (40%) and amphibians and reptiles at two out of three (67%) are also well represented. Thus when the SBL is considered, there are a large number of species additional to those already on the UK BAP list. Many of these are seabirds and marine species over which the Trust has no direct control, (in terms of number of species and size of populations). SBL species are found on 113 Trust reserves. See appendix 2 for full lists of SBL species on Trust reserves.

Figure 2: Comparison of the Scottish Biodiversity List species with the number found on Trust reserves.



In order to clarify where action might be both required and feasible, seabirds and marine species were removed from the list of SBL species recorded for Trust reserves (see appendix 2, table 8), along with species that were already accounted for in the higher UK BAP Priority Species List. This is not to say that nothing should be done for these species, but rather that any initiatives would have to take into account broader trends beyond the control of the Trust. Influencing marine policy for example might yield more positive long-term results than simply trying to adjust reserve management.

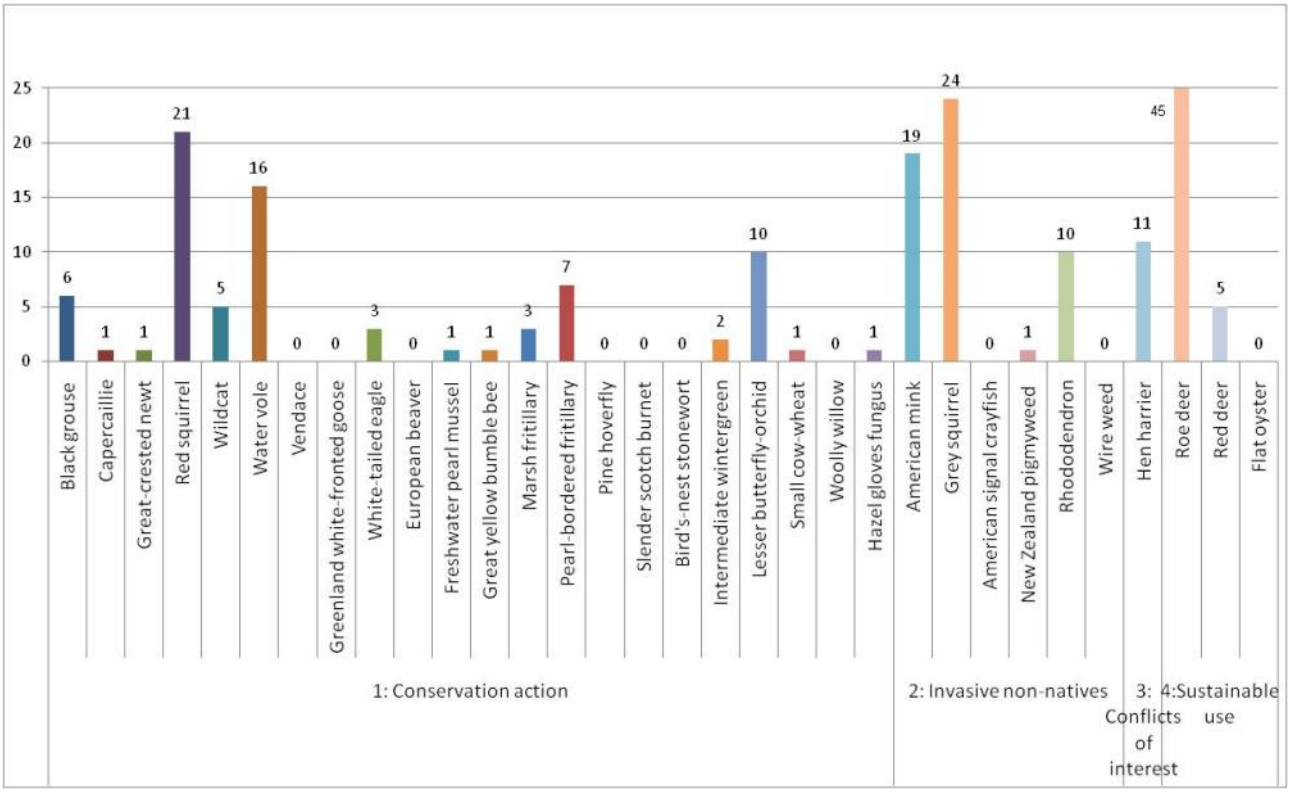
As with the UK BAP species, again it may be useful to consider birds separately. (There are no butterflies and moths once duplicates with the UK BAP list have been removed.) See appendix 2, table 7 for a breakdown.

The SBL (once duplicates already listed under UK BAP have been removed) contains 47 species of birds on Trust reserves. If these are also extracted from the list for the reasons given above, 68 species remain. The most abundant of these along with the number of reserves on which they occur are, heather (Calluna) (32), bluebell (31), Eurasian badger (24), common pipistrelle (22), Scots pine (22), harebell (20), and greater butterfly-orchid (11).

NB. SBL species found on Trust reserves will not be analysed further here as they are felt to be subordinate to the other two lists. This is due in part to an overlap and also because the SBL includes a number species of purely local interest (identified by the Scottish public in a social survey) that are neither nationally nor internationally threatened.

Of the 22 species listed as requiring "conservation action", 15 (68%) occur on Trust reserves (figure 3). The most common of these are red squirrel (21 reserves), water vole (16), lesser butterfly-orchid (10), pearl-bordered frit-

Figure 3: Occurrence of SNH Species Action Framework species on Trust reserves. SNH Species Action Framework species found on reserves



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illary (7) and black grouse (6). Only the hen harrier is listed as "conflict of interest" and this species occurs on 11 Trust reserves. Of the species listed for sustainable use, Trust reserves support two out of three; red deer and roe deer. Invasive non-native species will be considered in section 3. All but one of the SNH Species Framework species are already listed either in the UK BAP Priority Species List or the SBL, leaving the hazel gloves fungus (Hypocreopsis rhododendri), found only at Ballachuan Hazel Wood. Framework species requiring conservation action are found on 50 Trust reserves.

Though strictly speaking the UK BAP list takes precedence as it is more complete than the SNH Species Framework list, the latter is important as it indicates where funding might already be available and where projects may already exist in which the Trust might be able to become involved.

Appendix 3 details the SNH Species Action Framework species found on Trust reserves.

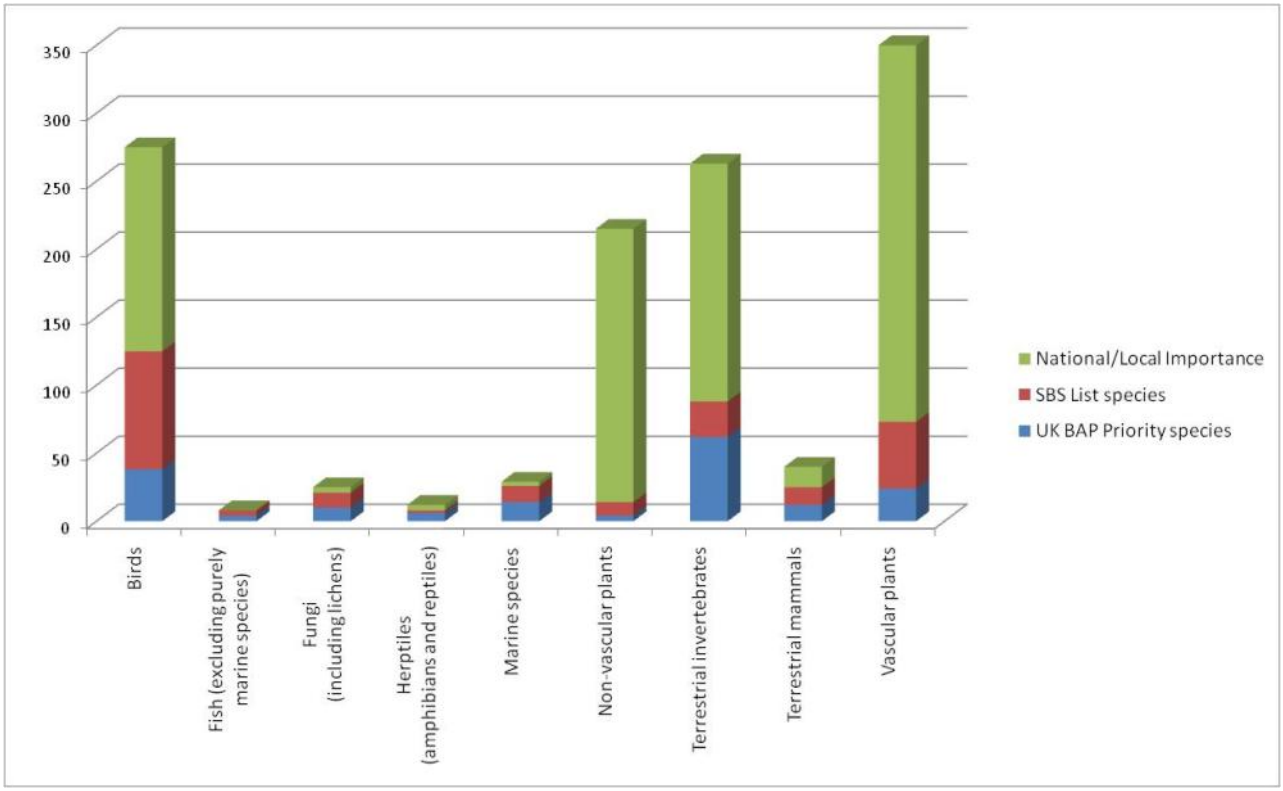
Group diversity on Trust reserves

When species of national or local importance and SBL species are viewed together with UK BAP Priority Species on reserves (figure 4), the bias towards birds and vascular plants is very pronounced. Again it is likely that this reflects a strong recorder bias towards the more easily recognised species. The relatively large number of invertebrates recorded is primarily the result of dedicated invertebrate surveys which were carried out on 37 reserves through a Heritage Lottery Funded project between 2002 and 2004.

Group range on Trust reserves

The distribution of Priority species across Trust reserves is shown in Figure 5. Over 80% of Trust reserves have Priority Species present. In the past, in the absence of an adequate set of data, the distribution of reserves with the largest number of Priority Species appeared to lean towards more remote, less populated areas of

Figure 4: Important species on reserves, by group, split by designation.



Scotland. Now that additional data has been included, although this holds true for some areas, this pattern is not as clear as it was. The previous results were probably an artefact of surveyor effort, and probably still are to some extent. Though additional work was undertaken to address this problem, there is still a strong suggestion that where reserves have the benefit of seasonal staff, more species tend to be recorded (Handa Island and the Isle of Eigg in particular), although it could be argued that seasonal staff are deployed on the more diverse and interesting reserves. Also, it does not appear to be the case that larger reserves invariably support more Priority Species. Belmaduthy Dam, for example, at only 19.6 ha, has 13 Priority Species recorded, while Ben Mor Coigach at almost 6,000 ha has only 11, although very little recording effort has been directed to this reserve in recent years.

The distribution of SBL species across Scotland is shown in Figure 6. The pattern is similar to that for UK BAP species to some extent, with reserves supporting the most UK BAP species also supporting the most SBL species. This is not entirely surprising as there is some overlap between these two designations. Although an increase in survey effort between 2005 and 2007 identified a large number of new species on reserves, the distribution results here will still reflect the bias in survey activity: more invertebrate surveys were undertaken than ever before, but no additional fungi, lichen or lower plant surveys took place, so these groups remain under-represented.

Peregrine *Falco peregrinus* © Neil Aldridge

Osprey *Pandion haliaetus* © Michael Davison

Pine marten *Martes martes* © Karl Franz

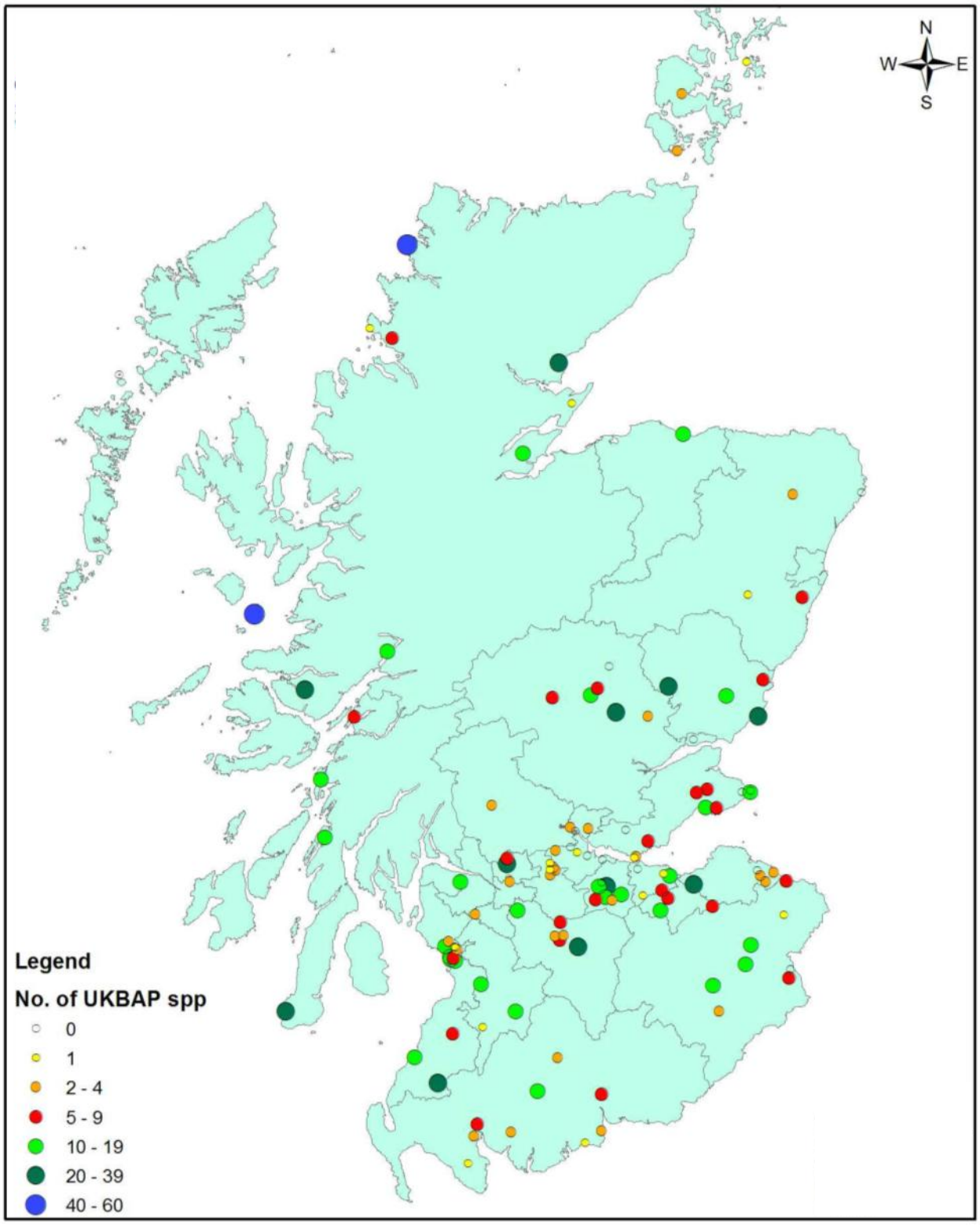


Figure 5: Range of UK BAP Priority Species on Trust reserves.

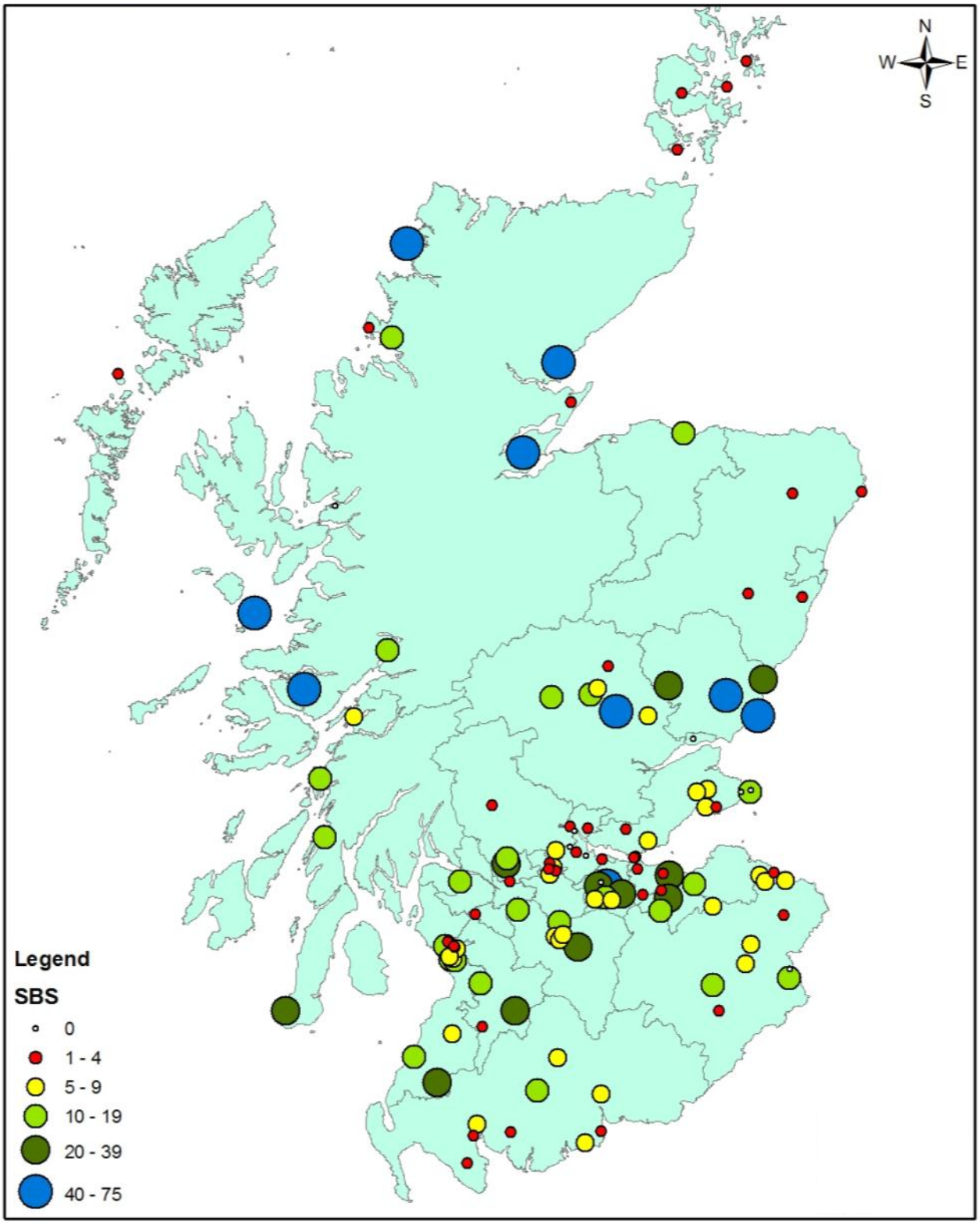


Figure 6: Range of SBL species on Trust reserves.

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Most common species

Of the 610 UK BAP Priority Species present in Scotland, 174 were found on Trust Reserves. Reed bunting is the most commonly found species, appearing on 45 reserves, followed by otter (40), eurasian curlew (39), common bullfinch (37), and song thrush (36).

Of the 215 SBS species found on Trust Reserves, the most common (not including those mentioned above as there are many overlaps between these two lists) were common kestrel (39), spotted flycatcher (35), heather (Calluna vulgaris) (32), european robin, skylark and bluebell (Hyacinthoides non-scripta) each at 31. The inclusion of very common species (heather, robin and bluebell) is accounted for by the fact that these were species considered to be of importance to the general public during the SBS list production process. If these species are ignored, the next most common SBS species are the northern lapwing & brown hare, present on 30 and 28 reserves respectively.

Of the 15[13] SNH Species Action Framework species (out of 22) found on reserves, the most abundant are red squirrel (found on 21 reserves), water vole (16 reserves), and lesser butterfly-orchid (10 reserves).

The Species of Conservation Concern (SoCC) List[14] includes compiled information on the designated and ecological status of UK species, and provides a mechanism for comparing different species lists for conservation or legislative purposes. This includes approximately 4,500 species in total, many of which do not occur on the UK BAP or SBS list but are considered to be of "national" or "local" interest.

From the above, a total of 853 further species considered to be of local interest (identified through LBAP's etc.) were reported (from 3,478 occurrences). Less overlap was found between the species recorded on different reserves. This is most likely to be due to a large variation in reporting and the nature of this category – the inclusion of species with local value. The most common species reported were: wren and common mouse-ear (both found on 38 reserves), willow warbler and mallard (36 reserves each), and swallow (34 reserves). While many species on the list are relatively common and not particularly threatened, this does reflect the perception and values of people at a local level, where potentially many actions will be taken.

Comparison of reserves

In terms of UK BAP Priority Species, the Trust Reserves that have the most are: Isle of Eigg with 57, Handa Island with 44, Hadfast Valley with 31, and Rahoy Hills and Loch of the Lowes each with 28.

The Trust reserves that have the most SBS species are Isle of Eigg (75), Handa Island (53) and Loch of the Lowes and Seaton Cliffs (both with 49).

