NatureScot
Scotland's Nature Agency

**NatureScot**

**SCIENTIFIC ADVISORY COMMITTEE**

**DISCUSSION PAPER**

# SPECIES PRIORITISATION

# Purpose

This paper provides an update on work being carried out to rationalise conservation action for species in order to meet the Scottish Government’s stated objective of halting and reversing the loss of biodiversity by 2030. It sets out the evidence-base being collated, an initial approach to filter for priorities and actions to take this work forward.

# Action

The Committee is invited to:

1. Note progress to date;
2. Review the approach being taken to collation and analysis of current evidence; and
3. Advise on next steps to take forward this work to an agreed list of Scottish species for conservation action.

# Preparation

This paper has been prepared by Mairi Cole. It is sponsored by Eileen Stuart.

# Background

A paper on species priorities was presented to the SAC in September 2017. This introduced the Committee to a Tool being developed to support resource decision-making for conservation and wildlife management activities within NatureScot. The primary aim of the tool was to assist timely, consistent and transparent decisions to get the maximum benefit from resources available and, although adaptable for other uses, was intended primarily for operational decisions. The Tool did not identify a list of priority species for Scotland but set a framework by which individual species could be categorised through risk management. The Committee suggested exploring a simplified approach to prioritisation based on species’ vulnerability.

A second paper was presented to the SAC in September 2020. This identified operational reasons for prioritisation, summarised progress on development of a database consolidating information on species in Scotland and suggested additional criteria to build into the process. The Committee again agreed that prioritisation of species should be based on clear scientific criteria but that other factors may come into play, e.g. cultural interest.

Over the last two years, NatureScot has led on work with a group of species eNGOs to clarify the rationale and methodology for prioritising species action in Scotland. This paper sets out in brief key considerations included in this discussion, the progress to date and recommendations for a way forward.

**Rationale**

Global biodiversity is declining at an astonishing rate. Extinctions rates are hundreds of times faster than the average over the past 10 million years, with the Living Planet Index estimating a decline in vertebrate populations by an average of 68% and an average decrease of 69% in globally-monitored wildlife since 1970 (WWF, 2022; WWF, 2020). Reports have identified multiple, concurrent causal factors and it is estimated that half a million terrestrial species are potentially already doomed to extinction as a result of habitat loss and deterioration (IPBES, 2019).

Scottish conservation reflects this global crisis. The State of Nature Scotland reported that 49% of Scotland’s species have declined in abundance since 1970, with an estimated 11% of 6,413 species in Scotland assessed under the IUCN Red List criteria now classified as threatened (Walton *et al.,* 2019). The messages from COP26 in Glasgow reinforced the need for urgent action, and the parlous state of some of our species means that any delay could result in further loss of species.

It is also clear, however, that available resources are shrinking and there is a need to make difficult decisions on how these are invested to gain maximum benefit. To date, priorisation exercises have generally focused on biological parameters such as levels of endangerment or evolutionary distinctiveness, with other parameters such as cultural importance used to modify the outputs to circumstances. However, as resources are required to effect actions, a realistic list must build in consideration of whether action is achievable, the likelihood of success and the investment required to do this. Failure to include these risks the list of priorities mis-directing resources towards unachievable outcomes, or not achieving the full benefits (Joseph *et al*, 2009).

In seeking to prioritise, it must be recognised that there is no universally ‘right’ outcome and that different goals and contexts may give rise to different priority lists (Mace *et al*, 2007*)*. Table 1 sets out a list of criteria used by NatureScot and partners in three key projects prioritising species for conservation (or associated management) action and, whilst there are consistencies between these, each was devised for a specific purpose. This highlights the importance of defining the problem(s) and setting clear objectives to guide the selection of criteria.

Table 1: Criteria used for species prioritisation

| **Criteria** | **Scottish Biodiversity List** | **Species Action Framework** | **Birds of Conservation Concern** |
| --- | --- | --- | --- |
| Native and present in Scotland | √ | √ | √ |
| Risk of extinction (RDL status) | √ |  | √ |
| Rarity, including mobile marine species of less than 250 mature individuals. | √ | √ |  |
| Range | √ |  | √ |
| Population decline | √ |  | √ |
| Endemism (species, subspecies, race) | √ | √ | √ |
| Scottish stronghold |  | √ | √ |
| International importance | √ |  | √ |
| Extinction |  | √ |  |
| Species at risk of conflict with other objectives |  | √ |  |
| Drivers of change are understood |  |  | √ |
| Species with socio-economic benefits |  | √ |  |
| Historic/cultural importance | √ |  | √ |
| INNS management |  | √ |  |
| Native species threatening wider biodiversity |  | √ |  |
| Probability of success |  | √ | √ |
| Awareness raising |  | √ |  |
| Keystone species |  | √ |  |
| Benefit from multi-species management |  | √ |  |

# Scottish database

A robust understanding of the conservation status of Scottish species is crucial to underpin informed decisions on priorities. Information on species is held in various databases and repositories but, at initiation of this project, there was no single source summarising the status of species in Scotland. Appendix 1 sets out, in brief, work carried out to create a single database and using this as the basis of initial work on prioritisation to identify species currently facing greatest risk of extinction. This work is led by NatureScot in collaboration with a group of lead species eNGOs acting as the Working Group[[1]](#footnote-1).

