

C4b Priority Species – Distribution

This Evidence Statement should be read in conjunction with the *Summary of Evidence* document (Annex 3). Assertions in bold text have been assigned a confidence rating following assessment by a panel of independent experts (see main report for details).

A. Background, structure and statistical issues/biases

- This indicator had a major overhaul in the 2015 version (published on 19 January 2016, after the evidence base was gathered). Where possible, the evidence statement has been written to reflect these changes.
- This indicator describes trends in the UK distribution from 1970-2012 of species deemed to be priorities for conservation action and for which sufficient data exist. It is based on occurrence records of 111 species: 101 terrestrial insects, 3 freshwater fish and 7 bryophytesⁱ. Around 90% of the terrestrial insect species were included in the 2014 version: the reduction in species number has occurred due to the exclusion of 79 moth species that also appear in in C4a. The species composition of the two priority species indicators is now mutually exclusive, but this was not the case in 2014.
- The list of “priority species” has been designated by statutory conservation bodies of the four countries of the UK, with each country following a separate process. The data used reflect changes of the entire populations of species, not just of the proportion using particular habitats, nor are the data restricted to the countries in which the species is listed as a priorityⁱⁱ.
- Indices for all species were derived from opportunistic records from a range of volunteer-run schemes. Species indices are derived from statistical models that have been shown to be robust to several sources of bias in opportunistic data (Bayesian Occupancy-Detection models)ⁱⁱⁱ. Each species is given equal weighting. Species index values are expressed as the odds of the average 1km² grid cell being occupied. The annual index is the arithmetic mean of the individual species indices for that yearⁱⁱ. Credible intervals in the headline indicator incorporate uncertainty in the species index values, resulting in much wider uncertainty than would be generated from bootstrapping (used by most other indicators). The indicator is assessed in unsmoothed form.
- The datasets for each taxonomic group have different statistical properties. Data used for the 2014 version of the indicator were strongly biased towards southern England^{iv} and towards certain landcover types^v. The new datasets added for the 2015 indicator are likely to show similar biases^{vi}. The indicator does not make a statistical correction for the location of sample locations.

B. Representation

1. There are nearly 3000 species on the UK priority species list, so the species contributing to this indicator are a small and biased subset. **The indicator is dominated by trends in the distribution of terrestrial invertebrates of conservation concern on semi-natural habitats in southern England** ^[High], although data from other regions and species also contribute information. It does not represent changes in abundance of species on the indicator, nor does it represent changes in species richness of sites on which they occur.
2. **The indicator should not be used to represent priority species in other taxonomic groups, nor can it be used to represent trends in wider biodiversity** ^{vii [High]}.

C. The Trend

3. The headline indicator declined by 35% over the period 1970-2012^{viii}. The decline occurred throughout the time period of the indicator. **There is strong evidence for a long-term decline in the average distribution of species contributing to the indicator** ^[High]. However, this is not surprising because many species were listed as priorities on the basis of known declinesⁱ.
4. Half (54/111) of species in the indicator declined by at least 1% per year in the long-term and 23% (25) increased at a similar rate^{ix}. Species in the 2014 version of this indicator showed a relatively small amount of variation in trends, compared with other indicators^x. **There is good**

evidence for large changes in the distribution of species in this indicator, with declines outnumbering increases ^[Medium] by 2:1.

5. **The indicator declined by 15% in the short-term (2007-12) but the uncertainty around this value is substantial** ^[Medium]. During this period 59 species declined and 45 species increased.
6. **There is no evidence about whether trends vary systematically within the UK** ^[Medium].

D. Wider Application

7. Encounters with rare species form an important component of human enjoyment of nature (cultural ecosystem services). However, the majority of species on this indicator are from taxonomic groups with limited appeal to the general public (e.g. ants and wasps). However, the link between species status and cultural services is not well-established, so it remains unclear how changes in the indicator could be used as a measure of cultural ecosystem services^{xi}.
8. The trend in indicator C4b is considered to provide a direct contribution to the assessment of progress towards Aichi target 12^{xii}: to improve the conservation status of known threatened species. **The Priority species indicator (distribution) is a useful metric for assessing progress towards Aichi Target 12** ^[Medium] (with caveats about representation, noted above). Note, however, that the species on the priority list were defined subjectively, and not all would qualify as threatened by an objective criterionⁱⁱ. The status of priority species is thought to be indirectly relevant to Aichi target 5 (natural habitats) and target 11 (protected areas)^{xiii}, but better indicators of progress towards these targets exist.

E. Drivers of change*

9. *Although the evidence is weak, the most significant drivers of change of the priority species indicator (distribution) relate to the intensification of agricultural management, which can be sub-divided as production-driven farm management, pesticide and herbicide use, intensive grazing, and fertiliser use. The very strong negative impact of these drivers can be linked to changes in management driven by the Common Agricultural Policy. **Agricultural intensification may be largely responsible for the decline in the indicator**^{xiv} ^[Medium].
10. ***The loss of semi-natural habitat (heathland, semi-natural grassland and wetland) through conversion to farmland was identified as moderate negative driver upon the indicator** ^[Medium], although the underpinning evidence is weak^{xv}.
11. ***The decline in woodland management, in particular the cessation of traditional management methods such as coppicing, had a strong adverse impact on a number of insects within the indicator** ^[Medium], such as the hoverfly *Cheilosia chrysocoma*^{xvi}.
12. ***The distribution of some priority species is associated with climate change, with more decreasing than increasing, but evidence is weak**^{xvii} ^[Medium].

*The evidence base underpinning these statements was collated for the species contributing to the 2014 version of this indicator. Around 85% of the species in this indicator were also in the 2014 version, but the 2014 version contained a much larger number of moth species.

Endnotes refer to the "Technical Report – Summary of Evidence" document, unless otherwise stated

ⁱ http://jncc.defra.gov.uk/docs/UKBI2015_TechBG_C4b_Final.docx

ⁱⁱ Eaton *et al.*, 2015. *Biodiversity* 16, 108-119

ⁱⁱⁱ http://jncc.defra.gov.uk/Docs/UKBI2015_TechBG_C4b-D1c_Bayesian_Final.docx

^{iv} Figure 2.3

^v Table 2.3

^{vi} Isaac & Pocock, 2015. *Biol J Linn Soc* 115, 522-531

^{vii} Section 3.4.1.2

^{viii} <http://jncc.defra.gov.uk/page-6850>

^{ix} http://jncc.defra.gov.uk/docs/UKBI2015_DS_C4b_Final.xlsx

^x Section 2.1.5, table 2.1.

^{xi} Section 3.4.2

^{xii} <http://jncc.defra.gov.uk/page-6121>

^{xiii} Section 6

^{xiv} Section 3.2.2, especially subsection 3.2.2.1

^{xv} Section 3.2.2, especially subsection 3.2.2.2

^{xvi} Section 3.2.2, especially subsection 3.2.2.3

^{xvii} Section 3.2.2, especially subsection 3.2.2.5