The Trust reserves with the most SNH Species Framework species (excluding invasive non-natives) are Rahoy Hills (7), Loch Fleet and Doire Donn (each with 6), and Balnaguard Glen (5). The Trust reserves with the most other species of interest (such as LBAP for example) are: the Isle of Eigg (161), Rahoy Hills (159), Belmaduthy Dam (130), Seaton Cliffs (112) and Balgavies Loch (105).

Footnotes

[13] With the reintroduction of European beaver to Knapdale this will be increased to 16 in 2009.

[14] http://uk.chm-cbd.net/default.aspx?page=7616 and http://www.ukbap.org.uk/Library/SOCC6.zip

Analysis of actions for UK BAP Priority Species on Trust reserves

Though it is acknowledged that species cannot be managed in isolation, and that habitat management rather than species manipulation is normally the correct approach, it is important to clarify what is of importance and to what extent the Trust can do something to protect these species. The analysis which follows represents a first step towards this.

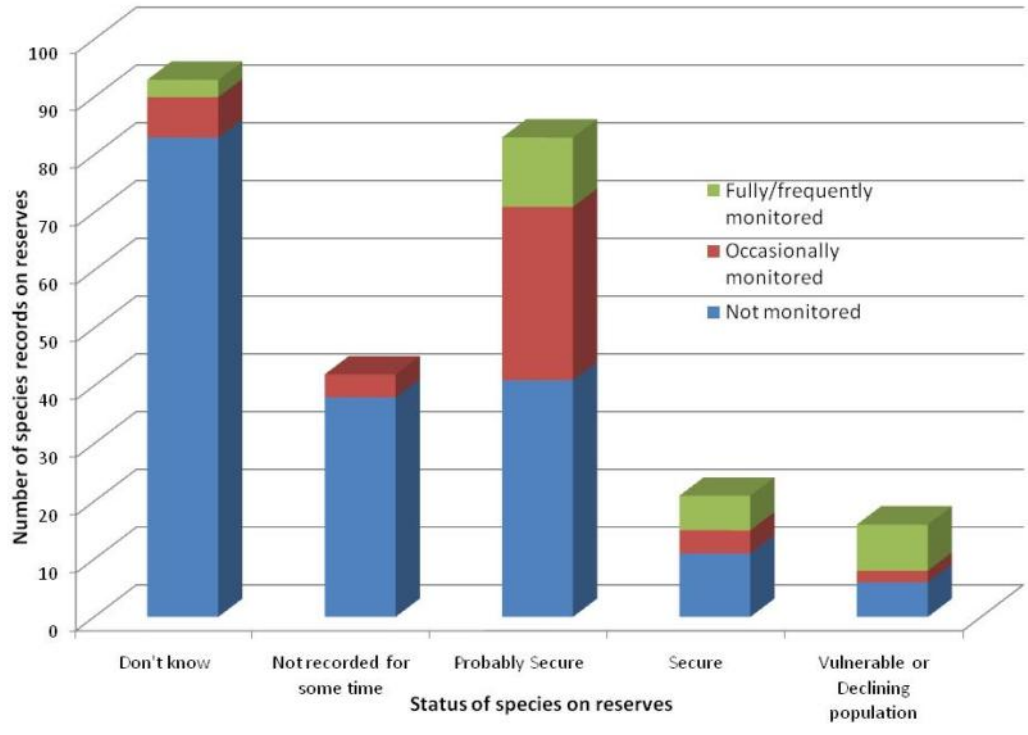
Even though more data was available than ever before, it will remain difficult to generalise about the extent to which Trust reserves reflect the national situation until more is done to set them in a broader context.

From an extensive list of species found on Trust reserves compiled from: the UK BAP Priority Species list; the SBL; and the SNH Five-year Species Action Framework; a number of species were set aside (birds, butterflies, marine species), for various reasons given above (mobility of species, their lack of dependence on reserves, ability to manage effectively, and the lack of marine reserves), to leave a shorter list of species that should be considered in greater detail. As further information had already been gathered from Reserve Managers for UK BAP butterflies and moths prior to production of the new extended list, this exercise was not updated. The new UK BAP list of butterflies and moths is now fairly extensive (see appendix 1, table 4) and it seems highly unlikely that management and monitoring would be able to focus on each individual species. Instead, a process of grouping species by habitat preference known as "signposting" is likely to be used (See UK BAP signposting of species to habitats on Trust reserves (p.43).

The extent to which the Trust can have a positive influence on these species will depend upon a number of factors including:

- the nature of the population of a given species (significant in number or just an occasional sighting for example);

Figure 7: Status of UK BAP species and monitoring



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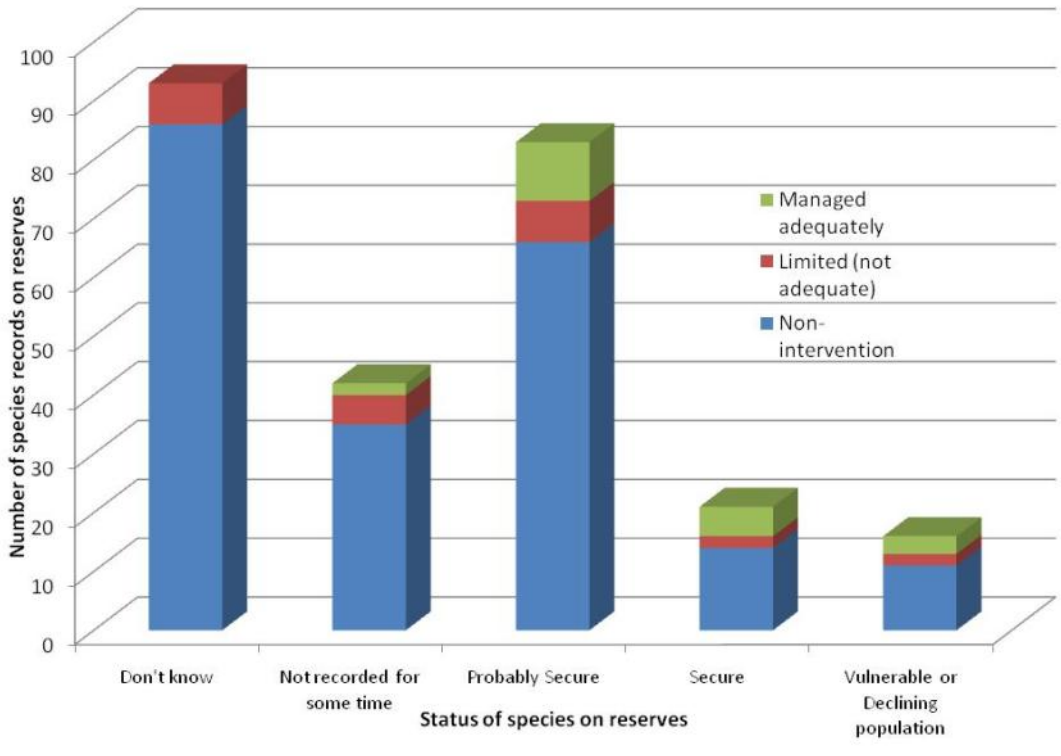
- practicality of managing a reserve for a particular species (can anything actually be done);
- how management for a particular species fits in with other priorities for a reserve (conflicting interests requiring further prioritisation);
- resources (including the practicality of creating a project and raising funds for this).

It is accepted that other species found on a particular reserve may be deemed important for various reasons, and that the case might be made for further action to safeguard these. However, in most cases this will relate to general habitat management rather than focusing on individual species. For individual species, in terms of prioritising actions on reserves for the Trust as a whole, the UK BAP list provides a very useful starting point. Not only is this more comprehensive than the SNH Species Action Framework list, but it incorporates the most threatened species from the SBS list which might otherwise be difficult to prioritise.

For these highlighted species, analysis focused on the status of UK BAP Priority Species on reserves and the monitoring and management actions that are already being taken This data is collated in appendix 4. In addition, appendix 4, table 11 shows the results of a separate study looking at the monitoring and management of butterflies and moths from the previous UK BAP list (mentioned above), the SNH Species Action Framework results are found in appendix 4 table 12.

Figure 7 shows the relationship between the status of a species and whether or not it was being monitored. Out of a total of 309 records of species occurrences, 9 were found to be unreliable and therefore set aside leaving 300 species. Of these, 44 were only occasional visitors to the reserve and therefore not monitored with the exception of the European otter at Falls of Clyde which is monitored occasionally and the brown long-eared bat on Eigg which is monitored frequently. This leaves 256 records to be analysed further.

Figure 8: Status of UK BAP species and practical management



Further detail can be obtained by looking at status of species against monitoring (figure 7) and practical management (figure 8). The final correlation is between monitoring of species and practical management (figure 9).

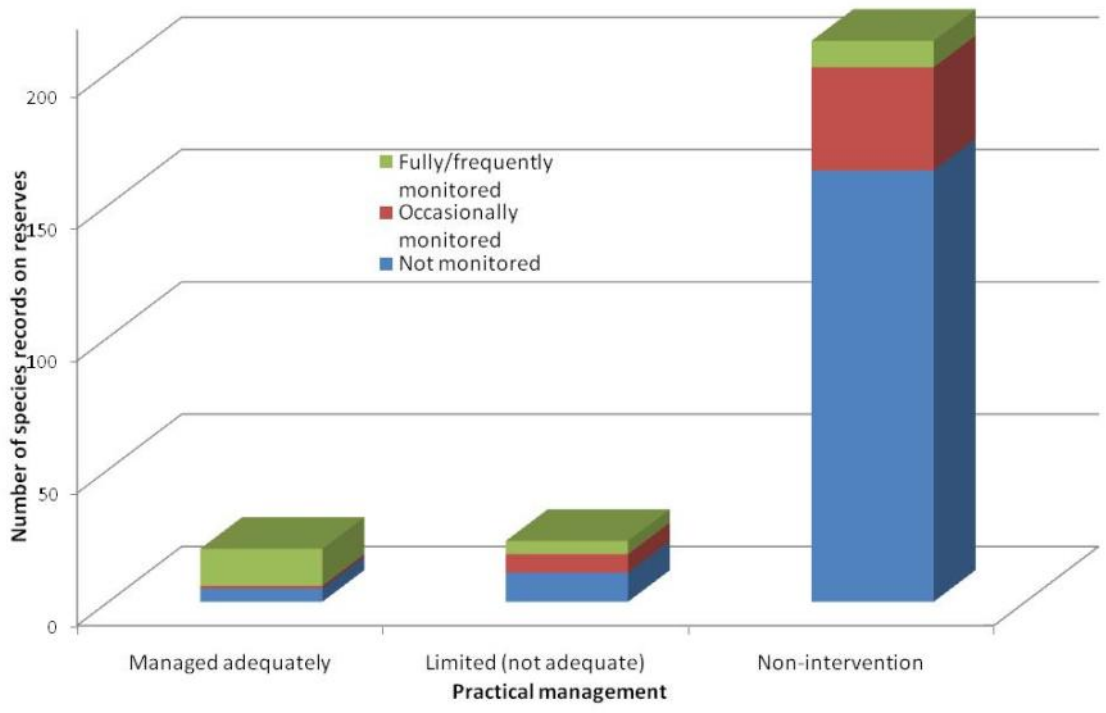
Discussion

With such a general overview it is important that care is taken when interpreting the results, although some interesting trends can be seen. In the section below, each category of species status has been assessed versus the monitoring and management undertaken for those species. It is important to remember, figures relate to records, not species: for example "12" could equally be 12 species on a single reserve or one species on 12 different reserves. However, the conclusions drawn are equally valid.

Unknown status
Under this heading, from figure 7 "status vs. monitoring" it can be seen that 83 of the records (89%) are never monitored and so their inclusion in this category is not surprising. Presumably for the remainder monitoring has revealed no clear trend, leading to uncertainty about the long-term future of the species on the reserve in question. The solutions would be to initiate some form of monitoring where none exists and to look at the existing methods used to determine whether or not they are adequate and appropriate. Because of the uncertainty surrounding the status of the species it is unsurprising that all records show no management at present. (See status vs. management, figure 8).

Not recorded for some time
As 38 of the records (90%) under this category show no monitoring, and the remaining 4 only occasional monitoring, it is not surprising that these species have not been recorded for some time. However, the decision to cease monitoring following a long period of negative results would be a reasonable one, although it could be of benefit to repeat monitoring

Figure 9: Practical management and monitoring of UK BAP species on reserves



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periodically as species can return after some considerable time. Non intervention in this case is understandable, though results show that in a small number of cases it is considered that what management is occurring would probably also benefit the species in question to some extent.

Probably secure
Here 43 (52%) of records show some level of monitoring. For the remaining 40 it must be assumed that casual observation alone is considered adequate for making this judgement and for deciding whether or not practical management is appropriate and adequate.

Stable/secure
Of the 22 records, 50% show no monitoring. Again it must be assumed that casual observations are being used to make decisions.

Vulnerable or declining
Of the 16 records in this category, 10 (62%) show some form of monitoring. For 11, a course of non-intervention is being followed. This raises the question of whether this is the result of a conscious decision where there now appears to be no further hope of success in trying to safeguard the species in question, or because nothing practical can be done, or whether the vulnerability is itself the result of lack of management.

Monitoring vs. management
The final correlation to be looked at is that between monitoring and practical management. Here it can be seen that out of 20 records considered to be managed adequately, 14 are fully/regularly monitored and one occasionally monitored, leaving only 5 with no monitoring. Out of the 213 for which non-intervention is prescribed, 158 are not monitored, 44 occasionally, and only 11 fully. In the 23 cases where management is considered inadequate, 5 are fully monitored, 7 occasionally, and 11 not monitored. This shows a very mixed approach and that management decisions are sometimes based on evidence other than systematic monitoring.

Implications
It is important not to read too much into these results while at the same time considering their implications. For example, while the vulnerable status identified through frequent monitoring of lesser butterfly orchid at Talich has shown that management is currently inadequate, this problem is currently being addressed but involves a process that is unlikely to yield instant results. That is to say, all that can be done is being done even though on the surface the analysis above suggests cause for concern. On the other hand, the vulnerable population of freshwater pearl mussel at Ben Mor Coigach is not being monitored while at the same time it is considered that current management is inadequate. In this case, although the species was surveyed in 2006, repeating this in such a way as to constitute monitoring is not a simple matter. At the same time, the options for management are limited as the fate of the species relies on a number of factors outwith the control of the Trust and beyond the boundaries of the reserve itself.

It might be expected that there could be a grey area between records for which “unknown status” has been recorded and those where the species has not been recorded for some time. However, the former denotes a general lack of knowledge while the latter implies that the species has been looked for (either through formal monitoring or casual observation) and not seen in recent years. In the first case it may be appropriate to gather more data. In the second it is necessary to ensure that whatever observation is taking place is adequate.

Bearing in mind that the above relates exclusively to UK BAP Priority Species (excluding: birds; butterflies and moths; and marine mammals), a number of facts of particular interest emerge.

- Of the 256 records in question, only around 30% are being monitored in some way.

- It is felt that Trust reserves are being managed adequately for Priority Species in 91% of cases.
- In cases where management is considered to be inadequate, only 52% are being monitored in some way.
- Of the 256 records, it is believed that only 16 (6%) are in a vulnerable or declining state. However, practical management is only being undertaken for 30% of these.

The difficulty will now lie in determining exactly what the real implications of this are. To a large extent this will involve Reserve Managers looking at these results and seeing how they relate to specific cases on their reserves. However, from this some general conclusions and recommendations can be drawn.

Bullfinch *Pyrrhula pyrrhula* © Darin Smith

Conclusions

To monitor and manage for every UK BAP Priority Species on every Trust reserve individually would be impractical. However, the results above strongly suggest that there are cases where the approach to monitoring at least needs to be considered further. While it may be impossible to manage reserves adequately for all species, not least because with so many, cases of conflicting requirements are almost certain to arise; unless some form of monitoring is undertaken, the true status of the species cannot be determined and the effectiveness of any management will remain uncertain. There are three levels of monitoring identified above; two explicitly, and the last one implicitly from responses to other questions. These are:

- Frequent
- Occasional
- Casual observation.

It would seem that much could be achieved by making “casual observations” less casual; ensuring that “occasional” is adequate; and that both “frequent” and “occasional” monitoring utilises standard, efficient techniques. In all these cases safe data storage which allows easy retrieval for analysis is essential.

Clearly at present, decisions are being made and conclusions drawn from casual observations alone in many cases. Those observations may or may not be adequate, but their usefulness could be greatly increased by recording results in a systematic way. This need not be onerous and a number of factors can come together to make monitoring more efficient.

- Reserve Managers and Convenors must visit reserves supporting Priority Species periodically through the year for a number of reasons, and monitoring can be made to coincide with these visits.
- Monitoring can be grouped in such a way that a number of different species are considered at the same time.
- An appropriate level of monitoring can be utilised which maximises efficiency through standard, recognised methods and an appropriate level of detail.
- In some cases the continued presence of a species may be sufficient to conclude that it is still secure and thus, so long as a record is kept of each time it is seen, its continued wellbeing may be inferred, providing its preferred habitat is being maintained in a suitable condition. For example: regular red squirrel sightings over a period of years imply no threat and the

probability of a breeding population rather than a single individual, but this can only be determined if records are kept in such a way that they can be analysed in the future. Such observations may be made by Trust members, local residents, or volunteers who visit the reserve for this purpose from time to time so long as a mechanism for recording results is set up and maintained.

- Results from occasional monitoring can be made more useful if a standard method is used and records stored in such a way as to make them easily accessible. Though monitoring may remain occasional, the length of repeat period must still be appropriate to the aims. Occasional monitoring must be informed by less formal observations relating to general conditions on the site and may be prompted by habitat monitoring which has detected some relatively rapid successional change for example.
- Frequent monitoring need not always mean annual monitoring providing the repeat period is adequate to yield meaningful results, and the method chosen appropriate to the aims. In this case, the difference between occasional and frequent monitoring should only be that the former is carried out at infrequent and usually longer intervals, presumably because evidence suggests that a species is under no immediate threat on a particular reserve, while the latter is undertaken at regular, much shorter intervals as it is anticipated that changes could occur over a relatively short time period.

Further details about survey and monitoring, including methods for particular species groups, are available in the Trust document, A Strategy for Recording and Monitoring on SWT Reserves, P. Gallagher 2008/09.

Practical management must always be informed by monitoring. Whether this is from casual observation (for example that the grass seems to be getting a little too rank for the orchids, or a glade too overgrown for the devil's-bit scabious essential for the marsh fritillaries), or from systematic monitoring, the thought process leading to the adoption of a particular strategy needs to be carefully documented in a way that will be readily accessible to others. While the Conservation Management System (CMS) database[15] may be adequate in some cases in so far as it explains the justification for a course of action, the Recorder database should be used for any form of quantitative data, including presence or absence relating to UK BAP Priority Species.

Bell heather *Erica cinerea* © Scottish Wildlife Trust

Footnotes

[15] CMS holds all of the Trust's reserve management plans and therefore lists and justifies all management actions planned on a reserve.

Towards a strategy for prioritising actions

Narrowing down the species categories

With so many species to be considered, prioritising is essential, hence the removal of some species categories from the analysis. As far as seabirds and marine species are concerned, where the Trust can have a direct influence through monitoring, research, and practical management, this is for the most part already in place. Where it is not, this is probably because nothing can be done at a local level. Instead, influencing marine policy and engaging with initiatives considering broader issues such as climate change are more likely to be effective.

The attempt to further narrow down the lists by considering the remaining birds, butterflies and moths separately should not be viewed in the same light as the removal of seabirds and marine species. These species are covered to a large extent by the activities of other organisations and as such any Trust initiatives should not be undertaken in isolation. Though mammals and many insects are highly mobile, it is probably birds and butterflies/moths that present the greatest challenge. This is because their range tends to be much broader than any given site, and the fact that a species has been recorded on a Trust reserve does not necessarily mean that it is in any way dependent upon that reserve. Equally, the decline of such species may have little to do with reserve management but rather other changes in the wider countryside. Before any initiative to protect such species can be considered it is necessary to ascertain the full details of a record and then place this in the broader context of the adjacent countryside. In situations where priority birds such as osprey and peregrine falcon are known to be breeding on Trust reserves (rather than just visiting), measures have already been taken to safeguard them.

Further narrowing down what remains

With so many species to consider it seems unlikely that the Trust will be able to manage reserves for all of them, not least because situations where the requirements of one species conflict with those of another are bound to arise. The process of “signposting” being developed to address the problem of the large number of species now on the UK BAP list may be of some help here. If some species can be grouped under a smaller number of habitats, providing the habitat itself is adequately monitored, the individual species may only need to be monitored occasionally at much longer intervals unless the habitat monitoring indicates a more rapid change in conditions.

Where habitat management will benefit a range of species rather than focusing narrowly on a single one, efforts will be both more cost-effective and more likely to be sustainable in the long term. Signposting is looked at further in section four of this report.

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5. Review of priority habitats on Trust reserves

Introduction

Following the "most comprehensive analysis ever undertaken in the UK", 65 habitats have now been listed as priorities for conservation action under the UK Biodiversity Action Plan (UK BAP)[16]. The extent of these habitats can now be assessed on Trust reserves through the evaluation of National Vegetation Classification[17] (NVC) mapping.