The resulting database currently contains information on the conservation status of c. 17,772 terrestrial species (plus 335 marine species). At the time of writing this paper, 12,144 have been identified as having records in Scotland, of which 11,860 are recorded as ‘native' (see para 23). Work is underway with species specialists to verify this list as the basis of further discussion on priorities.

# Species at Risk

The Species at Risk (S@R) approach built on previous suggestions by the SAC to focus on vulnerability assessments. It has identified five tiers of priority, with Tier 1 species assessed as closest to extinction. The lists are, however, prepared without prejudice of what action may be required, e.g. research, habitat management, reintroduction, etc., or the resource implications (see additional criteria below).

Based solely on GB status, an initial filter identified 113 species with records in Scotland as GB Critically Endangered (CR) or Critically Endangered (Provisionally Extinct) (CR(PE)), 946 as Endangered (EN) or Vulnerable (VU) and 612 as Near Threatened (NT). Using the S@R matrix, which introduces a wider perspective on vulnerability (Europe and Global scales), 148 species are in Tier 1, 918 are in Tier 2 and 644 are in Tier 3. A further 88 species have been categorised as ‘extinct’ (Table 2).

The number of species arising from these two approaches are similar however, their constituent species are different. For example, some species such as the European eel and Atlantic Sturgeon have not been evaluated at GB but are CR are both European and Global levels, raising questions as to whether species should be prioritised in Scotland to support an improvement in their European or Global status. It is worth noting, however, that where an approach relies on the collation or analysis of large amounts of information, it is inevitable the results will be skewed to well-understood species. Allowing a level of moderation by specialists where the published evidence-base is lacking or limited and new evidence is in the pipeline, allows the inclusion of less well understood species and helps rationalise the bias. The lists are, therefore, out to consultation with species specialists to gain this insight. This facility for subjective adjustment does not undermine the basic process of rationalisation as specialist recommendations are recorded with the output, so it is clear where any subjectivity lies.

The process focused on terrestrial species as there was some concern from NatureScot marine colleagues that creation of a S@R list would conflict with the process of identifying Priority Marine Features (PMFs). Whilst the spreadsheet does include some marine species, it is not comprehensive and these were excluded from the filter. A decision is still required on the S@R Working Group recommendation to include marine species.

The ambition was to link species in the top tiers to their IPBES drivers of change although further input is required from specialists to complete this. Guidance will be provided to distinguish proximate and ultimate causes of change to ensure all opportunities for action, both single- and multi-species, are identified.

Summary table for SR matrix analysisTotalTable 2: Summary tables for S@R matrix analysis

**Prioritisation**

In order to set selection criteria, it is important to clearly define the purpose underlying a list of priorities (see para 10). This paper addresses the need to prioritise species **to meet the Scottish Government stated intention of halting and reversing species decline by 2030** and, as such, uses risk of extinction as the initial criterion. However, focusing only on ecological factors such as vulnerability or evolutionary distinctiveness ignores three fundamental requirements to achieving the outcome, namely: 1) whether there is action that can be taken for the species, 2) the probability of success and 3) resources required. As such, using S@R - whilst setting a defensible basis for phasing of work beginning with those known to be most at risk - does not itself provide a list of priority species conservation action.

The previous Species Decision Tool was based on two essential NatureScot priorities: 1) ensuring delivery of statutory protection, and 2) mitigating risk of damage to native species from non-native species. In terms of the first, statutory protection may be linked to a species’ risk of extinction but there may be other reasons why it is scheduled, e.g. animal welfare. Work conducted under S@R was specifically designed to focus on vulnerability to extinction and separates this from protected status. Whilst it does recognise the protected status of each species, it is not a criterion for inclusion or exclusion.

Similarly, the need to protect native species from invasive non-natives is recognised in statute and addressed through the Invasive Non-Native Framework. INNS management is important to ensure protection *in situ* of vulnerable native species but INNS are not themselves priority species for conservation. A criterion filtering native from non-native species removes INNS from the process, although any specific INNS management required to support vulnerable native species should be identified when considering the feasibility of action required for each.

Figure 1 provides a flowchart setting out a decision process including the above points, and the role the Species at Risk can play in focusing subsequent action on species assessed to be closest to extinction.