The UK BAP priority habitats list covers all 'at risk' habitats found in the UK as a whole, some of which are not represented in Scotland. Marine habitats are included in this list; but the Trust has no marine reserves and the habitats adjacent to coastal reserves have rarely been surveyed due to their specialist requirements.

The UK BAP has also defined Broad Habitats, which have been recently reviewed "to ensure that the whole of the land surface of the UK and the surrounding sea to the edge of the continental shelf is covered. This has resulted in a revised list of 27 Broad Habitats"[18]. These have been grouped into more general habitats to allow direct comparison with land cover data for Scotland. The Trust's Reserve Disposal and Acquisition Policy states that: "The Scottish Wildlife Trust will acquire and maintain a network of wildlife reserves to safeguard a broad representation of wildlife found throughout Scotland, and to act as examples to others and for the public benefit including enjoyment, information and education". The analysis below goes some way towards assessing whether or not the Trust's existing suite of reserves meets these criteria.

The Scottish Biodiversity List (SBL) published in 2005 in response to The Nature Conservation (Scotland) Act 2004 includes 265 habitats. However, the habitat 'units' were more narrowly defined than for the UK BAP list so are not directly comparable[19]. Public bodies in Scotland are required to have regard to the SBS in carrying out their duty to conserve biodiversity, but inclusion on the list does not imply any specific action. Furthermore it appears that, following the revision of the UK BAP Priority Habitats list, the SBL is now incomplete. The SBL includes a number of habitats of purely local interest (identified by the Scottish public in a social survey) and therefore without a scientific basis. The SNH Species Framework does not identify any habitats specifically. These factors indicate the UK BAP list should take precedence in any analysis of habitats.

Methodology and constraints

The majority of Trust reserves have now been surveyed and mapped to NVC level, the remainder of sites are either too small for this to be useful, or the habitats do not match NVC vegetation types. This report covers 98 of the 123 Trust reserves, and 87% by area.

NVC habitat communities and UK BAP Priority (or Broad) Habitats are not directly comparable, so there are some limitations with this data that

Footnotes

[16] UK BAP - http://www.ukbap.org.uk/NewPriorityList.aspx

[17] John S. Rodwell, 2006. *National Vegetation Classification Users Handbook*. JNCC.

[18] http://www.jncc.gov.uk/page-4261

[19] Dr Ian Strachan, SNH Policy and Advice, information paper - report on progress with the revision of the Scottish biodiversity list (SBL) to take account of the revised UKbap priorities list, 6 December 2007

need to be outlined. The JNCC has designed "lookup" tables[20] to translate different habitat classifications, including NVC, Phase 1, EU Habitats Directive and UK BAP amongst others. As these often do not directly overlap, the relationship is described as "habitat 1 is contained in/overlaps with habitat 2" etc. These relationships were ranked by the statement "strength" and the most likely Priority Habitat to fit was used in the analysis. Obviously this can be an extrapolation at best, but with almost 8,300 separate areas of habitat on our reserves to be analysed, a purely automated option had to be used. Some cleaning of the data was undertaken afterwards, with each priority habitat checked as to its likelihood of occurring on a reserve based on: location, altitude, and some knowledge of the sites. The use of altitude has its own limitations, as each reserve has only one altitude type (Lowland, Marginal Upland or Upland), but some reserves will cross these imaginary boundaries, such as Eigg and Ben Mor Coigach, both of which go from sea level to mountainous areas.

Habitat description/categorisation

The UK Biodiversity Action Plan (UK BAP) set out to describe the biological resources of the UK, in order to set priorities for the protection of nationally and locally important habitats. The implementation of these priorities takes the form of Broad Habitat Statements and Priority Habitat Action plans. In the UK as a whole, there are 27 Broad Habitat Statements; each describes current issues affecting the habitat and suggests broad policies to address them. There are also 65 (previously 45) Priority Habitat Action Plans falling within the Broad Habitat classification, giving detailed actions and targets for conserving these habitats[21]. The Priority Habitats include examples from both the terrestrial and marine environments.

- Four criteria were used for selecting the original UK BAP priority habitat series:
  - Habitats for which the UK has international obligations
  - Habitats at risk, such as those with a high rate of decline especially over the last 20 years, or which are rare
  - Areas, particularly marine areas, which may be functionally critical (essential for organisms inhabiting wider ecosystems)
  - Areas important for key species (i.e. BAP priority species).

Footnotes

[20] http://www.jncc.gov.uk/page-4266

[21] UK BAP website (www. ukbap.org.uk)

[22] http://www.scotland.gov.uk/Publications/2007/10/08091435/4

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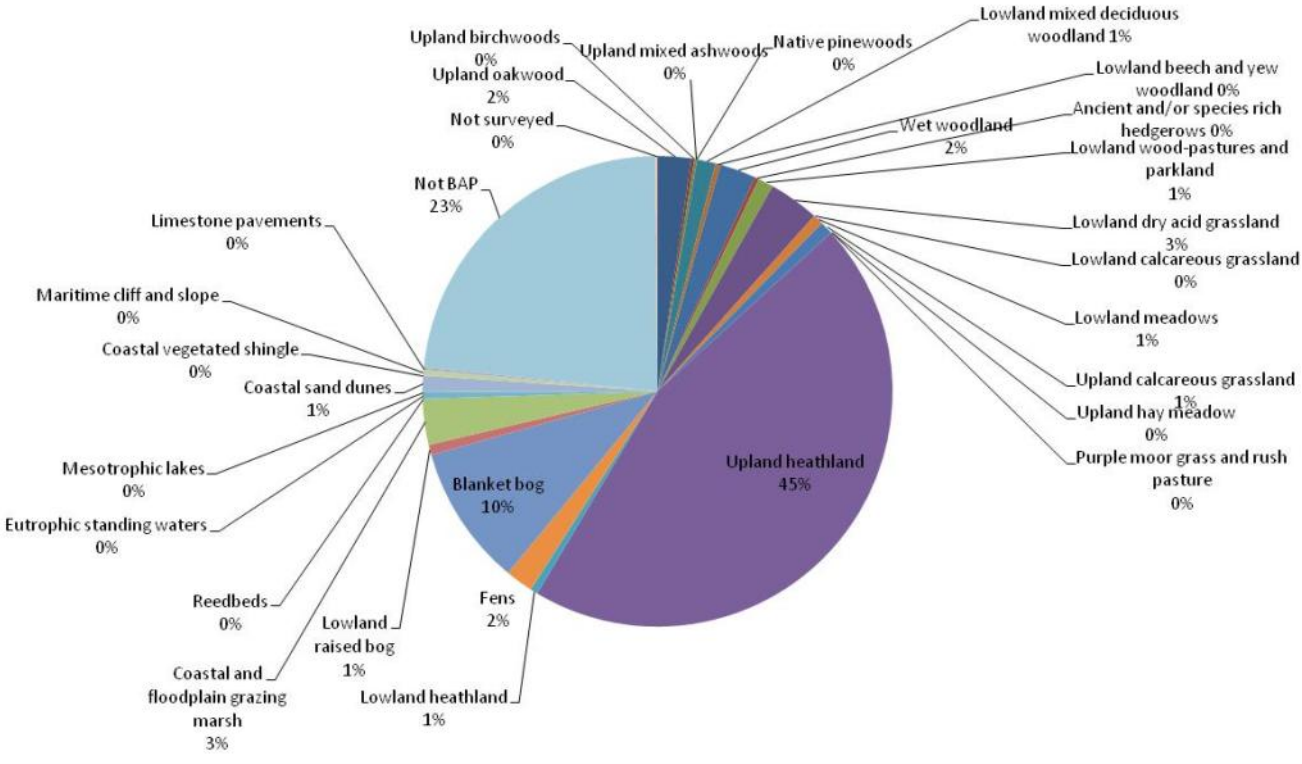
6. Habitat results

Of the 65 UK BAP Priority Habitats listed, 41 occur in Scotland[22]. Of these, 28 (68%) have been recorded on Trust Reserves. Of those habitats not recorded on Trust reserves, 13 (out of the 65 for the UK) are exclusively marine (for example, deep sea sponge communities), while others such as Ancient and or species-rich hedgerows are relatively scarce in Scotland.

Figure 10 provides the area (ha) of Trust reserves by UK BAP Priority Habitats. This shows a high abundance of upland heathland (45% of all habitats on Trust reserves) and blanket bog (10%), a large proportion of which is accounted for by the Ben Mor Coigach reserve alone. Of the remainder, broadleaved woodland (at a little over 5%), made up of upland oakwoods (2%), wet woodland (2%), lowland mixed deciduous woodland (1%), mixed ashwoods and upland birchwoods (each at <1%); is the next most abundant UK BAP habitat type on Trust reserves. (23% of habitats were not UK BAP.)

Largiebaan Wildlife Reserve © Scottish Wildlife Trust

Figure 10: Area of Trust reserves by UKBAP Priority Habitats

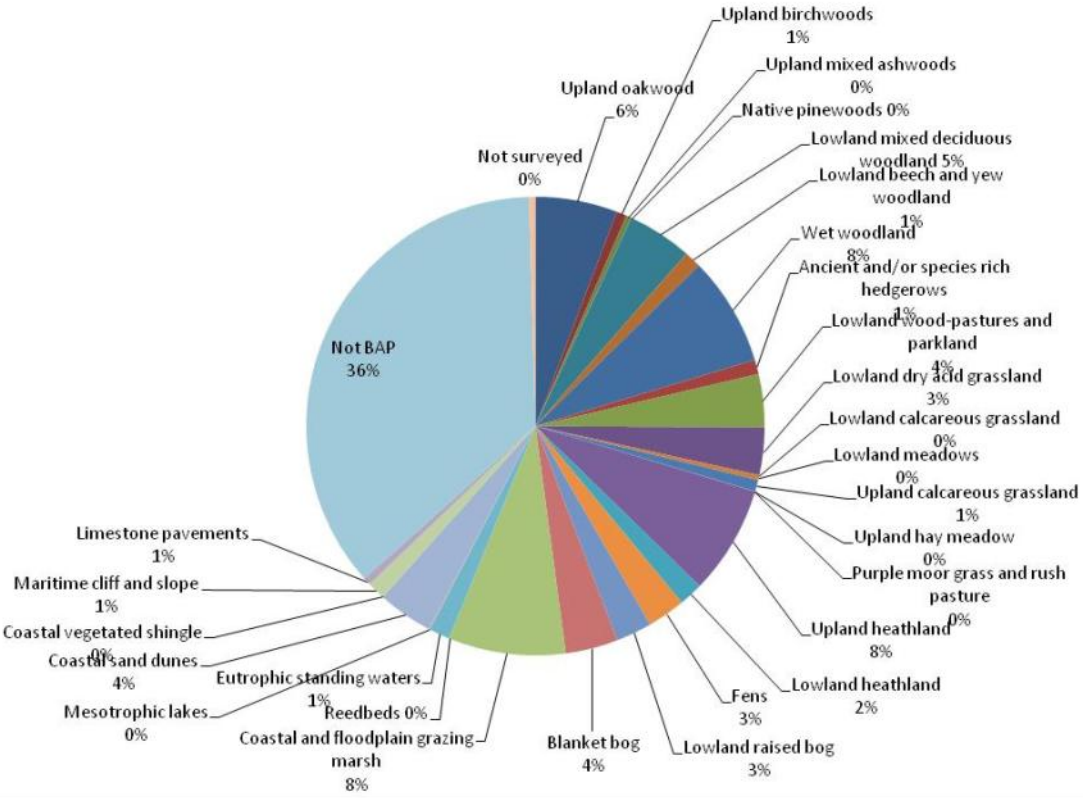


When the five reserves of over 1,500 hectare are removed (as these are clearly skewing the figures in favour of dwarf shrub heath)(Figure 11), a more diverse picture emerges with wet woodland, upland heathland, and coastal flood-plain grazing marsh each at 8% and bog at 7% (comprising blanket bog 4% and lowland raised bog 3%) emerging as most abundant.

Priority Habitats are found on 98 Trust reserves. The reserves which support the largest number of different Priority Habitats are Isle of Eigg (16 habitats), Ben Mor Coigach (12), Spey Bay (11), and Balgavies Loch, Cullaloe, Doire Donn, Loch Ardinning, and Shian Wood each with 10. The reserves which support the largest area of Priority Habitat are Ben Mor Coigach (5,286 ha), Isle of Eigg (2,168 ha), Largiebaan (1,466 ha), and Rahoy Hills (1,361 ha). The distribution of UK BAP Priority Habitats on Trust reserves is shown in Figure 12.

Pease Dean Wildlife Reserve © Scottish Wildlife Trust

Figure 11: UK BAP Priority Habitats on Trust reserves by area (ha) with reserves >1,500ha removed



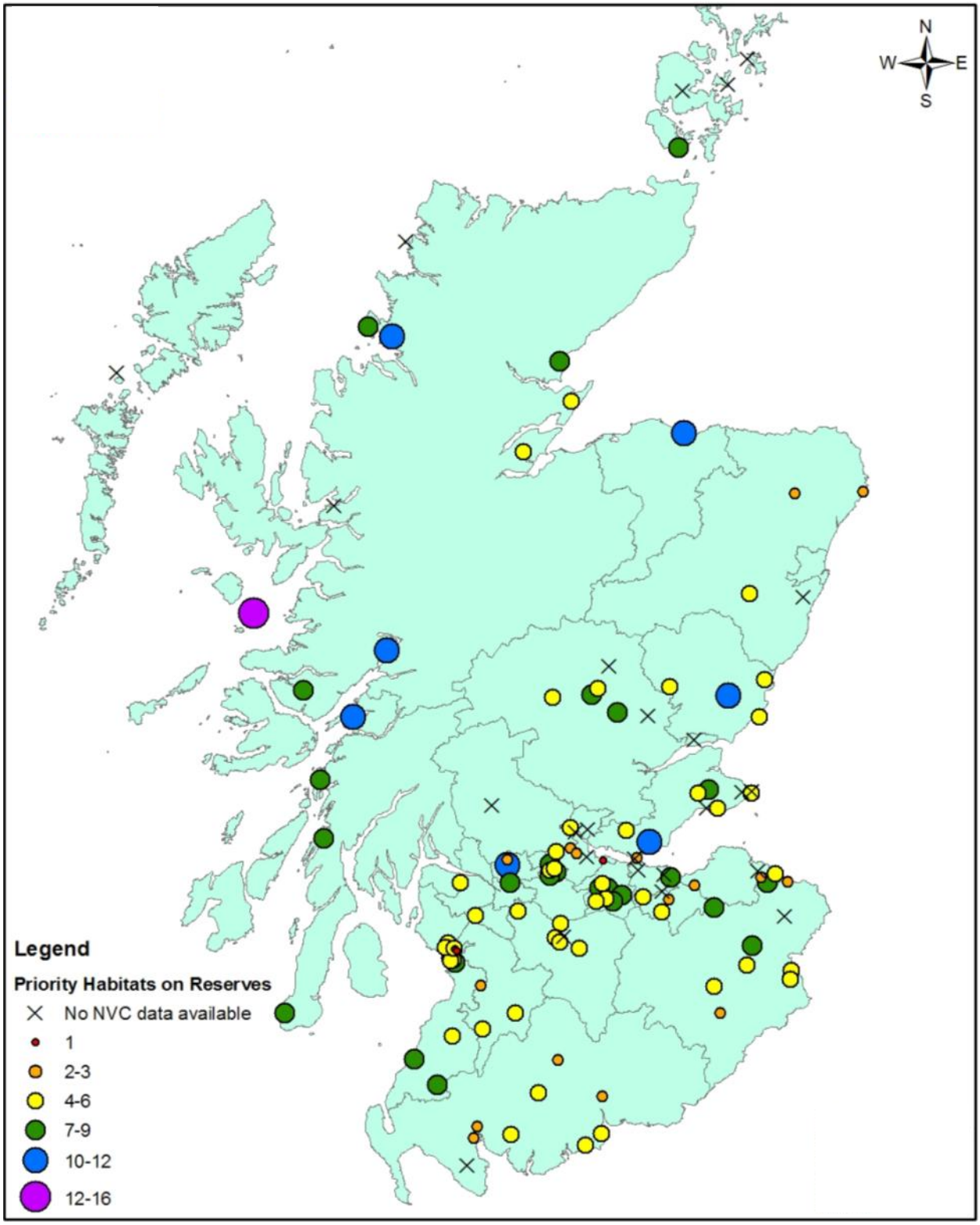


Figure 12: Number of UK BAP Priority Habitats by Trust reserve

General habitats on Trust reserves

For the purpose of analysis, SNH has grouped the habitats of Scotland into General Habitat types[23], shown in Figure 13. By similarly grouping all habitats found on Trust reserves (Figure 14), a useful comparison can be made. This provides an indication of the degree to which the Trust's land holdings reflect the actual situation in Scotland; a useful piece of information for strategic planning and when looking at potential reserve acquisitions.

On Trust reserves the dominant Broad Habitat category at 69% is upland grasslands, peatlands & montane, with woodland at 14%. This is primarily due to the influence of Ben Mor Coigach, making this a less useful picture than is provided by UK BAP Priority Habitats (see Figure 11).

When comparing UK BAP Broad Habitat[24] types recorded for Scotland against those found on reserves (Figure 15), the Trust has a greater percentage coverage of dwarf shrub heath, broadleaved mixed and yew woodland, and standing open water and canals and rivers and streams. At the same time, the Trust has a much lower percentage coverage of coniferous woodland, acid grassland, improved grassland, and arable and horticultural land. Of these, while the latter categories would be expected due to the Trust's focus of interests on wildlife conservation, the lower percentage of coniferous woodland might be more significant if this relates to pinewoods.

Footnotes

[23] Data adapted from Mackey E.C., Shaw, P., Holbrook,J., Shewry, M.C., Saunders, G., Hall, J., Ellis, N.E. *et al*. *Natural Heritage Trends*, *Scotland 2001*.

[24] Broad Habitat types are "a framework classification for 37 habitat types across the whole of the UK" produced to assist with the Biodiversity Action Planning process. See: Report 307 - Guidance on the interpretation of the Biodiversity Broad Habitat Classification (terrestrial and freshwater types): Definitions and the relationship with other classifications- JNCC (2000) - http://www.jncc.gov.uk/page-2433

Figure 13: General habitats types for Scotland, by area

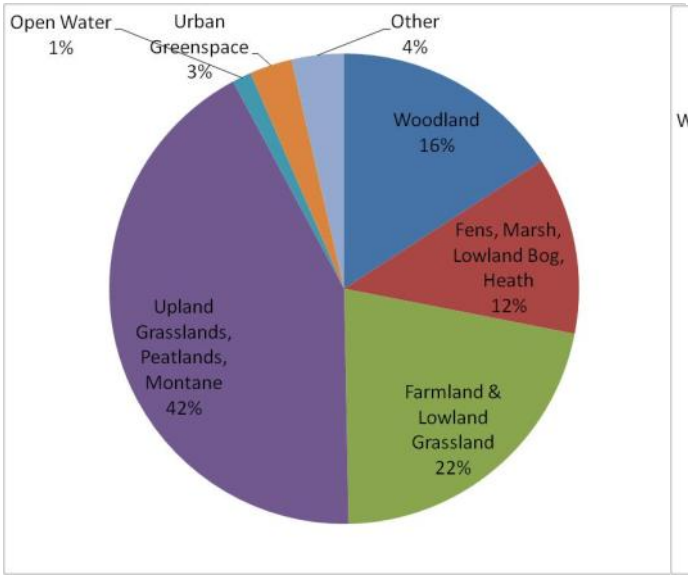
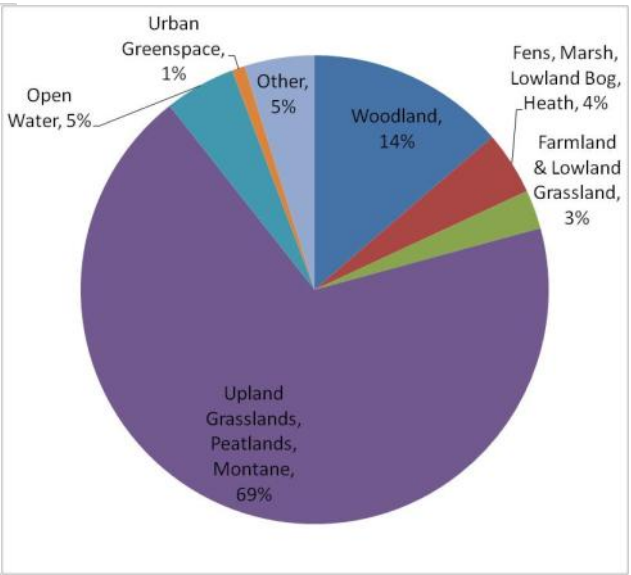


Figure 14: General habitat types for Trust reserves, by area



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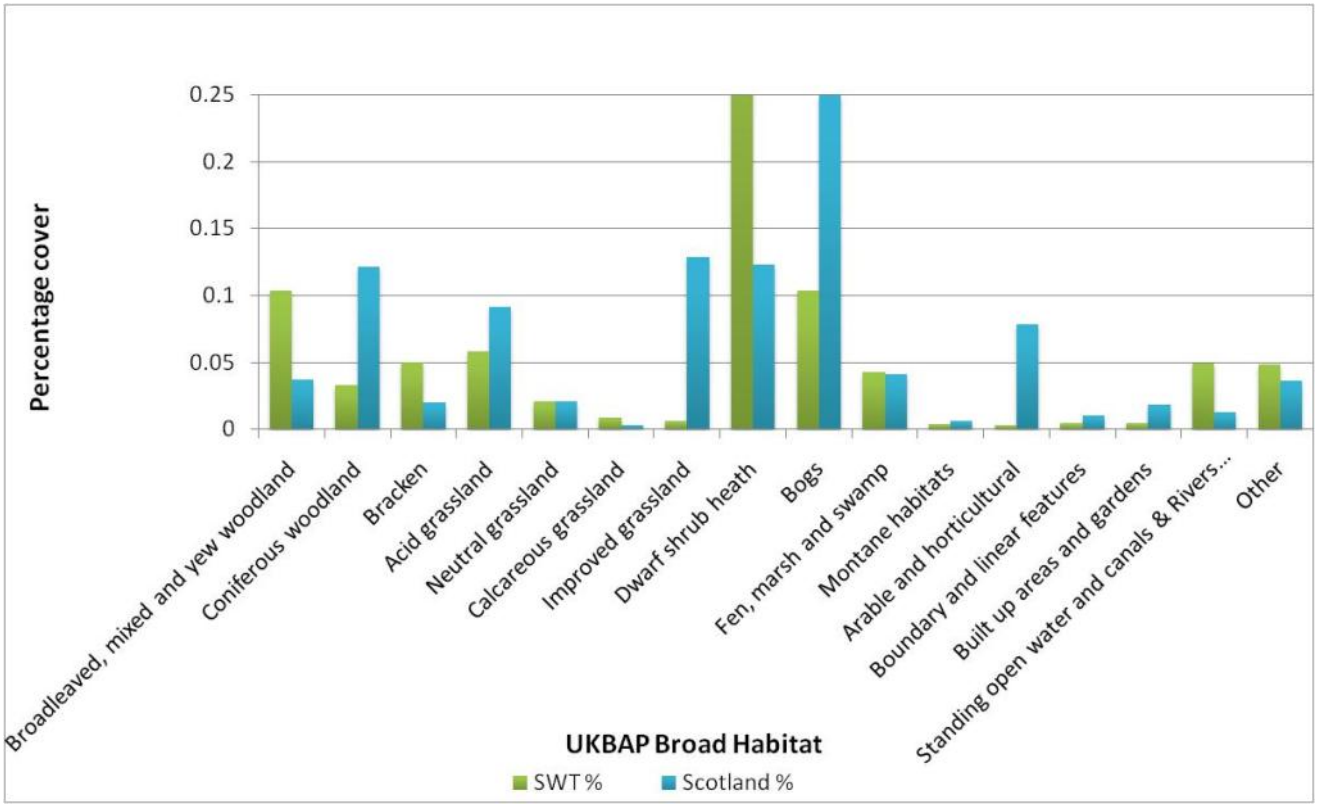
Analysis

From the above alone, nothing can be deduced regarding the condition of habitats on Trust reserves. Unlike the Priority Species and invasive non-native species analysis, its doubtful the seeking of further information from individual Reserves Managers would yield sufficient additional information as to make this exercise worthwhile. The fact that a habitat has been successfully categorised using NVC does show that the necessary indicator species are present, if not some of the rarer or otherwise interesting species associated with this. It must therefore be assumed that these results show that the habitats in question are at least in a condition favourable to their persistence in the short-term. Whether or not this can be extended to persistence in the long-term will depend upon a number of factors, some of which will lie beyond the control of the Trust.

Figure 15: Comparison of Broad Habitats on Trust reserves and across Scotland as a whole, by percentage by area



Discussion

Habitats are subject to a range of influences both natural and through the actions of humans. These include:

- Natural succession
- Other natural processes such as weathering, erosion and deposition
- Climate change
- Human adaptation and modification
- Large-scale habitat fragmentation

As such, habitats are part of a dynamic system which operates at a range of timescales. Under natural conditions, habitats would generally be fairly resilient to change, but succession would still take place: a woodland will encroach on to a bog. In a fragmented, modified landscape such as Scotland's, these natural and human processes combine, resulting in a need for habitat management where the desire is to maintain a habitat in a particular condition. The motivation for this is primarily that, without such intervention, some habitats and the species within them would disappear.

The effectiveness and cost of habitat management depends on the degree of pressure exerted from factors such as those identified above. The aim should therefore be to minimise the need for intervention wherever possible. The only effective way of achieving this is to manage the land surrounding a Trust reserve at the larger, ecosystem scale wherever possible. By placing Trust reserves in a wider context in this way, not only would it become easier to safeguard important habitats, but also targeting of resources and prioritising actions would be greatly assisted.

A fragmented landscape © Scottish Wildlife Trust

Habitat representation

From the results presented above it can be seen that while the Trust manages a reasonable range of Priority Habitats, some (as a percentage of the whole, and also in comparison with Scotland as a whole) are under-represented while others are over-represented. While the Trust has an wealth of upland heathland, it has very little native pinewood.

The abundance of upland heathland relates to a few large upland reserves, including Ben Mor Coigach. In such areas, under natural conditions, native pinewood would be expected to thrive: could a change in management practice redress this imbalance? These large areas of heathland could (and should?) be supporting trees, so these may be suitable locations to restore or recreate pinewoods; decreasing the area of heathland, whilst increasing the area of pinewood that the Trust manages. Although other organisations are already successfully managing existing and extensive pinewoods, this potential extension of pinewood within its former range might be an untapped niche the Trust could fill effectively.

The other habitat that is under-represented within the Trust's suite of reserves is that of bog. This will relate to both blanket bogs and lowland raised bogs. However, the Trust's involvement in a national bog project does to some extent redress this balance, and probably more effectively than land acquisition alone could.

Regarding other habitats, the Trust seems to have a reasonably representative spread. Only in the case of improved grassland and arable and horticultural land does the Trust fall below the national levels. However, this is unsurprising due to the nature of the Trust's priorities.

Red Moss of Balerno Wildlife Reserve © Scottish Wildlife Trust ↑

Habitats and species

When it comes to prioritising habitats, it is also necessary to consider UK BAP species which rely upon these. Following the last revision of the UK BAP lists it was seen that, with a much longer list of species, these could no longer be sensibly considered individually. Therefore the concept of "Signposting": whereby species are grouped under different habitat categories, was developed. The results of this which have recently become available will assist the Trust to prioritise actions more effectively (and more cost-effectively). Signposting is looked at in detail in a later section.

Loch of the Lowes Wildlife Reserve © Michael Davison ↑

7. Review of invasive non-native species on Trust reserves

Introduction

The term invasive non-native species relates to those species that have been introduced from other countries, either deliberately or accidentally, which now pose a threat to native biodiversity. Though many species have been introduced in the past (such as garden flowers and certain tree species), only those which spread aggressively at the expense of native species are of concern. This can be illustrated by looking at the number of invertebrates that different tree species can support: oak supports vastly more than non-natives such as sycamore, but these often out-compete oak for space in a woodland. The knock-on effect is the reduction of invertebrates means less food for species including birds. The invasive non-native threat can be much more immediate and direct, in the case of American mink, which can decimate water vole populations.

For the purposes of this analysis, invasive non-native species are defined as: "species that are not native to a particular area [which] threaten biodiversity aims". This excludes more benign species such as the common poppy that, though their occurrence is not strictly natural, their presence poses no significant threat to other species.

The SNH Species framework identifies 6 species requiring immediate action. These are:

- American mink
- Grey squirrel (with regard to red squirrel conservation)
- North American signal crayfish
- New Zealand pigmyweed
- Rhododendron ponticum and its hybrids
- Sargassum muticum (wireweed)

This may be useful as funding has been allocated to these species. However, clearly there are a number of other species not included in the framework that will also need to be considered. Ultimately it will be the level of perceived threat that determines where action must be taken, particularly if this relates to UK BAP Priority Species or habitats. This will also be guided by the Trust's Non-native Invasive Species Policy (2007).

Nowhere is it more apparent than with invasive non-native species that Trust reserves cannot be managed in isolation from the wider countryside. While species such as mink are free to roam over large areas, others such as Japanese knotweed tend to be a problem over a large part of a river basin. Only by tackling such problems over a wide area, can individual sites such as Trust reserves be safeguarded. This poses a definite challenge for the Trust.

Invasive Non-native Results

Data collected on the occurrence of invasive non-native species on Trust reserves has allowed analysis of the potential threats these species pose to our native biodiversity. Figure 16 shows the occurrences of those invasive non-natives highlighted by the SNH Species Framework.
Though the emphasis here is on non-native species that might pose a threat in some form, the results from Trust surveys also showed other non-native species that are perhaps of less concern. Figure 17 shows the occurrence of all invasive non-native species on Trust reserves.

Following this preliminary analysis, further data was collated to determine to what extent an invasive non-native species present on a reserve posed a threat and whether or not that species

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Figure 16: Occurrence of invasive non-native species from the SAF on Trust reserves

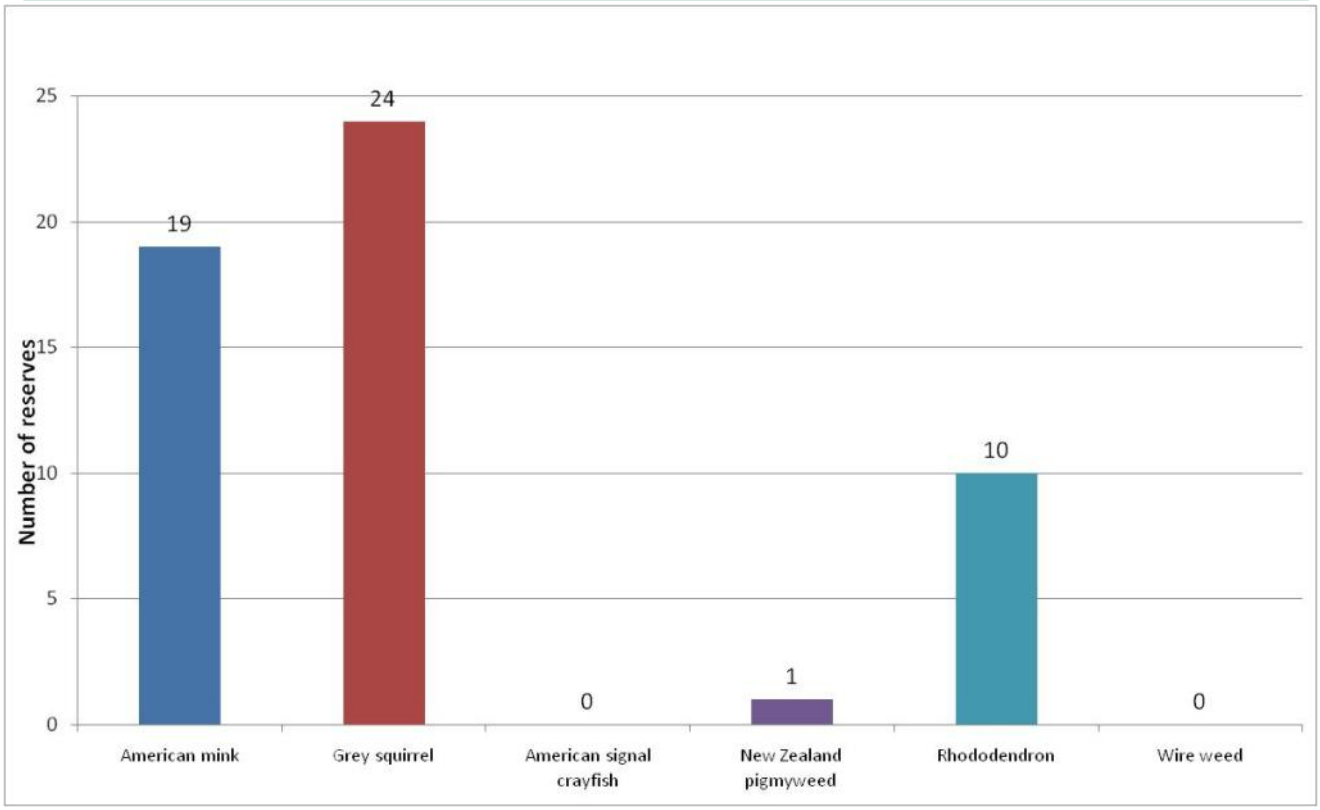
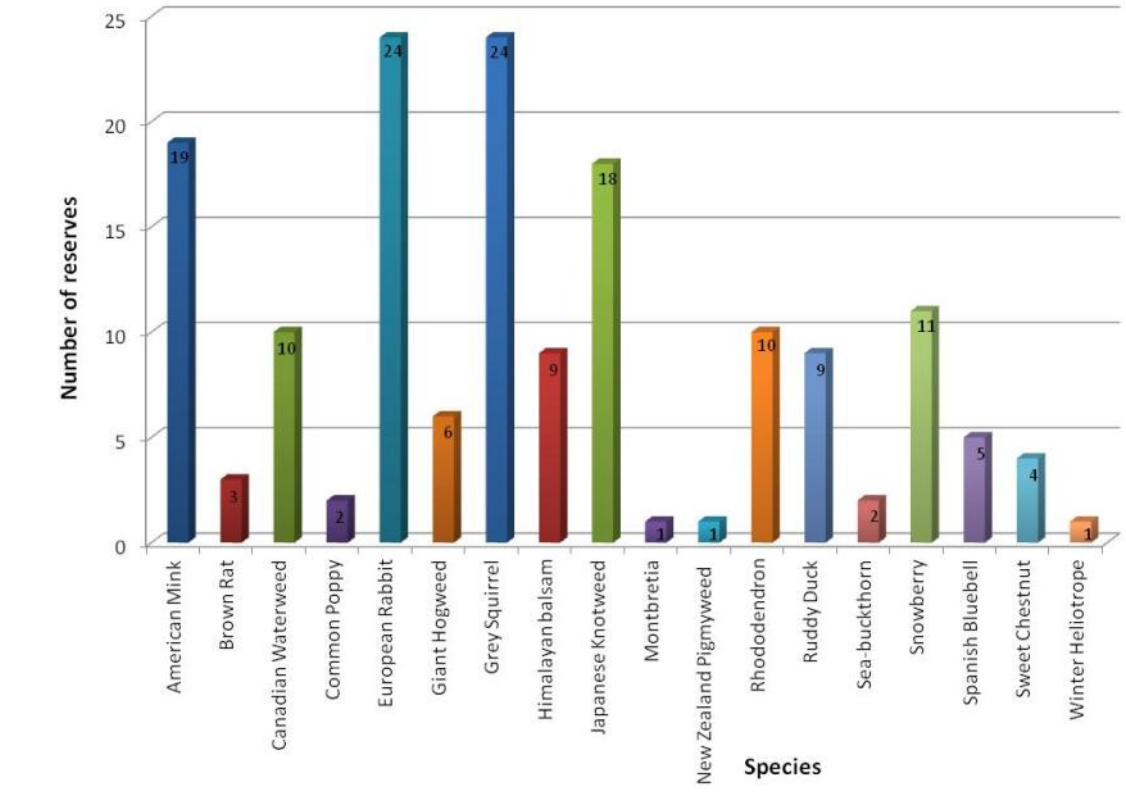


Figure 17: Occurrence of all invasive non-native species on Trust reserves



was being monitored and/or actively managed.

Out of a total of 123 Trust reserves, 63 (51%) support invasive non-native species. The Trust reserves identified as having the highest number of different invasive non-native species are: Bawsinch and Duddingston (9), Cumbernauld Glen and Falls of Clyde (7), Ayr Gorge Woodlands, Balgavies Loch and Perceton Wood (each with 6), and Shewalton Sandpits (5).

In terms of the SNH Species Framework list, four out of the six listed occur on Trust reserves. These are: grey squirrel (24 reserves), American mink (19), rhododendron (10) and New Zealand Pigmyweed (1).

Regarding other non-native species recorded on Trust reserves, European rabbit (on 24 reserves), Japanese knotweed (18), snowberry (11), Canadian pondweed (10), Himalayan balsam and ruddy duck (both 9), giant hogweed (6), brown rat (3) and sea buckthorn (2) are those that are most likely to pose some threat. Others, such as common poppy and sweet chestnut are relatively benign and may actually be welcomed as being intrinsically appealing.

Although invasive non-native species occur on almost half of Trust reserves, this in itself does not necessarily mean that these species are a threat requiring active management in every case. The next step was therefore to determine the abundance of such species on Trust reserves, whether or not they were perceived as a threat, and whether or not the species was being monitored and actively managed. (See analysis below.) Of particular concern for the future will be where such species threaten: UK BAP Priority Species or habitats; SBS list species; or SNH Species Framework species requiring conservation action on Trust reserves.

Most invasive non-native species spread out readily. While the expansion in range of some may be largely confined to certain areas (such as water-courses as with giant hogweed, Himalayan balsam and Japanese knotweed for example), others such as European rabbit and brown rat can go much further afield. American mink lies somewhere between these extremes as, while it may spread widely in lowland areas, in the uplands it does tend to follow water courses upstream.

The nature of the distribution of these species can dictate what can be done to control or eradicate them from an area. Figure 18 reflects this to some extent as it shows a greater concentration of invasive non-native species in lower lying Trust reserves. At the same time, such species may be easier to manage on upland reserves where spread is inhibited by topography or island reserves where total eradication may be feasible.

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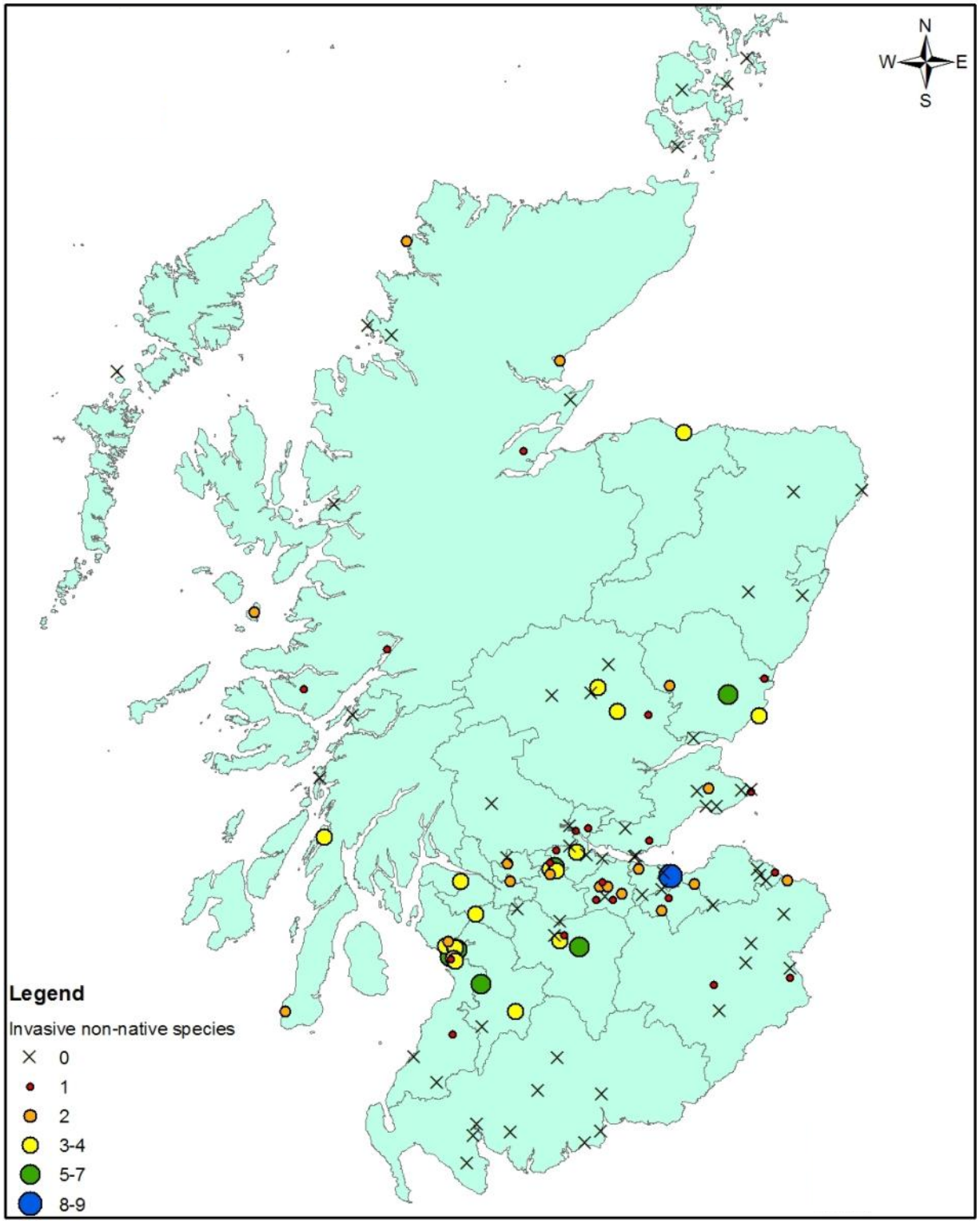

Figure 18: Number of UK BAP Priority Habitats by Trust reserve

Analysis of actions for invasive non-native species on Trust reserves

In order to define how much of a threat these species pose, more detailed information beyond the presence or absence of non-native invasive species was obtained as to the status, monitoring and management of these species. The relationships between these were analysed and the results are summarised in figures 19, 20 and 21.