# Next steps

Work will continue with the S@R Working Group, and NatureScot specialist advisers, to complete the collation and validation of information in the Scottish species database. The Group is also keen that this resource is made more widely available to provide a common resource for future conservation work in Scotland. Discussions are underway on creating a user-friendly front-end for the NatureScot website through which people can interrogate the database (spreadsheet). This would require a process and commitment to maintaining the currency of data, although it would be possible to share this task between partner organisations, coordinated by NatureScot.

In terms fo the criteria applied, questions have arisen during the process about how to define ‘native’. The timescale for this differs between taxa, e.g. pre- or post AD1500 for plants compared to pre- or post 12th Century for mammals, but the definition is integral to whether a species is considered ‘native’ or ‘naturalised’, i.e. introduced by humans but subsequently survived without a dependence on humans. Whilst non-native species are filtered out of the process early, the question remains whether we include naturalised species as priority. It is not without precedent, and some have been highlighted in other initiatives for conservation action, e.g. Orkney vole on the Scottish Biodiversity List. However others have been excluded but included as priority for other reasons, e.g. the inclusion of brown hare in the UK Biodiversity Action Plan for socio-economic reasons. A decision is therefore required on whether naturalised species should be given equal status and considered eligible for priority conservation listing.

Finally, the S@R process provides a defensible basis from which to determine species conservation priorities based on risk of extinction. However, the approach does not identify other reasons that people may consider important for species conservation, e.g. cultural importance or socio-economic benefit. Decisions are required on:

1. What other criteria are required to meet the challenge of halting and reversing biodiversity loss by 2030; and
2. How to integrate these into development of a list of priority species focused on the SG 2030 target.

**The Committee is asked to:**

1. **Discuss the approach taken under Species at Risk and advise on its suitability to deliver the SG stated intention of halting and reversing biodiversity loss by 2030;**
2. **Provide comment on how to address issues of nativeness in identifying priority species in Scotland; and**
3. **Consider other criteria used for prioritising species for conservation action (see Table 1) and advise on whether and how these should be integrated into the process of developing a list of species priorities.**

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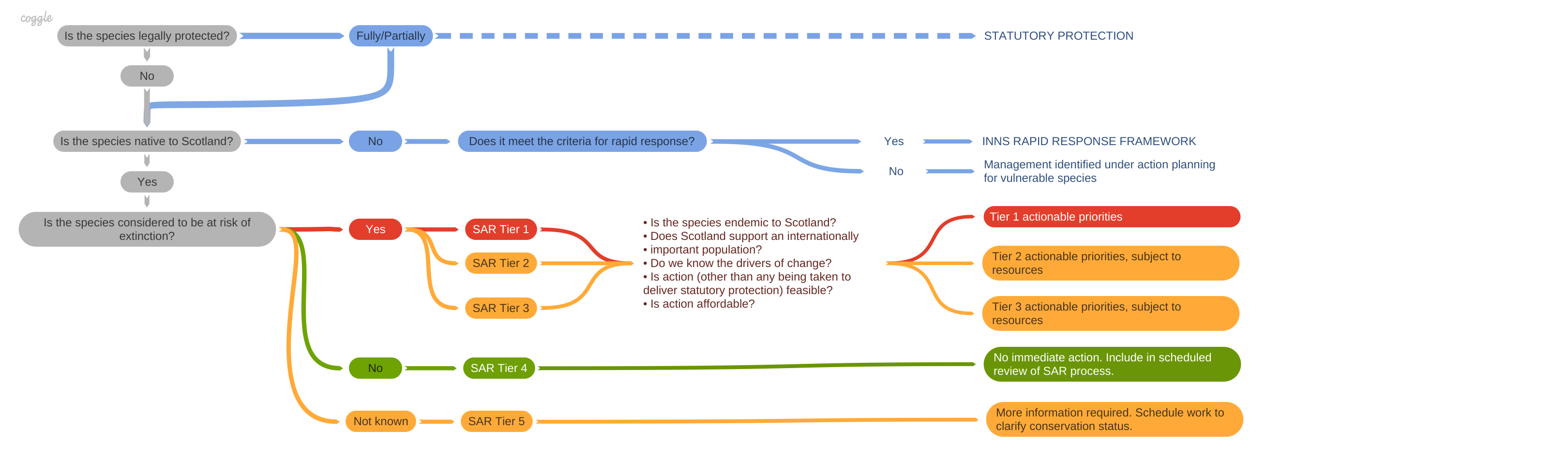


Figure 1: Flowchart of suggested prioritisation process

# Appendix 1: Species at Risk

# Background

The State of Nature in Scotland (2019) reported that “Of the 6,413 species found in Scotland that have been assessed against the International Union for Conservation of Nature (IUCN) Regional Red List criteria,624 (11%) are formally classified as threatened (Critically Endangered, Endangered or Vulnerable)”. With a cited c.90,000 species resident in Scotland (Usher, 1997), classification of 6,413 provides a starting point from which to produce headline figures but does not necessarily reflect the real scale of threat to our biodiversity. More information is required on the uncategorised species to adequately assess this.