The extent to which the Trust will be capable of managing invasive non-native species will depend upon a number of factors including:
the extent to which a species is perceived as a threat on a Trust reserve;
the extent to which a species is confined to a Trust reserve as opposed to being a problem in the wider countryside and hence the practicality of managing a reserve to eradicate a particular species;
the practicality of eradicating the species from the wider countryside (can anything actually be done);
resources (including the practicality of creating a project and raising funds for this).

Figure 19: Status of invasive non-native species and monitoring on Trust reserves

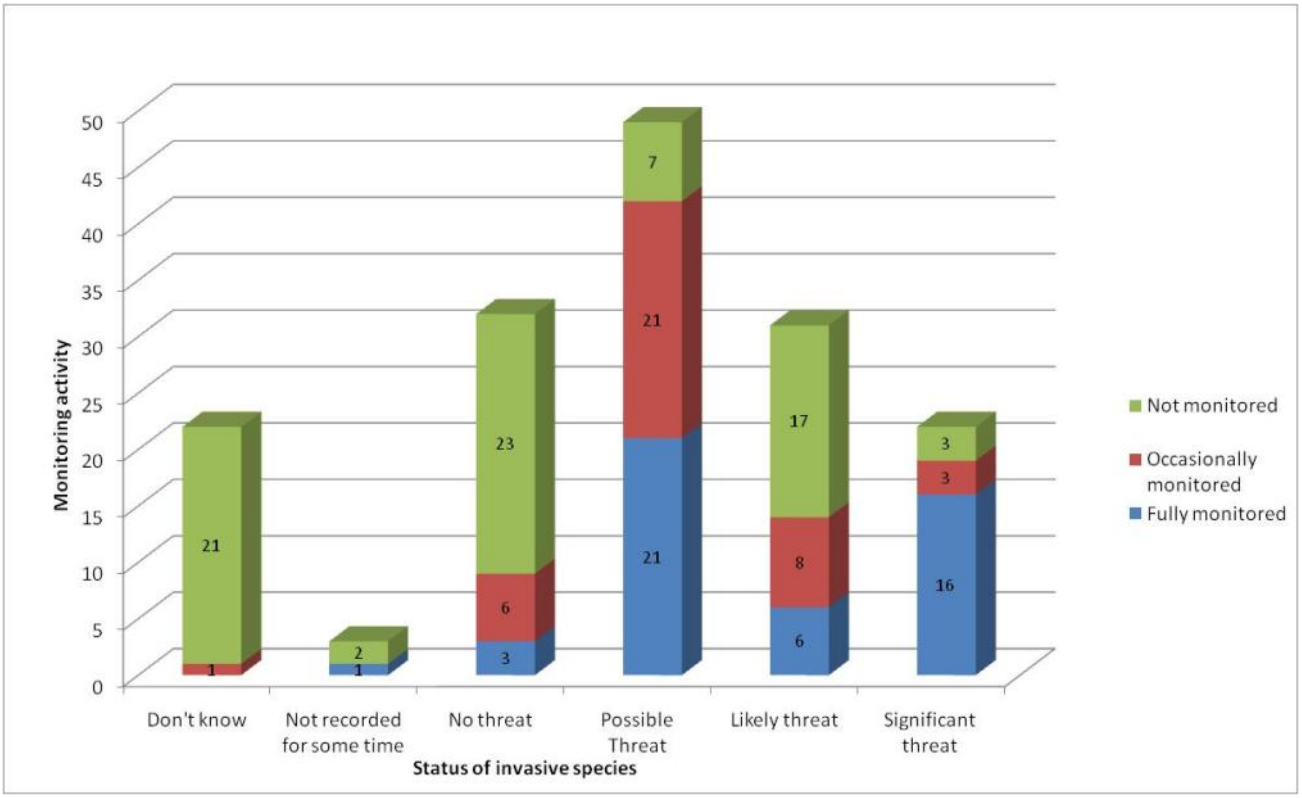

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Figure 20: Status of invasive non-native species and practical management on Trust reserves

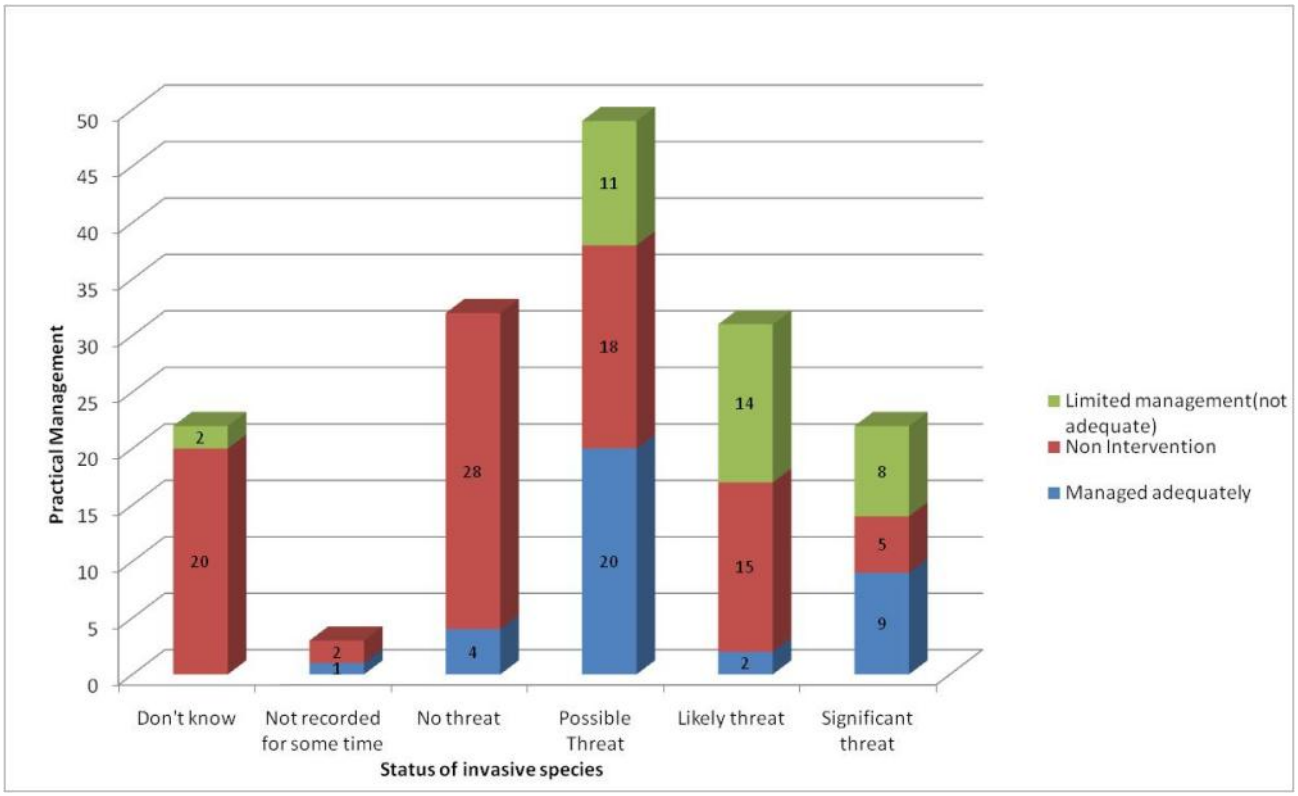
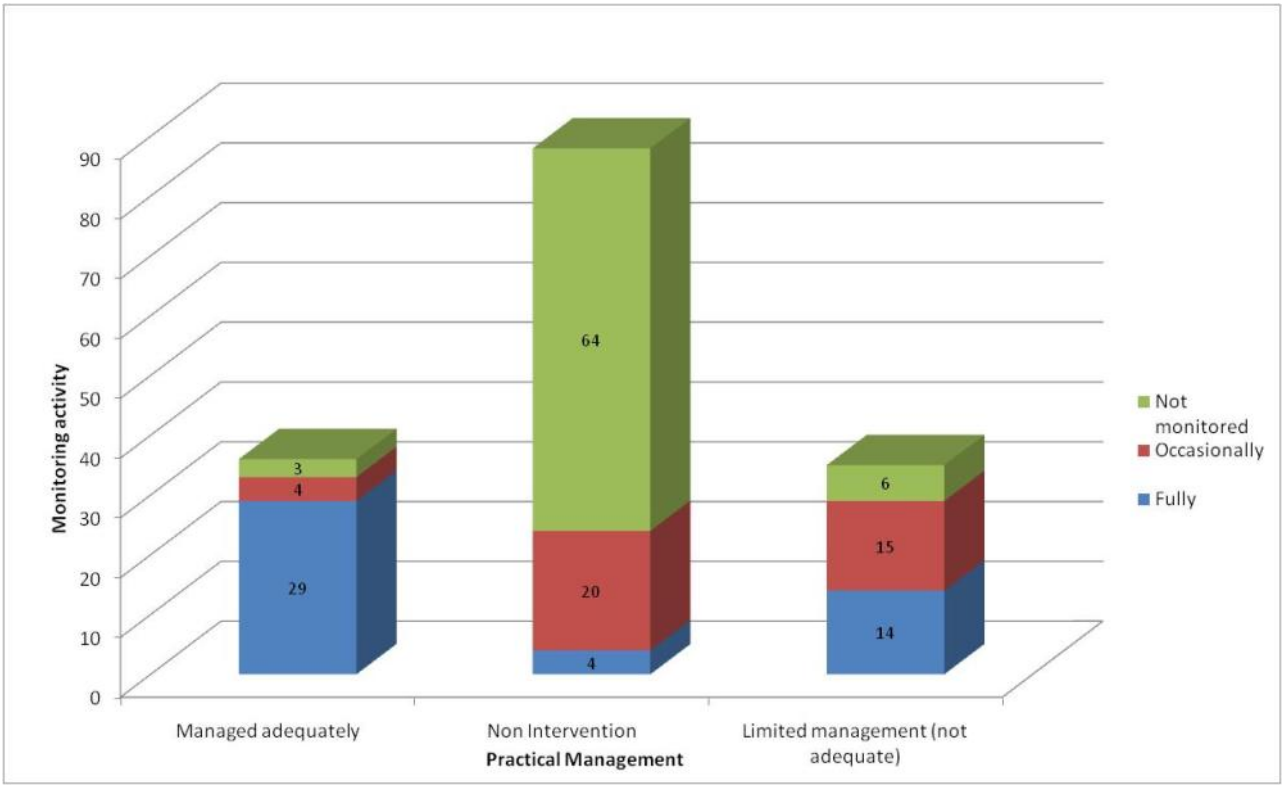


Figure 21: Practical management and monitoring of invasive non-native species on Trust reserves



Discussion

With such a general overview it is important that care is taken when interpreting the results. However there are some interesting initial findings. These will be considered in turn under the various categories of species status before broader implications are discussed. Remember, figures relate to records, not species. So, for example the figure 12 could equally be 12 species on a single reserve or one species on 12 different reserves. However, the conclusions drawn are equally valid.

Don't know
Out of 22 records, 21 are not monitored and only 1 occasionally monitored. Perhaps it is not surprising that little is known about the status of these. At the same time, non-intervention is prescribed for 20 of these, while limited, inadequate intervention is acknowledged (by the Reserve Managers) for the remaining 2.

Not recorded for some time
Of the 3 records showing not recorded for some time (all American mink), 1 is fully monitored and the others not monitored. At the same time, the fully monitored species record is listed as being managed adequately, and the other 2 as non-intervention. As this is a species not confined to any particular site, this is perhaps as would be expected.

No threat
Out of 32 records considered to be no threat, 3 are fully monitored, 6 occasionally, and the remaining 23 not monitored. The evaluation of these is therefore based primarily on something other than systematic monitoring. At the same time, 4 of these are considered to be managed adequately (raising the question of how significant a threat they would be if they were not). For the remaining 28, non-intervention is prescribed. Again this decision has been based on something other than systematic monitoring.

Looking in more detail at the species concerned, those considered as “no threat” include all Common poppy and Sweet chestnut records, as well as 15 reserves with the European rabbit present, which is considered naturalised in mainland Scotland. There are also four incidents of grey squirrel included in this category, all within the central belt, where they have taken over irreversibly from the red squirrel.

Possible Threat
Out of 49 records, 21 are fully monitored, 21 occasionally monitored, and the remaining 7 not monitored. At the same time, 20 are considered to be managed adequately, non-intervention is prescribed for 18, and the remaining 11 are considered to be managed inadequately. All of those being managed adequately are monitored either frequently or occasionally.

Likely threat
Out of 31 records, 6 are fully monitored, 8 occasionally, and the remaining 17 not monitored. The evaluation of a little over 50% of these is therefore based primarily on something other than systematic monitoring. In terms of management, 2 are considered to be managed adequately, non-intervention is prescribed for 15, and the remaining 14 are considered to be managed inadequately.

Significant threat
Out of 22 records, 16 are fully monitored, 3 occasionally monitored and 3 not monitored. The higher percentage of records being monitored here suggests that at this high level of threat, as would be expected, the need for this is much clearer. At the same time, 9 are managed adequately, non-intervention is prescribed for 5, while management remains inadequate for 8. In the case of the latter, the species involved are American mink (2 records), brown rat (1), Himalayan balsam (1), snowberry (2), and Spanish bluebell (2). Here most species, and in particular the American mink, the brown rat, and the Himalayan balsam, cannot be adequately managed in isolation at any particular mainland site and require a co-ordinated effort in the wider countryside. Interestingly, the brown rat record

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is from the Isle of Eigg. However, although in theory this species can be eradicated from islands, Eigg is considered too large for this and so this particular species is not considered in detail.

Monitoring vs. Management

Here it can be seen that out of 36 records considered to be managed adequately, 29 are fully/ regularly monitored and a further 4 occasionally, leaving only 3 that are not being monitored. Out of the 88 for which non-intervention is prescribed, 64 are not monitored, 20 occasionally, and only 4 fully. In the 35 cases where management is considered inadequate, 14 are fully monitored, 15 occasionally, and only 6 not monitored. This shows a very mixed approach and that management decisions are sometimes being made on evidence other than systematic monitoring.

Implications

From the analysis above a number of facts of particular interest emerge:

- Of the159 records of invasive non-native species on Trust reserves, only around 54% are being monitored in some way.
- It is felt that Trust reserves are being managed adequately for invasive non-native species in 23% of cases (of invasive species occurrence). If non-intervention is added to this the figure becomes 78%. However the latter figure is somewhat ambiguous as 95% of these records are monitored either only occasionally or not at all.
- The number of records for which management is considered to be adequate 36 (23%) is on a par with those for which management is considered inadequate (35, or 22%).
- In cases where management is considered to be adequate, 92% are being monitored in some way, suggesting that decisions are for the most part being guided by this.
- Of the 159 records, it is believed that only 22 (14%) pose a significant threat. However, practical management is only being undertaken for 9 of these.

From the above it is clear that in some cases, particularly where non-intervention is prescribed, decisions are being based on something other than systematic monitoring. However, this is not to say that those decisions are not appropriate but merely that the reasons for them are not transparent at present.

That 23% of records are not being managed adequately does not necessarily mean that more could be done as this could relate to problems in the wider countryside which cannot be tackled in isolation at a single site. (For example, the Japanese knotweed at Shewalton Sandpits which is part of a larger population in the area beyond the site itself.)

The difficulty will now lie in determining exactly what the real implications of this are. To a large extent this will involve Reserve Managers looking at these results and seeing how they relate to specific cases on their reserves. However, from this some general conclusions and recommendations can be drawn.

Conclusions

It has became clear that the approach to invasive non-native species is quite mixed. Clearly decisions are not being made from the results of systematic monitoring alone, and actions are not always being taken even where a species is considered to be a significant threat. It would seem that the difficulty lies in the fact that many (or possibly most) such species are not confined within the boundaries of a given reserve. This need to manage the wider countryside rather than an individual site means that the Trust's ability to manage invasive non-native species will remain limited unless co-operation is sought with other land managers in an area.

Most species that are considered to pose a significant threat are being monitored, although this falls to less than half for those seen as only a likely threat. This suggests that in the case of the latter, additional monitoring might clarify the situation, shifting records into the categories of either significant threat or possible/ potential threat or no threat. Where decisions are being made from evidence other than systematic monitoring, this could be made more transparent through recording findings in such a way that they are readily available to others. However, such informal observation could be made considerably more effective simply by standardising the approach so that it is repeated in the same way on each visit.

Himalayan balsam *Impatiens glandulifera* © Scottish Wildlife Trust

8. UK BAP signposting of species to habitats on Trust reserves

Introduction

As the latest review of UK BAP Priority Species resulted in a much extended list, these species can no longer be sensibly considered individually in terms of management. The concept of "Signposting" was developed by the JNCC to combat this as species are grouped under different habitat categories. The premise being that those species with a particular habitat in common will also share common requirements. This being the case, caring for the habitat as a whole should safeguard the species reliant upon it. The resulting species to habitat links were applied to the Priority Species and Priority Habitats on Trust reserves. This should assist the Trust in prioritising actions more effectively (and more cost-effectively).

Methodology and constraints

Linking species to habitats is a complicated process as many species are not confined to a single habitat or even habitat type. JNCC focussed on Priority Habitats, which obviously do not cover the entire habitat range. While in some cases a species could be assigned to a small number of UK BAP Priority Habitats, possibly with its most favoured habitat highlighted, others were found to be very difficult to pin down in this way. Therefore additional analysis was required before this approach could be applied to Trust reserves.

The species being considered could be broadly categorised as specialists (which includes most of the plants, lichens and fungi) or non-specialists (such as otter and wild cat which range widely over a number of habitats), with a small number coming under the third category of "dual habitats" (predominantly insects whose life-cycle incorporates different habitats at different stages). The specialists (those species which strongly preferred a single habitat type) were readily assigned to a Priority Habitat. As such, the management of a reserve for these species is much simpler to visualise. However the non-specialists, being found in a range of habitats, could usually only be assigned to a much broader "ecosystem" category. The dual habitat species were those where their life cycle utilises entirely different habitats at different times. The implications of this will be considered further in the discussion.

Signposting Results

Figure 22 shows the number of UK BAP Priority Species that could be assigned to a particular Priority Habitat and compares the figures for Trust reserves with those for Scotland as a whole. Though the figures for Trust reserves are lower (as you would expect), the proportions are broadly similar in some cases: this is particularly clear with broadleaved woodland habitats with the notable exception of wet woodland. Areas where the Trust's suite of reserves apparently falls short in accommodating Priority Species include bogs and intertidal habitats. However, the reality is rather more complex and this will be discussed further below.

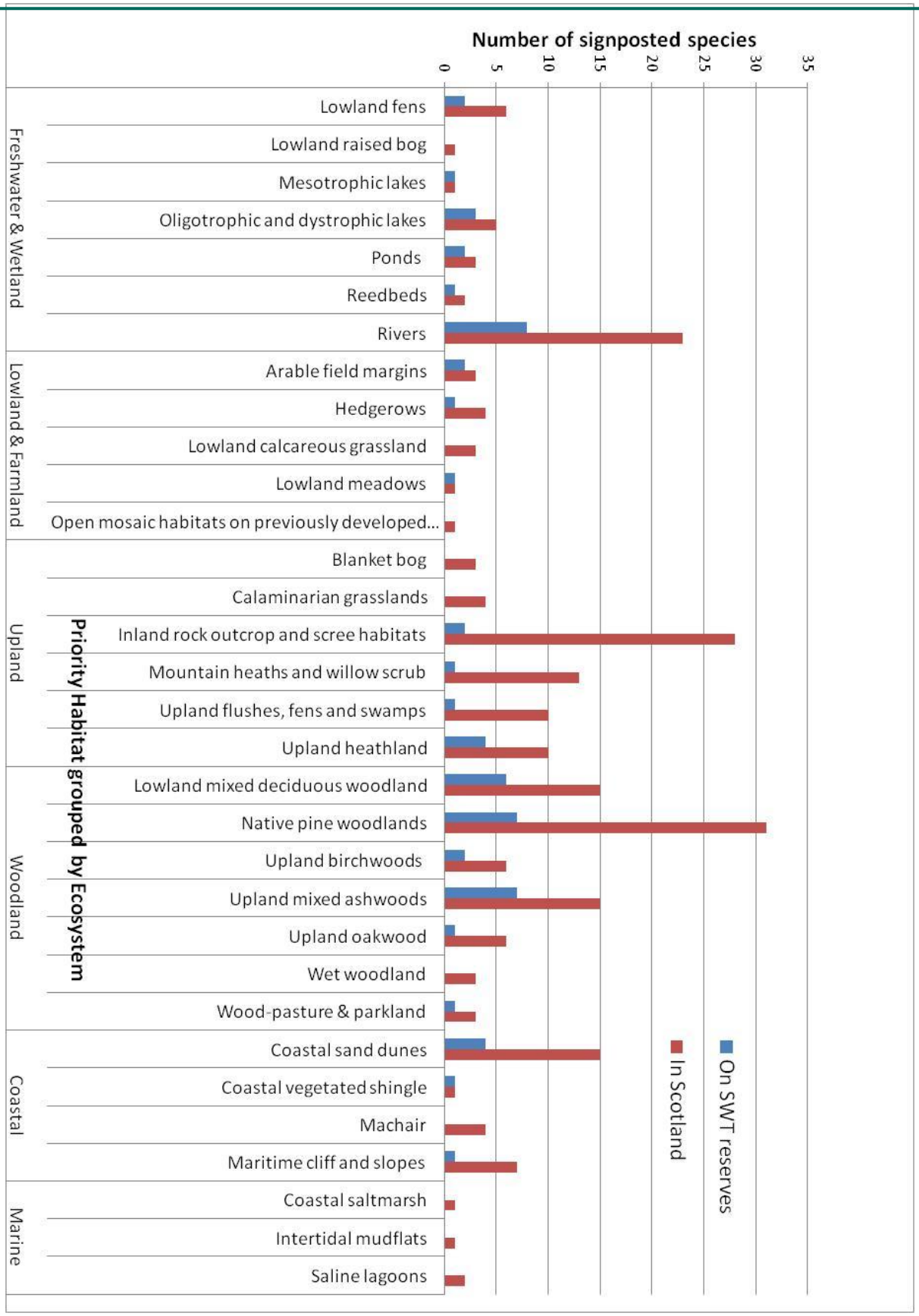

Figure 22: Priority Species by signposted Priority Habitat on Trust reserves & in Scotland

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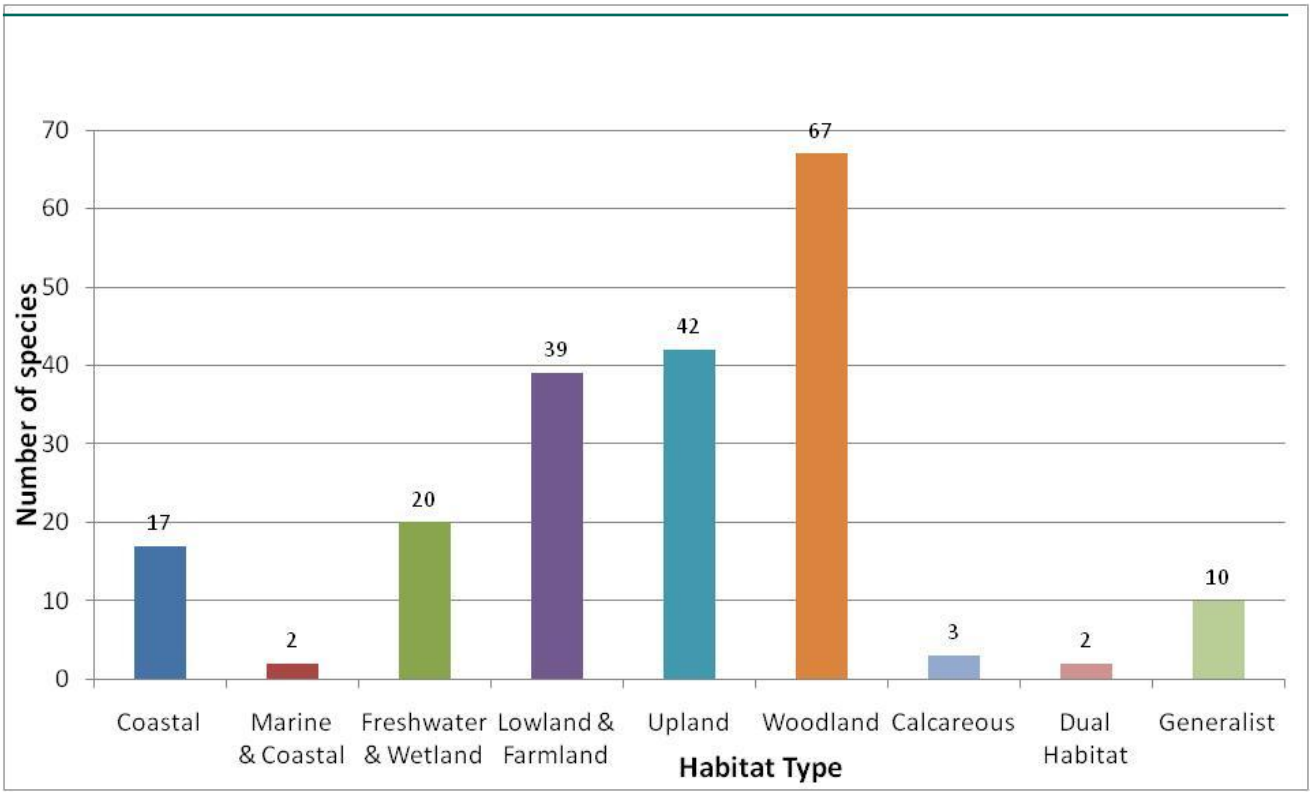
Figure 23 shows the proportions of non-specialist species by ecosystem type. As can be seen, most could be assigned to an ecosystem leaving only a small number of true generalists that range widely over a number of ecosystems, and an even smaller number of dual-habitat species.

Figure 24 which shows Priority Species plotted against Habitats using JNCC signposting simply confirms what would be expected intuitively; that is that more diverse reserves tend to support a larger number of UK BAP Priority Species. However, the implications of this are not so straightforward and will be considered further.

Figures 25 and 26 simply refine the above by plotting UK BAP Priority Species next to Priority Habitats for each Trust reserve across the whole of Scotland, divided by Reserve Manager areas. This is useful in itself as it shows where efforts may need to be focused. Generally there will be more Priority Species on a reserve than Priority Habitats, although this is not always the case: it will depend on whether an NVC habitat survey has been carried out, and whether there is any coordinated species recording.
Analysis of this data in regard to location is difficult as there is no clear spatial pattern, however in terms of reserve size (not shown here), it is interesting that while this influences the number of species on a reserve, it does not necessarily influence the number of habitats. Ben Mor Coigach is a good example of this: a large upland reserve, with a large number of species associated with a small number of habitats.

Figure 23: Non-specialist species by ecosystem type



Discussion

While the signposting exercise has not provided the perfect solution to having to consider a large number of species, and some species will still require carefully targeted individual attention, it would seem to provide a useful basis for future planning. However, only by attempting to apply this in the field will it become clear just how useful this is.

The Trust is a front-runner in considering the signposting approach, with other organisations such as Natural England, RSPB and Butterfly Conservation. This may not be an advantage, as more work needs to be done on narrowing down preferred niches for species within a particular habitat.

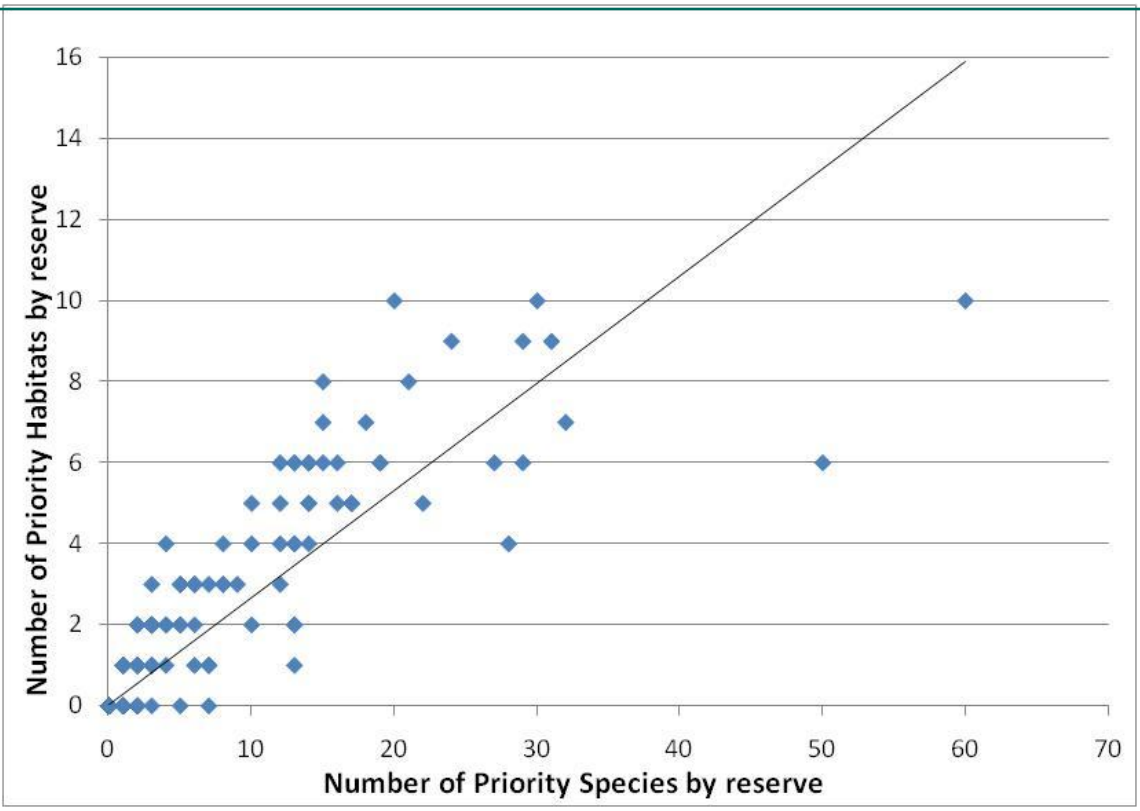
Natural England is taking this approach for invertebrates as part of their ISIS project, as yet unpublished. Butterfly Conservation has reservations about signposting as the requirements for some species (moths in particular) are poorly understood[25]. It will be extremely beneficial for the Trust to liaise with these organisations when tackling signposting for reserves and species individually.

Earlier in this report, birds and butterflies and moths were set aside to be considered later. That is because, more than any other species, they are reliant upon an area much broader than any one reserve. They are potentially far more mobile than any other group of species. While some birds are well known to migrate enormous distances under their own power, butterflies and moths can be distributed by wind over large areas. As a result, management of the wider countryside has a particularly

Footnotes

[25] Personal communication

Figure 24: Priority Species plotted against Habitats using JNCC Signposting



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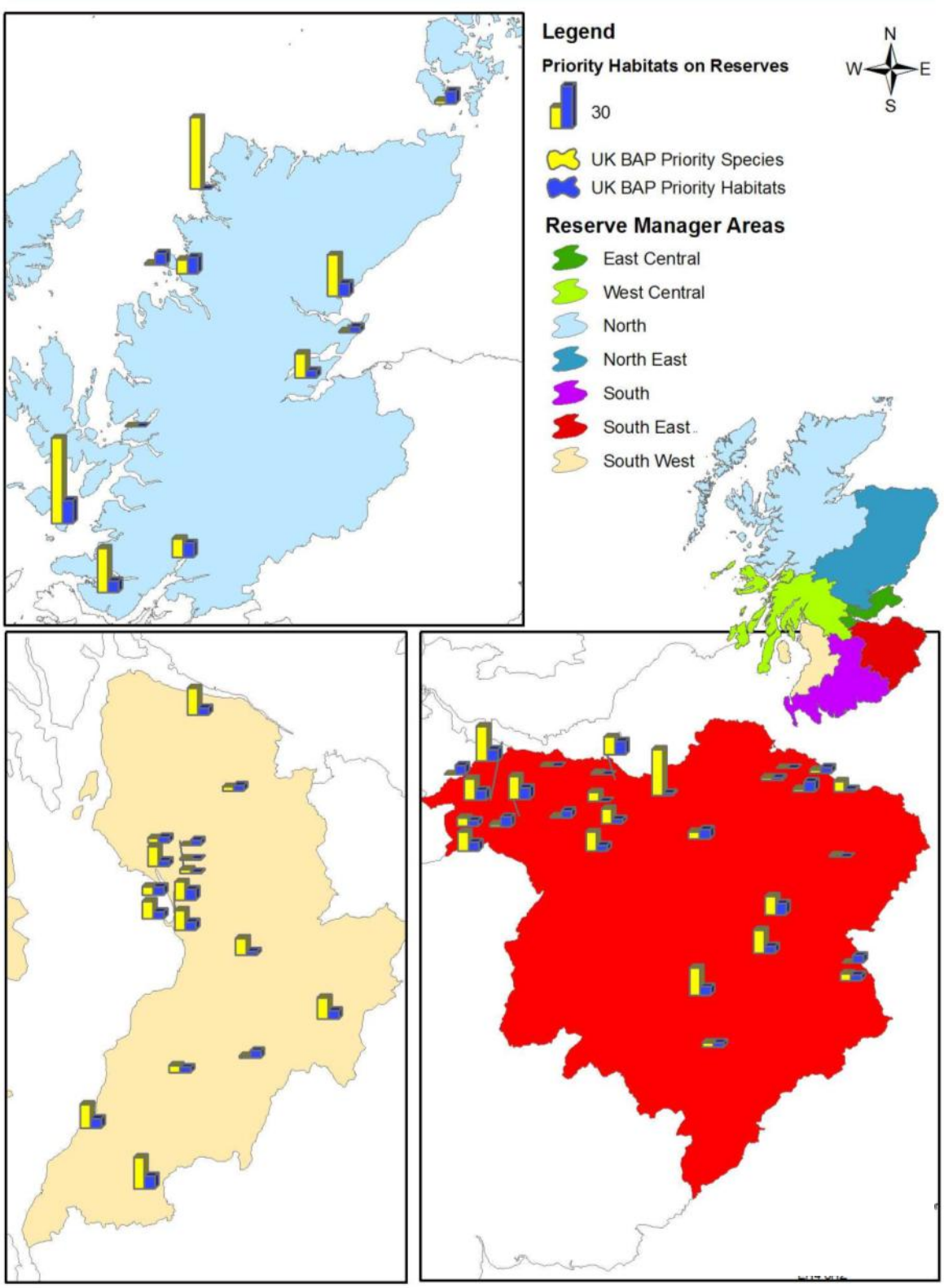

Figure 25: UK BAP Priority Species & Habitats by reserve (1/2)

strong influence on these species and management of habitats on reserves alone is unlikely to be adequate to safeguard them: some of these species may only be passing through, with only limited reliance on the reserve. Therefore, where Priority birds, butterflies and moths are concerned, signposting is only of limited help unless it is also applied to the wider countryside. In cases where it is believed that a species is utilising a reserve in more than a casual way, the following is recommended:

- Liaise with relevant organisations to determine to what extent they have succeeded in applying signposting to the species in question or, failing this, what other approach they advocate.
- Place the reserve in the context of the wider countryside in terms of the distribution of habitats upon which a species relies, for example: marsh fritillary at Ballachuan Hazel Wood where the devil's bit scabious on which it relies is more abundant in areas adjacent to the reserve than on the reserve itself.
- Place the reserve in the context of other Trust reserves supporting the same species thereby improving opportunities for a project covering all of these as well as sharing best practice.
- Ensure that any Trust initiative is closely tied to any national initiatives for a particular species and species group.

Comparing Trust reserves with Scotland as a whole shows how far in theory the Trust's reserves could go to accommodate additional species. However, a number of factors work against this:

- Species may have conflicting requirements and therefore it would be impossible to manage a reserve to accommodate all of them;
- Even with suitable conditions on a reserve, there may be an absence of potential colonisers in the surrounding countryside due to landscape scale habitat fragmentation.
- With some species such as fungi and lower plants, additional surveying by experts might reveal additional species;
- The carrying capacity[26] of a habitat area within both a reserve and the surrounding countryside might be insufficient to support a sustainable population of a given species, and expanding that habitat at the expense of other habitats might be undesirable.

Taking these factors into account, some species will be more easily accommodated within the boundaries of a reserve than others. These will be the specialist species which tend to be confined to a single habitat type. Thus management and monitoring efforts can be more finely focused. However, non-specialists, which utilise a range of different habitats, won't be limited to the boundaries of the reserve. Many of these are birds, certain mammals and some invertebrates. This means the most the Trust can do is maintain a reserve in a biologically diverse and ecologically healthy state. Any projects aimed at safeguarding such species could only be effective if they were fully linked to the wider countryside.

The few "dual habitat" species identified could be best served in a similar way to the non-specialists, but with regard to their particular habitat requirements. Many such species are associated with freshwater, so safeguarding water quality and riparian habitats would be important in such cases. This would also benefit other species, whether specialists or non-specialists; again maintaining a reserve in a generally healthy condition would be the only realistic approach.

Simply because more diverse reserves tend to support a larger number of species, it would not

Footnotes

[26] Carrying capacity = how large a population of a given species can be supported at a given location.

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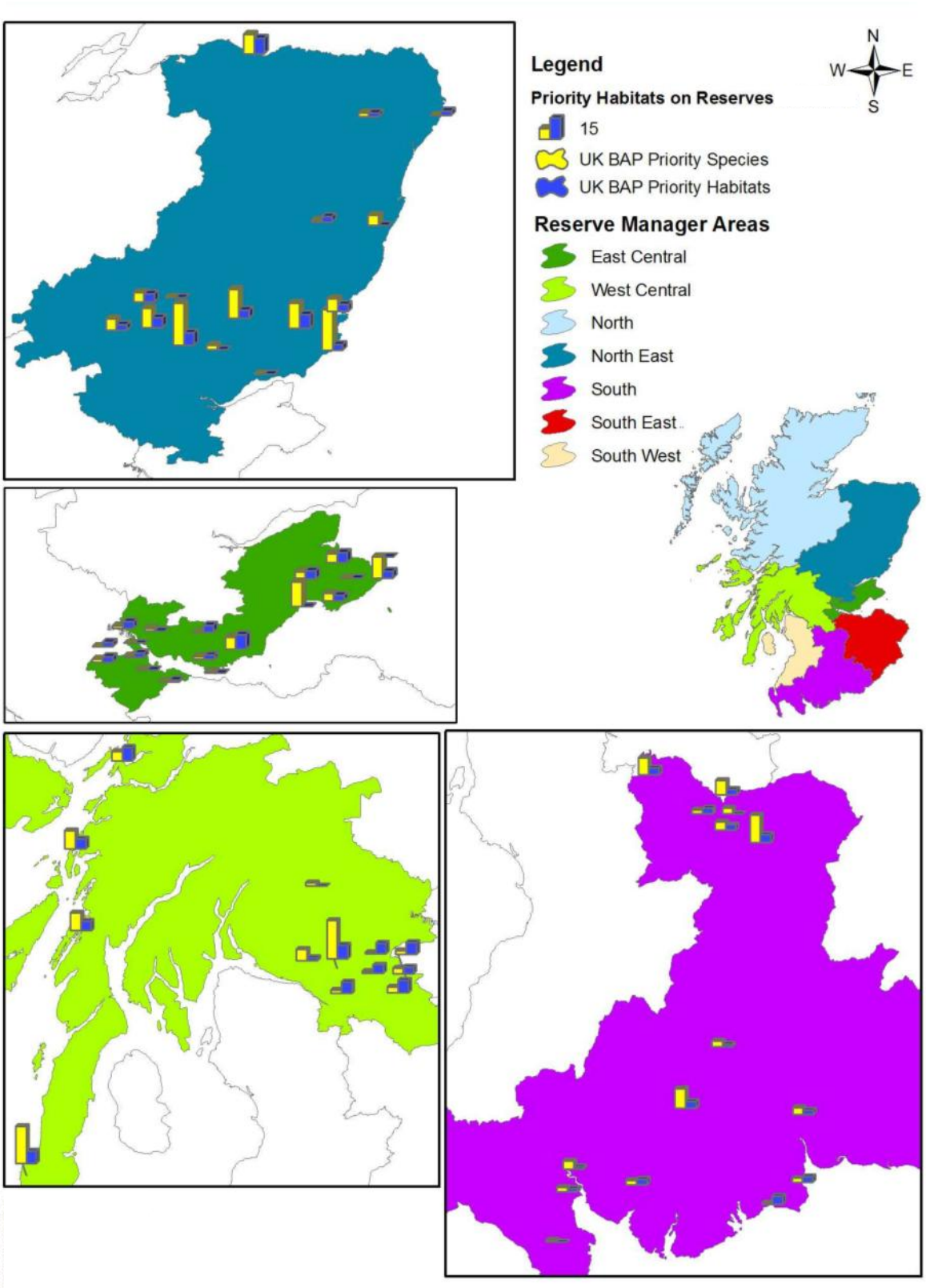

Figure 26: UK BAP Priority Species and Habitats by reserve (2/2)

be realistic to try to attempt to manage reserves purely to maximise habitat diversity. This is due to carrying capacity issues whereby the reduction in area of one habitat to accommodate another might render the first too small to support the species already there. Trust reserves were initially chosen as areas of fairly high biodiversity, and through Trust management the habitats, and therefore the species that survive on them, have been maintained and in many cases improved. The monitoring and survey work undertaken by the Trust has highlighted their biological diversity: where monitoring indicates a significant habitat change that may lead to a decline in a particular species, the Trust should consider a change in management regime.

When new acquisitions are considered, the existing biodiversity of the site would be one of the factors examined in accordance with the Trust's reserve acquisition strategy. This might help to plug "gaps" in the Priority Species and Habitats on the Trust's land holdings.