A workshop hosted by NatureScot in November 2019 invited lead eNGOs to discuss whether the information could be refined and a list of priority species developed to help guide future decisions and actions. Whilst there has been a move to focusing action at an ecosystem or landscape-scale- to achieve multiple benefits, it was agreed this did not obviate the need to manage individual species where the broader scale did not deliver the necessary benefits. It was also acknowledged that measures of ecosystem health are often derived from data on individual species’ trends, which further reinforced the need to maintain knowledge of the constituent parts. This knowledge also supports a wide range of local and national policy implementation, such the Scottish Biodiversity Strategy, the Land Use Strategy, the Forestry Strategy, Agri-environment incentives, protected areas management and Nature Networks.

Whilst the task began as an exercise in species prioritisation, it was agreed the output should be moderated by levels of knowledge and would, in fact, provide a list of species at risk and in need of action. It was agreed the project should be re-branded as ‘Species at Risk’ to reflect this.

# Method

There was no single list available identifying species resident in Scotland so initial work collated information from a range of lists into a single Excel spreadsheet. Sources were

* The Scottish Biodiversity List
* Natural England list of updated Red Data List species
* The RSPB State of Nature species List

Combined, these provided an initial spreadsheet of c.18,000 species. However, the level of information was inconsistent between species, e.g. whether resident in Scotland, IUCN assessments, etc., so taxonomic lists were created and circulated to relevant NatureScot advisers and eNGO lead contacts for verification. This was relatively straightforward where species were well recorded, e.g. birds, or the number of species in a taxon was limited, e.g. reptiles and amphibians, but was a daunting and time-consuming task where species were numerous or information limited, e.g. invertebrates and vascular plants. It was not therefore possible to complete this task for the full spreadsheet.

In order to create a more manageable task, the Species at Risk (S@R) Working Group considered criteria to begin identifying the most urgent need based on available knowledge. Several requirements were identified:

* Although the spreadsheet should include legal instruments, identification of species’ vulnerability needed to be independent of protected status.
* The categorisation of vulnerability needed to be standardardised. It was agreed this would draw heavily on IUCN Red Data assessments recently coordinated by Natural England.
* Drivers of change included for species in the spreadsheet should align with those identified by the IUCN.
* Consideration should be given to extinct species to support future operational decisions on priorities for restoration. Reintroduction is a tool to improve the status of a species but should not be a criterion for prioritisation.

It was also agreed that horizon-scanning should be conducted every five years to identify any new species arriving by natural means and included on the list under a ‘watching brief’. The list should be formally reviewed every ten years.

# Criteria

Species identified as GB IUCN Critically Endangered were automatically included in the first sift top tier. However, whilst this information was available for some species, it was recognised that some species assessed as CR at European or Global resoluation may not at the time of the sift have been assessed at GB resolution, e.g. plants and fish. It was agreed, therefore, that a matrix of criteria encompassing all resolutions would ensure some parity between these. Discussion resulted in the decision matrix illustrated in Figure 1. Tier 1 represents those species considered to be at greatest risk of extinction.

Species endemic to Scotland were also elevated to the first sift top tier as loss or deterioration of these species would have global impact.

*Figure 1: S@R criteria*

| **Global or European RD status** | **CR** | 1I | 1H | 1F | 1D | 1A |
| --- | --- | --- | --- | --- | --- | --- |
| **EN/VU** | 2G | 2E | 2B | 1J | 1B |
| **NT** | 3D | 3C | 2D | 2A | 1C |
| **LC** | 4C | 4A | 3A | 2C | 1E |
| **NE/DD** | 5 | 4B | 3B | 2F | 1G |
|  |  | **NE/DD** | **LC** | **NT** | **EN/VU** | **CR** |
|  |  | **GB RD status** | | | | |

The criteria were subsequently applied to the spreadsheet list of species and the resulting tiers re-circulated to specialists for verification.

Key points to note:

* S@R is designed to draw from knowledge and methods of prioritisation already in use. No new knowledge has been collected in the process.
* The list makes no presumptions about what action may be required, e.g. research, population supplementation, habitat management, reintroduction, or a combination thereof. Decisions on these are secondary to the assessment of risk of extinction.
* The approach focuses on species-level assessment. Subspecies could be included where there is a strong justification but their inclusion needs to be proportionate to the benefits gained.

1. S@R Working Group is: NatureScot (Chair), Amphibian and Reptile Conservation, Buglife, Butterfly Conservation, Forest and Land Scotland, Plantlife, Royal Botanic Gardens and Edinburgh. Representatives of Buglife and RBGE also represent Scottish Environment Link. [↑](#footnote-ref-1)