As the signposting exercise relates to ecosystems and habitats, the remaining task will be for Reserves Managers to translate this for their own reserves. As highlighted in the habitats section, there are translation issues between the NVC codes used on reserves and the more general habitats and ecosystems favoured by the JNCC system, but use of their lookup tables[27] should make this more straightforward. Using signposting in this way has certain benefits:

- With so many species to consider, signposting appears to be the only realistic way forward. By assigning Priority Species to Priority Habitats on each individual reserve; monitoring, and where necessary, management, can be more easily and effectively targeted.
- The Trust is accountable for the species and habitats which it manages and needs to be confident that everything possible is being done to protect these. In addition, the Trust needs to be able to demonstrate this to others.
- From the results of the species action analysis, it could be suggested that there is little direct action for the protected species on reserves. Clearly with such biologically diverse reserves this cannot be the case. Past and current management has often been habitat focussed, but not linked to specific species. Signposting indicates those species that are likely to be benefiting from this approach; allowing the Trust to more realistically gauge the effectiveness of management.

Footnotes

[27] http://www.jncc.gov.uk/page-4266

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9. Species appendices

Appendix 1. – UK BAP Priority Species on SWT reserves

With such a large number of species it becomes necessary to break this down to some extent. Marine species were removed as SWT has no marine reserves; birds, butterflies and moths were viewed in isolation (See tables 6, 7 and 10).

UK BAP Priority Species	Total UK BAP species	Scottish BAP List	on SWT reserves	SWT % of total for Scotland
Birds	59	52	38	73.08%
Fish (excluding purely marine species)	14	12	4	33.33%
Fungi (including lichens)	215	127	10	7.87%
Herptiles (amphibians and reptiles)	10	8	6	75.00%
Marine species	88	73	14	19.18%
Non-vascular plants	122	64	4	6.25%
Terrestrial invertebrates	411	151	62	41.06%
Terrestrial mammals	18	12	12	100.00%
Vascular plants	212	111	24	21.62%
Total	1149	610	174	28.52%

Table 1: Categories of UK BAP Priority Species on SWT reserves

Species	Scientific Name	No of SWT reserves
Adder	Vipera berus	7
Arctic Sandwort	Arenaria norvegica subsp. norvegica	2
Arthonia cohabitans	Arthonia cohabitans	1
Ascomycete	Hypocreopsis rhododendri	1
Atlantic Salmon	Salmo salar	3
Bombus (Thoracombus) humilis	Bombus (Thoracombus) humilis	1
Bombus muscorum	Bombus muscorum	3
Brown Hare	Lepus europaeus	28
Brown Long-eared Bat	Plecotus auritus	6
Chamomile	Chamaemelum nobile	1
Collema fasciculare	Collema fasciculare	2
Common Lizard	Lacerta vivipara	15
Common Pipistrelle	Pipistrellus pipistrellus	18
Common Toad	Bufo bufo	25
Cornflower	Centaurea cyanus	1
Crested Buckler-Fern	Dryopteris cristata	1
Eurasian Red Squirrel	Sciurus vulgaris	21
European Eel	Anguilla anguilla	5
European Otter	Lutra lutra	40
European Water Vole	Arvicola terrestris	16
Eyebright	Euphrasia anglica	1
Field Gentian	Gentianella campestris	8
Freshwater Pearl Mussel	Margaritifera margaritifera	1
Frog Orchid	Coeloglossum viride	4
Fuscopannaria sampaiana	Fuscopannaria sampaiana	1
Glaucous Meadow-grass	Poa glauca	1
Graphis alboscripta	Graphis alboscripta	1
Grass-poly	Lythrum hyssopifolia	1
Grayling	Hipparchia semele	5
Great Crested Newt	Triturus cristatus	1
Great Yellow Bumblebee	Bombus distinguendus	1
Greater Water-parsnip	Sium latifolium	1
Harvest Mouse	Micromys minutus	1
Heath tiger beetle	Cicindela sylvatica	1
Hedgehog	Erinaceus europaeus	9
Holly-fern	Polystichum lonchitis	1
Hypogymnia vittata	Hypogymnia vittata	6
Juniper	Juniperus communis	9
Leptogium brebissonii	Leptogium brebissonii	2
Lesser Butterfly-orchid	Platanthera bifolia	10
Long-leaved Tail-moss	Anomodon longifolius	1
Marsh Clubmoss	Lycopodiella inundata	1
Marsh Stitchwort	Stellaria palustris	3
Mountain Hare	Lepus timidus	3
Narrow-Leaved Helleborine	Cephalanthera longifolia	2
Noctule	Nyctalus noctula	3
Northern Dock	Rumex longifolius	4
Northern Hawk's-beard	Crepis mollis	1
Oil Beetle	Meloe violaceus	3
One-flowered Wintergreen	Moneses uniflora	1
Parmeliella testacea	Parmeliella testacea	2
Pine Marten	Martes martes	7
Pseudocyphellaria intricata	Pseudocyphellaria intricata	1
Species	**Scientific Name**	**No of SWT reserves**
Pseudocyphellaria norvegica	Pseudocyphellaria norvegica	2
Purple Milk-vetch	Astragalus danicus	4
Pyramidal Bugle	Ajuga pyramidalis	3
Pyrenula macrospora	Pyrenula macrospora	2
River Lamprey	Lampetra fluviatilis	2

Species	Scientific Name	No of SWT reserves
Pseudocyphellaria norvegica	Pseudocyphellaria norvegica	2
Purple Milk-vetch	Astragalus danicus	4
Pyramidal Bugle	Ajuga pyramidalis	3
Pyrenula macrospora	Pyrenula macrospora	2
River Lamprey	Lampetra fluviatilis	2
Ruby-tailed wasp	Chrysis fulgida	1
Sea Trout	Salmo trutta	3
Silometopus incurvatus	Silometopus incurvatus	1
Skye bog-moss	Sphagnum skyense	1
Slender Naiad	Najas flexilis	1
Slender Thread-moss	Orthodontium gracile	1
Slow-worm	Anguis fragilis	2
Small Cow Wheat	Melampyrum sylvaticum	1
Small-White Orchid	Pseudorchis albida	4
Soprano Pipistrelle	Pipistrellus pygmaeus	2
Stonefly	Brachyptera putata	1
Truncatellina cylindrica	Truncatellina cylindrica	1
Tumid Notchwort	Lophozia ventricosa	7
Twinflower	Linnaea borealis	2
Usnea articulata	Usnea articulata	1
Valvata macrostoma	Valvata macrostoma	1
Whorled Solomon's Seal	Polygonatum verticillatum	1
Wildcat	Felis silvestris	5

Table 2: UK BAP Priority Species on SWT reserves excluding: birds; butterflies and moths; and marine species.

Species	Scientific Name	Number of Reserves
Arctic Skua	Stercorarius parasiticus	6
Black Grouse	Tetrao tetrix	6
Black-throated Diver	Gavia arctica	6
Capercaillie	Tetrao urogallus	1
Common Bullfinch	Pyrrhula pyrrhula	37
Common Cuckoo	Cuculus canorus	13
Common Linnet	Carduelis cannabina	22
Common Scoter	Melanitta nigra	6
Corncrake	Crex crex	2
Cuckoo	Cuculus canorus	3
Dark-Bellied Brent Goose	Branta bernicla subsp. bernicla	1
Eurasian Curlew	Numenius arquata	39
Eurasian Tree Sparrow	Passer montanus	12
Eurasian Wryneck	Jynx torquilla	3
European Turtle Dove	Streptopelia turtur	2
European White-Fronted Goose	Anser albifrons	5
Grasshopper Warbler	Locustella naevia	24
Great Bittern	Botaurus stellaris	1
Greater Scaup	Aythya marila	3
Grey Partridge	Perdix perdix	16
Hawfinch	Coccothraustes coccothraustes	1
House Sparrow	Passer domesticus	11
Lapwing	Vanellus vanellus	10
Lesser Redpoll	Carduelis cabaret	3
Marsh Warbler	Acrocephalus palustris	1
Nightjar	Caprimulgus europaeus	1
Northern Lapwing	Vanellus vanellus	30
Red-backed shrike	Lanius collurio	2
Reed Bunting	Emberiza schoeniclus	45
Ring Ouzel	Turdus torquatus	6
Roseate Tern	Sterna dougallii	3
Scaup	Aythya marila	4
Scottish Crossbill	Loxia scotica	2
Skylark	Alauda arvensis Alauda arvensis subsp. arvensis/scotica	24 7
Song Thrush	Turdus philomelos	36
Spotted Flycatcher	Muscicapa striata	35
Stone-Curlew	Burhinus oedicnemus	1
Tree Pipit	Anthus trivialis	22
Wood Warbler	Phylloscopus sibilatrix	12
Yellowhammer	Emberiza citrinella	27

Table 3: UK BAP Priority Birds found on SWT reserves

Species	Scientific Name	Number of Reserves
Argent & Sable	Rheumaptera hastata	3
Arthothelium macounii	Arthothelium macounii	1
Autumnal Rustic	Eugnorisma glareosa	1
Brindled Ochre	Dasypolia templi	1
Broom Moth	Ceramica pisi	4
	Melanchra pisi	2
Brown-spot Pinion	Agrochola litura	2
Buff Ermine	Spilosoma luteum	1
Centre-barred Sallow	Atethmia centrago	2
Chequered Skipper	Carterocephalus palaemon	1
Cinnabar	Tyria jacobaeae	9
Dark Brocade	Mniotype adusta	2
Dark-Barred Twin-Spot Carpet	Xanthorhoe ferrugata	2
Dingy Skipper	Erynnis tages	1
Double Dart	Graphiphora augur	2
Dusky Brocade	Apamea remissa	5
Ear Moth	Amphipoea oculea	2
Forester	Adscita statices	2
Garden Dart	Euxoa nigricans	1
Garden Tiger	Arctia caja	9
Ghost Moth	Hepialus humuli	2
Goat Moth	Cossus cossus	1
Grayling	Hipparchia semele	6
Green-brindled Crescent	Allophyes oxyacanthae	1
Grey Dagger	Acronicta psi	7
Grey Mountain Carpet	Entephria caesiata	1
Haworth's Minor	Celaena haworthii	3
Heath Rustic	Xestia agathina	1
Knot Grass	Acronicta rumicis	6
Large Heath	Coenonympha tullia	10
Latticed Heath	Chiasmia clathrata	2
	Semiothisa clathrata	4
Lunar Yellow Underwing	Noctua orbona	2
Marsh Fritillary	Eurodryas aurinia	3
Minor Shoulder-Knot	Brachylomia viminalis	2
Mottled Rustic	Caradrina morpheus	1
Mouse Moth	Amphipyra tragopoginis	1
Narrow-bordered Bee Hawk-moth	Hemaris tityus	2
Neglected Rustic	Xestia castanea	1
Northern Brown Argus	Aricia artaxerxes	5
Oblique Carpet	Orthonama vittata	1
Paradiarsia glareosa	Paradiarsia glareosa	1
Pearl-bordered fritillary	Boloria euphrosyne	7
Red Carpet	Xanthorhoe decoloraria	1
Rosy Rustic	Hydraecia micacea	4
Rustic	Hoplodrina blanda	1
Sallow	Xanthia icteritia	4
September Thorn	Ennomos erosaria	1
Shaded Broad-Bar	Scotopteryx chenopodiata	5
Small Blue	Cupido minimus	7
Small Heath	Coenonympha pamphilus	26
Small Pearl-bordered Fritillary	Boloria selene	16

Table 4: UK BAP Priority butterflies and moths found on SWT reserves (also over)

Species	Scientific Name	Number of Reserves
Small Phoenix	Ecliptopera silaceata	6
Small Square-Spot	Diarsia rubi	4
Streak	Chesias legatella	1
White Ermine	Spilosoma lubricipeda	8

Table 4: UK BAP Priority butterflies and moths found on SWT reserves (continued).

Species	Scientific Name	Number of Reserves
Atlantic white-sided dolphin	Lagenorhynchus acutus	2
Basking Shark	Cetorhinus maximus	2
Bottle-Nosed Dolphin	Tursiops truncatus	2
Common Dolphin	Delphinus delphis	2
Common Porpoise	Phocoena phocoena	2
Common Seal	Phoca vitulina	4
Killer Whale	Orcinus orca	1
Leatherback Turtle	Dermochelys coriacea	1
Long-finned Pilot Whale	Globicephala melas	1
Minke Whale	Balaenoptera acutorostrata	2
Porbeagle	Lamna nasus	1
Risso's dolphin	Grampus griseus	2
Sea Lamprey	Petromyzon marinus	1
White-Beaked Dolphin	Lagenorhynchus albirostris	1

Table 5: UK BAP Priority marine species recorded from SWT reserves

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Appendix 2. – SBL species on SWT reserves

SBL	on SWT reserves	Total SBL species	% of SBL
Birds	87	93	93.55%
Fish (excluding purely marine species)	4	10	40.00%
Fungi (including lichens)	11	679	1.62%
Herptiles (amphibians and reptiles)	2	3	66.67%
Marine species	12	109	11.01%
Non-vascular plants	10	476	2.10%
Terrestrial invertebrates	26	289	9.00%
Terrestrial mammals	13	20	65.00%
Vascular plants	49	236	20.76%
TOTAL	214	1915	11.17%

Table 6: Categories of the Scottish Biodiversity List species on SWT reserves

Birds (B)	Species	Scientific Name	Number of SWT reserves
B	Arctic Tern	Sterna paradisaea	9
B	Barn Owl	Tyto alba	12
B	Barnacle Goose	Branta leucopsis	9
B	Bar-Tailed Godwit	Limosa lapponica	5
B	Bean Goose	Anser fabalis	1
B	Bearded Tit	Panurus biarmicus	1
	Beetle	Gyrinus paykulli	1
		Hydrochus brevis	1
	Black Bindweed	Fallopia convolvulus	1
B	Black-headed Gull	Larus ridibundus	25
B	Black-necked Grebe	Podiceps nigricollis	3
B	Black-tailed Godwit	Limosa limosa	5
	Bluebell	Hyacinthoides non-scripta	30
B	Brambling	Fringilla montifringilla	10
	Brook Lamprey	Lampetra planeri	2
B	Charlock	Sinapis arvensis	1
	Cladonia mitis	Cladonia mitis	1
	Cleft Bog-moss	Sphagnum riparium	1
	Clustered Bellflower	Campanula glomerata	1
B	Common Kestrel	Falco tinnunculus	39
B	Common Kingfisher	Alcedo atthis	17
B	Common Pochard	Aythya ferina	12
B	Common Swift	Apus apus	7
B	Common Tern	Sterna hirundo	9
	Corn Mint	Mentha arvensis	2
	Dickie's Bladder-fern	Cystopteris dickieana	1
	Dotted Sedge	Carex punctata	1
	Dropwort	Filipendula vulgaris	1
B	Dunlin	Calidris alpina	9
	Eurasian Badger	Meles meles	24
B	Eurasian Dotterel	Charadrius morinellus	1
B	Eurasian Marsh Harrier	Circus aeruginosus	5

Table 7: SBL species found on SWT reserves (also over)

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Birds (B)	Species	Scientific Name	Number of SWT reserves
B	Eurasian Siskin	Carduelis spinus	23
B	Eurasian Woodcock	Scolopax rusticola	24
B	European Golden Plover	Pluvialis apricaria	12
B	European Honey Buzzard	Pernis apivorus	1
B	European Robin	Erithacus rubecula	31
B	European Storm-petrel	Hydrobates pelagicus	3
	Field Garlic	Allium oleraceum	1
	Field Madder	Sherardia arvensis	1
B	Garganey	Anas querquedula	5
B	Golden Eagle	Aquila chrysaetos	9
B	Great Northern Diver	Gavia immer	4
	Greater Butterfly-orchid	Platanthera chlorantha	11
B	Green Sandpiper	Tringa ochropus	7
	Hairy Buttercup	Ranunculus sardous	1
	Harebell	Campanula rotundifolia	20
	Harsh Downy-rose	Rosa tomentosa	2
	Heath Cudweed	Gnaphalium sylvaticum	1
	Heather	Calluna vulgaris	31
B	Hen harrier	Circus cyaneus	11
B	Herring Gull	Larus argentatus	25
	Hoary Plantain	Plantago media	1
	Hoary Whitlowgrass	Draba incana	2
	Holy Grass	Hierochloe odorata	1
B	Hooded Crow	Corvus cornix	4
	Hoverfly	Brachyopa insensilis	2
	Hydroporus elongatulus	Hydroporus elongatulus	1
	Hydroporus glabriusculus	Hydroporus glabriusculus	1
	Intermediate Wintergreen	Pyrola media	2
	Large-flowered Hemp-nettle	Galeopsis speciosa	1
B	Leach's Storm-petrel	Oceanodroma leucorhoa	1
	Lesser Centuray	Centaurium pulchellum	1
B	Little Tern	Sterna albifrons	2
	Long-stalked Crane's-bill	Geranium columbinum	1
B	Manx Shearwater	Puffinus puffinus	4
	Marsh Helleborine	Epipactis palustris	1
B	Merlin	Falco columbarius	13
	Mossy Saxifrage	Saxifraga hypnoides	2
	Mountain Bumble Bee	Bombus monticola	1
	Natterer's Bat	Myotis nattereri	3
	Notaris bimaculatus	Notaris bimaculatus	1
B	Osprey	Pandion haliaetus	7
	Pamponerus germanicus	Pamponerus germanicus	1
B	Peregrine Falcon	Falco peregrinus	20
	Philonotis tomentella	Philonotis tomentella	1
	Procas granulicollis	Procas granulicollis	1
B	Purple Sandpiper	Calidris maritima	3
	Rannoch-rush	Scheuchzeria palustris	2
	Red Deer	Cervus elaphus	5
B	Red Kite	Milvus milvus	3
B	Red-Necked Grebe	Podiceps grisegena	1
B	Red-throated Diver	Gavia stellata	8
B	Redwing	Turdus iliacus	24
B	Reed Warbler	Acrocephalus scirpaceus	2

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Birds (B)	Species	Scientific Name	Number of SWT reserves
	Rhizocarpon cinereovirens	Rhizocarpon cinereovirens	1
	River Pocket-moss	Fissidens rivularis	1
	Rock Samphire	Crithmum maritimum	1
B	Ruff	Philomachus pugnax	4
	Salad Burnet	Sanguisorba minor	1
B	Sandwich Tern	Sterna sandvicensis	5
	Scandinavian Small-Reed	Calamagrostis purpurea	1
	Scots Pine	Pinus sylvestris	21
	Scottish Primrose	Primula scotica	1
	Scottish wood ant	Formica aquilonia	1
	Shepherd's Cress	Teesdalia nudicaulis	1
	Shetland Mouse-ear-hawkweed	Pilosella flagellaris	1
B	Short-eared Owl	Asio flammeus	12
B	Slavonian Grebe	Podiceps auritus	4
B		Podiceps grisegena	1
	Small Restharrow	Ononis reclinata	1
B	Smew	Mergellus albellus	4
B	Snow Bunting	Plectrophenax nivalis	2
	Sun Spurge	Euphorbia helioscopia	1
B	Temminck's Stint	Calidris temminckii	1
	Thornback Ray	Raja clavata	1
	Twist-tip Feather-moss	Eurhynchium schleicheri	1
	Water Beetle	Hydroporus elongatulus	1
B	White-Tailed Eagle	Haliaeetus albicilla	3
B	Whooper Swan	Cygnus cygnus	16
	Wild Pansy	Viola tricolor	5
B	Willow Tit	Parus montanus	5
	Wood Bitter-vetch	Vicia orobus	1
B	Wood Sandpiper	Tringa glareola	3
	Woolly Apple Moss	Philonotis tomentella	1
	Yellow Bartsia	Parentucellia viscosa	1
	Yellow Oxytropis	Oxytropis campestris	1
B	Yellow Wagtail	Motacilla flava	2
	Grand Total		699

Table 7: SBL species found on SWT reserves (excluding those already covered by UK BAP list)
The 1st column indicates which species are birds (B). (continued)

Arctic Skua	Stercorarius parasiticus
Arctic Tern	Sterna paradisaea
Black-headed Gull	Larus ridibundus
Common Tern	Sterna hirundo
European Storm-petrel	Hydrobates pelagicus
Herring Gull	Larus argentatus
Leach's Storm-petrel	Oceanodroma leucorhoa
Little Tern	Sterna albifrons
Manx Shearwater	Puffinus puffinus
Sandwich tern	Sterna sandvicensis
Thornback Ray	Raja clavata

Table 8: Seabirds and marine species removed from the SBL excluding those already covered by UK BAP list

Appendix 3. – SNH Species Action Framework species on SWT reserves

Species	Scientific Name	Number of SWT reserves
Black Grouse	Tetrao tetrix	6
Capercaillie	Tetrao urogallus	1
Eurasian Red Squirrel	Sciurus vulgaris	21
European Water Vole	Arvicola terrestris	16
Freshwater Pearl Mussel	Margaritifera margaritifera	1
Great Crested Newt	Triturus cristatus	1
Great Yellow Bumblebee	Bombus distinguendus	1
Intermediate Wintergreen	Pyrola media	2
Lesser Butterfly-orchid	Platanthera bifolia	10
Marsh Fritillary	Eurodryas aurinia	3
Pearl Bordered Fritillary	Boloria euphrosyne	3
Pearl-bordered fritillary	Boloria euphrosyne	4
Small Cow Wheat	Melampyrum sylvaticum	1
White-Tailed Eagle	Haliaeetus albicilla	3
Wildcat	Felis silvestris	5

Table 9: SNH Species Action Framework “species of conservation concern” found on SWT reserves.

Appendix 4. – Actions for UK BAP Priority species on SWT reserves

Actions relating to species are categorised as follows:

Status of species	Monitoring	Practical management
D = Don't know	N = not monitored	NI = Non-intervention
UR = Unreliable record	O = occasional	L = Limited (not adequate)
NR = Not recorded for some time	F = fully/frequently monitored	M = Managed adequately
PS = Probably secure		
S = Stable/secure population		
V = Vulnerable or declining population		
O = Occasional visitor (not resident)		

Table 10: Analysis of actions for UK BAP Priority Species on SWT reserves excluding bird, butterflies and moths, and marine species

This is a large amount of information & so is included in the electronic excel version of the appendices, available on CD on request.

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SWT Reserve	Butterfly and moth species	Information from RMs	Monitoring ▲ = full △= partial	Potential actions
Addiewell Bing	Goat Moth	Sp. Unknown to RM. Not mentioned in HLF funded Invertebrate Survey (Biodiversity Solutions) 2003 which attempted to collate all historical data. So nothing specific being done, but since it likes bark and heartwood of broadleaves and damp situations current work to gradually replace Lodge Pole pine with greater proportion of broadleaves should help, also a river runs along one side of site (Riverbanks are listed as suitable habitat in field guide).		Options limited.
Ballachuan Hazel Wood	Marsh Fritillary	Present & monitored (haphazardly) on annual basis. Summer grazing with cattle for their benefit. (Pearl bordered fritillary, green hairstreak, scotch argus, silver hooks and forester moths recorded in past. No HLF invertebrate survey but likely to be an important site and survey required.)	△	More thorough monitoring and also some cutting of vegetation in some areas (volunteers?).
Belmaduthy Dam	Narrow-bordered Bee Hawk-moth	Mentioned in new updated management plan (2007) in the table of rare or uncommon invertebrates. Taken from Inverness Museum records IMRC, 1995. However, it has not been seen since 1986 and is assumed to no longer occur on the site.		Action options limited.
Carlingnose Point	Small Blue	Last recorded in 1993, but is still plenty of Kidney Vetch on the site. No ongoing monitoring for the species, but this may be useful. Would need to find out more about current distribution in wider area to decide whether this would be worthwhile. Thought to be still present at some sites further north.		Review local distribution of sp. and consider monitoring reserve
Doire Donn	Argent & Sable (moth), Chequered Skipper, Pearl Bordered Fritillary	Argent and Sable – not monitored for this species, but it's habitat requirements are met by young developing woodland (as at Rahoy for eg.) so fair to say that if we construct more exclosures this species will be better off. Chequered Skipper and Pearl Bordered Fritillary – have 11 years of transect records for these species. Numbers fluctuate annually and it's difficult to discern any trend. However it is certain that the exclosure for woodland regeneration is very popular with both species because it provides sites for nectaring violets and bluebells.	▲	1. re-establish the annual monitoring programme. 2. construct more exclosures. 3. manage open land in existing exclosure to allow bluebells and violets to flower. This might mean the introduction of cattle at some time in the future
East Lammermuir Deans	Northern Brown Argus	Colony annually monitored by volunteers and area of Common Rock-rose protected from grazing sheep by electric fencing during summer – colony fairly small probably due to small amount of Rock-rose clinging onto friable soils on steep valley sides.	▲	Continue monitoring, and site protection in summer
Flanders Moss	Argent & Sable (moth)	Argent & Sable confirmed. Occasional monitoring by local volunteers (Roy Sexton, Stirling LMC) usually organized by SNH. Site in process of land transfer to SNH. No active management or monitoring. (Rannoch brindled beauty (1987) and large heath also present.)	△	More regular monitoring (but will be SNH property soon)
Isle of Eigg	Lunar Yellow Underwing	The Mark Lunar Yellow Underwing has not been confirmed as occurring on Eigg & probably does not occur. Any past records are probably errors & relate to Lesser Yellow Underwing, the northern form of which is much darker than the nominate race & closely resemble Lunar Y.U.		Options limited.
Linn Dean	Northern Brown Argus	Good sized colony monitored annually by volunteers (adults and egg searches) – good areas of Common Rock-rose – site grazed during Autumn/Winter by cattle seems to provide good conditions for sp.	▲	Continue monitoring
Keltneyburn	Northern Brown Argus, Pearl Bordered Fritillary	RM has been looking for larvae this summer (2007) of both species – no luck so far.		Additional survey and more systematic monitoring.

Table 11: Analysis of actions for UK BAP Priority butterflies and moths on SWT reserves

Common name	Number of SWT reserves	Observations
Black Grouse	5	Bird requiring large-scale habitat management
Capercaillie	1	Bird requiring large-scale habitat management
Great Crested Newt	1	Not recorded for some time
Great Yellow Bumblebee	1	Hill of White Hamars – occasional sightings only. Protection relates to retaining habitat in a biologically diverse and healthy state and current management is ensuring this.
Eurasian Red Squirrel	21	SWT participates in nationwide initiative
European Water Vole	12	SWT participates in nationwide initiative
Freshwater Pearl Mussel	1	Ben More Coigach – recent survey – may be monitored but habitat management possibilities limited
Hazel gloves fungus	1	Protection relates to maintaining a suitable habitat. Being a fungus accurate monitoring is difficult.
Intermediate Wintergreen	2	SNH attempting to initiate project - BSBI to increase recording
Lesser Butterfly-orchid	9	SNH attempting to initiate project – BSBI have increased recording and FWAG will look at individual sites and assess requirements following which Plant Life volunteers will monitor. SWT will provide info and try to engage with process as closely as possible.
Marsh Fritillary	3	See UK SAP analysis above.
Pearl Bordered Fritillary	7	See UK SAP analysis above.
Small Cow-wheat	1	SWT participates in nationwide initiative – *ACTIONS CLARIFIED AND ONGOING*
White-Tailed Eagle	3	Bird requiring large-scale habitat management
Wildcat	5	Highly mobile – protection may relate more to wider countryside issues than to a particular reserve. Any well managed reserve would probably provide suitable habitat conditions

Table 12: Analysis of actions for SNH Species Action Framework species found on SWT reserves (only hazel gloves fungus is unique to this list)

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Appendix 5. – Tables comparing status of species, practical management and monitoring on SWT reserves

Status of species	Monitoring			Total
	Not monitored	Occasionally monitored	Fully/frequently monitored	
Don't know	83	7	3	93
Not recorded for some time	38	4		42
Probably Secure	41	30	12	83
Secure	11	4	6	21
Vulnerable or Declining population	6	2	8	16
Grand Total	179	47	29	255

Table 13: Status of UK BAP Priority Species and monitoring

Status of species	Management			Total
	Non-intervention	Limited (not adequate)	Managed adequately	
Don't know	86	7		93
Not recorded for some time	35	5	2	42
Probably Secure	66	7	10	83
Secure	14	2	5	21
Vulnerable or Declining population	11	2	3	16
Grand Total	212	23	20	255

Table 14: Status of UK BAP Priority Species and practical management.

Practical management	Monitoring			Total
	Not monitored	Occasionally monitored	Fully/frequently monitored	
Managed adequately	5	1	14	20
Limited (not adequate)	11	7	5	23
Non-intervention	163	39	10	212
Grand Total	179	47	29	255

Table 15: Practical management and monitoring of UK BAP Priority Species

10. Habitat appendices

UK BAP Priority Habitat
Rivers
Oligotrophic and Dystrophic Lakes
Ponds
Mesotrophic Lakes
Eutrophic Standing Waters
Aquifer Fed Naturally Fluctuating Water Bodies
Arable Field Margins
Hedgerows
Traditional Orchards
Wood-Pasture & Parkland
Upland Oakwood
Lowland Beech and Yew Woodland
Upland Mixed Ashwoods
Wet Woodland
Lowland Mixed Deciduous Woodland
Upland Birchwoods
Native Pine Woodlands
Lowland Dry Acid Grassland
Lowland Calcareous Grassland
Upland Calcareous Grassland
Lowland Meadows
Upland Hay Meadows
Coastal and Floodplain Grazing Marsh
Lowland Heathland
Upland Heathland
Upland Flushes, Fens and Swamps
Purple Moor Grass and Rush Pastures
Lowland Fens
Reedbeds
Lowland Raised Bog
Blanket Bog
Mountain Heaths and Willow Scrub
Inland Rock Outcrop and Scree Habitats
Calaminarian Grasslands
Open Mosaic Habitats on Previously Developed Land
Limestone Pavements
Maritime Cliff and Slopes
Coastal Vegetated Shingle
Machair
Coastal Sand Dunes
Intertidal chalk
Intertidal boulder communities
Sabellaria alveolata reefs
Coastal saltmarsh
Intertidal mudflats
Seagrass beds
Sheltered muddy gravels
Peat and clay exposures
Subtidal chalk
Tide-swept channels
Fragile sponge & anthozoan communities on subtidal rocky habitats
Estuarine rocky habitats

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Seamount communities
Carbonate mounds
Cold-water coral reefs
Deep-sea sponge communities
Sabellaria spinulosa reefs
Subtidal sands and gravels
Horse mussel beds
Mud habitats in deep water
File shell beds
Maerl beds
Serpulid reefs
Blue mussel beds
Saline lagoons

Table 16: UK BAP Priority Habitats

Go through habitat section for appropriate info BUT:

UK BAP Priority Habitats

NVC-UK BAP correspondence – table in excel only

http://en.wikipedia.org/wiki/Category:British_National_Vegetation_Classification_communities

UK BAP priority habitat not present in Scotland
*Aquifer fed naturally fluctuating water bodies
*Lowland beech and yew woodland
*Intertidal chalk
*Peat and clay exposures
*Subtidal chalk

Other habitats not to be considered are any over which SWT has little or no control, such as intertidal or aquatic.

11. Invasive non-native species appendices

Appendix 1. – Number of invasive non-native species on SWT reserves

Scientific Name	Species	Number of SWT reserves
American Mink	Mustela vison	20
Brown Rat	Rattus norvegicus	3
Canadian pondweed	Elodea spp.	1
Canadian Waterweed	Elodea canadensis	9
Common Poppy	Papaver rhoeas	2
European Rabbit	Oryctolagus cuniculus	24
Giant Hogweed	Heracleum mantegazzianum	6
Grey Squirrel	Sciurus carolinensis	24
Himalayan balsam	Impatiens glandulifera	9
Japanese Knotweed	Fallopia japonica	18
Montbretia	Crocosmia x crocosmiiflora	1
Rhododendron	Rhododendron ponticum	10
Ruddy Duck	Oxyura jamaicensis	9
Sea-Buckthorn	Hippophae rhamnoides	2
Snowberry	Symphoricarpos albus	11
Spanish Bluebell	Hyacinthoides hispanica	5
Sweet Chestnut	Castanea sativa	4
Winter Heliotrope	Petasites fragrans	1
Grand Total		**159**

Table 17: Non-native invasive species on SWT reserves

Appendix 2. – Number of invasive non-native species on each SWT reserve

RESERVE	Total number of species
Alloa Inches	1
Auchalton Meadow	1
Ayr Gorge Woodlands	6
Balgavies Loch	6
Bankhead Moss	2
Bawsinch and Duddingston	8
Belmaduthy Dam	1
Black Devon	1
Bogburn Flood Lagoons	2
Carron Dam	3
Carron Glen	1
Corsehillmuir Wood	2
Cullaloe	1
Cumbernauld Glen	7
Doire Donn	1
Dullatur Marsh	1
Falls of Clyde	7
Forest Wood	3
Gailes Marsh	1
Garnock Floods	3
Glen Moss	3
Hadfast Valley	2
Handa Island	2

Hare & Dunhog Moss	1
Hermand Birchwood	1
Isle of Eigg	2
Kilminning Coast	1
Knapdale Habitats Partnership	3
Knockshinnock Lagoons	3
Largiebaan	2
Lawthorn Wood	4
Linhouse Glen	2
Lintrathen	2
Loch Ardinnning	2
Loch Fleet	2
Loch Libo	3
Loch of the Lowes	4
Longridge Moss	1
Lower Nethan Gorge	1
Luggiebank Wood	3
Milkhall Pond	2
Montrose Basin	1
Northside Wood	4
Oldhall Ponds	4
Pease Dean	2
Pepper Wood	2
Perceton Wood	6
Petershill	1
Possil Marsh	2
Rahoy Hills	1
Roslin Glen	1
Seaton Cliffs	3
Shewalton Sandpits	5
Shewalton Wood	4
Sourlie Wood	4
Spey Bay	3
Stormont	1
Tailend Moss	2
Thornton Glen	1
Tummel Shingle Islands	4
Upper Nethan Gorge	3
Yetholm Loch	1
Grand Total	**159**

Table 18: Number of non-native invasive species on each SWT reserve

Appendix 3. – Results of consultation with Reserve Managers

This extensive, comprehensive table is available on CD on request

Appendix 4. – Tables comparing status of invasive non-native species, practical

	Monitoring			
Status of species	**Fully**	**Occasionally**	**Not monitored**	**Grand Total**
Don't know		1	21	22
Not recorded for some time	1		2	3
No threat	3	6	23	32
Possible Threat	21	21	7	49
Likely threat	6	8	17	31
Significant threat	16	3	3	21
Grand Total	**47**	**39**	**73**	**159**

Table 19: Status of invasive non-native species and monitoring

	Management			
Status of species	**Managed adequately**	**Non Intervention**	**Limited (not adequate)**	**Grand Total**
Don't know		20	2	22
Not recorded for some time	1	2		3
No threat	4	28		32
Possible Threat	20	18	11	49
Likely threat	2	15	14	31
Significant threat	9	4	8	21
Grand Total	**36**	**87**	**36**	**159**

Table 20: Practical management and monitoring of invasive non-native species management and monitoring on SWT reserves

	Practical management			
Monitoring	**Managed adequately**	**Non Intervention**	**Limited (not adequate)**	**Grand Total**
Fully	29	4	14	47
Occasionally	4	19	15	38
Not monitored	3	64	7	74
Grand Total	**36**	**87**	**36**	**159**

Table 21: Status of invasive non-native species and practical management.

Appendix 5. Invasive non-native species in the UK[28]

Species listed on Schedule 9 of the Wildlife and Countryside Act (1981) which require licences (list at 20 February 2003[29])

Part I - Animals which are established in the wild

Scientific name	English name	Year scheduled
Aix sponsa	Carolina wood-duck	1981
Aix galericulata	Mandarin duck	1981
Alectoris chukar	Chukar partridge	1981
Alectoris graeca	Rock partridge	1981
Alopochen aegyptiacus	Egyptian goose	1981
Alytes obstetricans	Mid-wife toad	1981
Ambloplites rupestris	Rock bass	1981
Arthurdendyus triangulatus[30]	New Zealand flatworm	1992
Astacus astacus	Noble crayfish	1992
Astacus leptodactylus	Turkish crayfish	1992
Bombina variegata	Yellow-bellied toad	1981
Branta canadensis	Greater Canada goose	1981
Cervus nippon	Sika deer (including any hybrid 1999)	1992
Cervus spp[31]	Any deer or hybrid of genus *Cervus*.	1999
Chrysolophus amherstiae	Lady Amherst's pheasant	1981
Chrysolophus pictus	Golden pheasant	1981
Colinus virginianus	Bobwhite quail	1981
Cynomys species	Prairie marmot or prairie dog	1981
Elaphe longissima	Aesculapian snake	1992
Emys orbicularis	European pond terrapin	1981
Glis glis	Fat dormouse	1981
Haliaetus albicilla	White-tailed eagle	1981
Hyla arborea	European (common) tree-frog	1981
Hystrix cristata	Crested porcupine	1981
Hystrix hodgsonii	Himalayan porcupine	1981
Lepomis gibbosus	Pumpkinseed, sun-fish or pond-perch	1981
Lophura nycthemera	Silver pheasant	1981
Macropus rufogriseus	Red-necked wallaby	1981
Melopsittacus undulatus	Budgerigar	1981
Meriones unguiculatus	Mongolian gerbil	1981
Micropterus salmoides	Large-mouthed black bass	1981
Muntiacus reevesi	Muntjac deer	1997
Mustela vison	American mink	1981
Myocastor coypus	Coypu	1981
Nycticorax nycticorax	Night heron	1981
Oxyura jamaicensis	Ruddy duck	1981
Pacifastacus leniusculus	Signal crayfish	1992
Podarcis muralis	Common wall lizard	1981

Psittacula krameri	Ring-necked parakeet	1981
Rana esculenta	Edible frog	1981
Rana ridibunda	Marsh frog	1981
Rattus rattus	Black rat	1981
Rhodeus sericeus	Bitterling	1981
Sciurus carolinensis	Grey squirrel	1981
Siluris glanis	Wels or European catfish	1981
Stizostedion lucioperca	Zander	1981
Syrmaticus reevesii	Reeves' pheasant	1981
Tetrao urogallus	Capercaillie	1981
Triturus alpestris	Alpine newt	1981
Triturus camifex	Italian crested newt	1992
Tyto alba	Barn owl	1992
Xenopus laevis	African clawed toad	1981

Part II - Plants

Asparagopsis armata	Hooked asparagus seaweed	1992
Codium fragile tomentosoides	Green seafingers	1992
Fallopia japonica	Japanese Knotweed	1981
Heracleum mantegazzianum	Giant Hogweed	1981
Laminaria japonica	Japanese kelp	1992
Macrocystis angustifolia	Giant kelp	1992
Macrocystis integrifolia	Giant kelp	1992
Macrocystis laevis	Giant kelp	1992
Macrocystis pyrifera	Giant kelp	1981
Pikea californica	Red Californian seaweed	1992
Porphyra species	Laver seaweeds	1992
Except native species		
P. amethystea		
P. leucosticta		
P. linearis		
P. miniata		
P. purpurea		
P. umbilicalis		
Sargassum muticum	Japanese Seaweed	1981
Undaria pinnatifida	Wakame	1992

Nature Conservation (Scotland) Bill

During Stage 2 of the Nature Conservation (Scotland) Bill 2004 consultation responses provided overwhelming agreement to species being added to Schedule 9, and consequently the following list of 13 plant species were added to Part II of the Schedule in June 2005.

Allium paradoxum	Few-flowered leek	2005
Azolla filiculoides	Water fern	2005
Cabomba caroliniana	Fanwort	2005
Carpobrotus edulis	Hottentot fig	2005
Crassula helmsii	Australian swamp stonecrop	2005
Eichhornia crassipes	Water hyacinth	2005

Gaultheria shallon	Shallon	2005
Hydrocotyle ranunculoides	Floating pennywort	2005
Lagarosiphon major	Curly waterweed	2005
Myriophyllum aquaticum	Parrot's-feather	2005
Pistia stratiotes	Water lettuce	2005
Robinia pseudocacia	False-acacia	2005
Salvinia molesta	Giant salvinia	2005

Commonly Known Non-Native Invasive Species present or thought likely to arrive in Great Britain, not currently included on Schedule 9 of the Wildlife and Countryside Act (1981).

Animals

Australoplana sanguinea var. *alba*	Australian flatworm	
Dreissena polymorpha	Zebra mussel	
Lepus europaeus	Brown Hare	introduced before the Roman invasion[32]
Oryctolagus cuniculus	Rabbit	introduced in the 13th Century
Rana catesbiana	American Bullfrog	

Plants

Azolla caroliniana	Water Fern (possibly found in the UK)	(freshwater)
Campylopus introflexus	(a moss)	
Castanea sativa	Sweet Chestnut	
Crocosmia x *crocosmiiflora*	Montbretia	
Chrysanthemum segetum	Corn Marigold	
Doronicum pardalianches	Leopard's-bane	
Elodea nuttalii	Nuttall's pondweed	(freshwater)
Elodea canadensis	Canadian pondweed	(freshwater)
Hippophae rhamnoides	Sea Buckthorn	
Hyacinthoides hispanica	Spanish Bluebell	
Impatiens glandulifera	Himalayan Balsam	
Myriophyllum brasiliense	closely related to Parrots Feather	(freshwater)

Footnotes

[28] From: SWT Invasive Non-native Species Policy 2007

[29] Some animal or plant species may be added to this list and confirmation should be sought from Defra or the JNCC.

[30] Formerly known as *Artioposthia triangulate*

[31] ONLY applies to Outer Hebrides, Arran, Islay, Jura and Rum

[32] Yalden, D. (1999) The History of British Mammals. T. & A. D. Poyser Natural History. Academic Press, London.

12. Signposting appendices

List of action categories used to summarise initial signposting exercise[33]

- Priority habitat based action (condition)
- Priority habitat based action (expansion)
- Site specific action (small number of sites)
- Management actions to benefit single species
- Agricultural activities and measures (wider scale)
- Measures to address impacts of climate change
- Forestry/tree management and planning (landscape scale)
- Fisheries control measures/policy and legislation
- Habitat based wider action
- Water and water quality management
- Landscape/regional level projects
- Planning controls on development
- Landscape/regional strategic planning
- Communications to stakeholders
- Measures to control/regulate agro-chemicals
- Air pollution initiatives
- International level agreements and plans
- Legal protection for species
- Survey for new sites
- Survey known sites
- Research into taxonomy/genetics
- Research into ecological requirements
- Research into conservation action
- Research into climate change impact
- Research into other impacts

Footnotes

[33] Dr Ian Strachan, SNH Policy and Advice, Information Paper - Report on progress with the revision of the Scottish Biodiversity List (SBL) to take account of the revised UK BAP Priorities list, 6 December 2007.

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