UK Biodiversity Indicators 2019

This document supports
C4b. Status of UK priority species: Distribution

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C4. Status of UK priority species

C4b. Distribution

Type: State Indicator

Summary

No additional data point since the previous publication but methodological changes have resulted in revisions to the full data series (see method changes section for further details).

Official lists of priority species have been published for each UK country. There are 2,890 species on the combined list; actions to conserve them are included within the respective countries' biodiversity or environment strategies.

Between 1970 and 2016, the index of distribution of priority species in the UK decreased, with a higher proportion of species decreasing in distribution than increasing. The long-term trend is assessed as a decline of 27%.

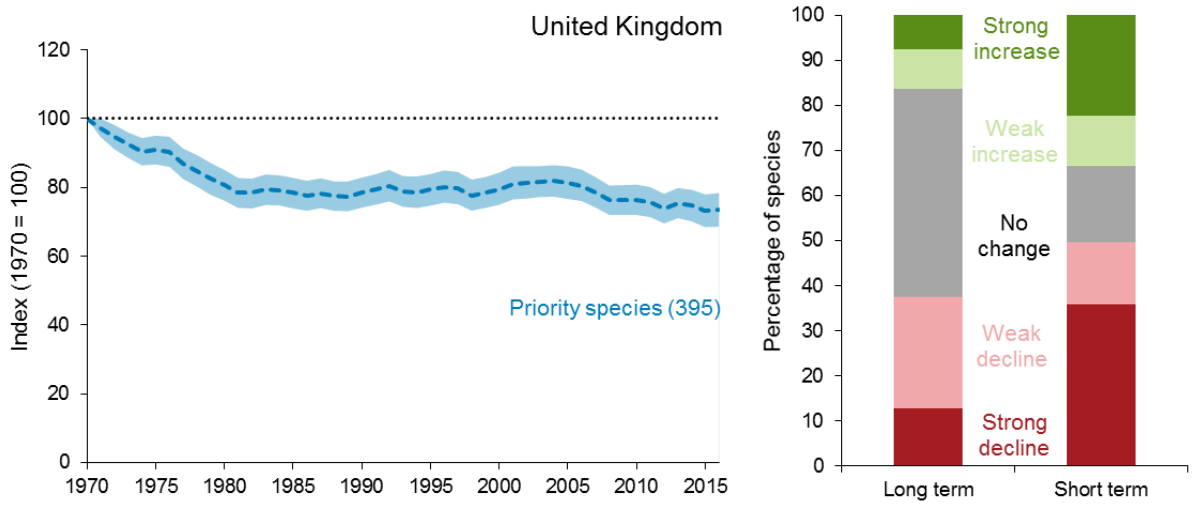
Indicator Description

This indicator measures change in the number of 1km grid squares across the UK in which priority species were recorded in any given year. This is referred to as the 'occupancy index' and is effectively equivalent to changes in the distribution of priority species for which data are available. The indicator will increase when priority species become more widespread on average, and decrease when species becomes less widespread.

This indicator should be read in conjunction with C4a which provides data on those species for which abundance data are available.

The index was 3% lower in 2016 than in 2011, with 33% of species showing an increase and 50% showing a decline. However, this short-term decrease was not significant, and therefore the short-term assessment is stable.

Figure C4bi. Change in distribution of UK priority species, 1970 to 2016.



Notes:

1. The line graph shows the unsmoothed trend (dashed line) with variation around the line (shaded area) within which users can be 90% confident that the true value lies (credible interval).
2. The figure in brackets shows the number of species included in the composite index.
3. The bar chart shows the percentage of species within the indicator that have increased, decreased or shown no change in distribution (measured as the proportion of occupied sites), based on set thresholds of change.

4. All species in the indicator are present on one or more of the country priority species lists (Natural Environmental and Rural Communities Act 2006 – Section 41 (England), Environment (Wales) Act 2016 section 7, Northern Ireland Priority Species list, Scottish Biodiversity List).
5. These charts are not directly comparable to previous versions of the indicator. As a result of methodological improvements and more stringent criteria in the occupancy model analysis, fewer species have been included in the 2019 iteration of this indicator compared with the 2018 iteration (714 versus 395). Also since 2018, data updates to the Biological Records Centre database for 3 groups (craneflies, hoverflies and leaf and seed beetles) have been received for this indicator (see method changes section for further details).

Source: Biological records data collated by a range of national schemes and local data centres.

Assessment of change in distribution of priority species in the UK			
	Long term	Short term	Latest year
Priority species – Distribution	 1970–2016	 2011–2016	No change (2016)

Note: Analysis of the underlying trends is undertaken by the data providers.

Indicator description

Priority species are defined as those appearing on one or more of the biodiversity lists of each UK country (Natural Environmental and Rural Communities Act 2006 - Section 41 (England); Environment (Wales) Act 2016 section 7, Northern Ireland Priority Species List, Scottish Biodiversity List). The combined list contains 2,890 species in total. The priority species were highlighted as being of conservation concern for a variety of reasons, including rapid decline in some of their populations. Actions to conserve these priority species are included within the respective countries' biodiversity or environment strategies.

Of the 2,890 species on the combined priority species list, the 395 for which robust quantitative time-series of the proportion of occupied sites are available are included in the indicator. These 395 species include bees, wasps and ants (80); bryophytes and lichens (120); moths (117); and other insects (39). The species have not been selected as a representative sample of priority species and they cover only a limited range of taxonomic groups. The measure is therefore not fully representative of species in the wider countryside. See the technical background document for more detail.

The relative change in distribution of each of these species is measured by the number of 1km grid squares across the UK in which they were recorded – this is referred to as the 'occupancy index'. The occupancy index will increase when a species becomes more widespread; it will decrease when a species becomes less widespread.

The index of distribution of priority species in the UK fell by more than 20% between 1970 and 1981; this was then followed by a relatively stable period until 2010 when the composite trend steadily declined until 2016. Occupancy of priority species was assessed as declining between 1970 and 2016. The index was 27% lower in 2016 than in 1970, this is considered a significant change. Although the indicator decreased by 3% between 2011 and 2016, it was assessed as stable when taking into account the 90% credibility interval. Uncertainty in the species-specific annual occupancy estimates are incorporated into the overall indicator; details of how this was done are included in the technical background document.

Relevance

Priorities for species and habitat conservation are set at a country level through country biodiversity or environment strategies. Each country has an identified list of priority species,

which are of high conservation concern due, for example, to restricted range or population declines. The indicator therefore includes a substantial number of species that, by definition, are becoming less widespread.

Measures of distribution are less sensitive to change than measures of abundance (see indicator C4a). Nonetheless, if a threatened species that has been declining starts to recover, its distribution should stabilise, and may start to increase. If the proportion of species in the indicator that are stable or increasing grows, the indicator will start to decline less steeply. If the proportion declines, it will fall more steeply. Success can therefore be judged by reference to trends in both indicators C4a and C4b, as well as other information on other priority species for which there are insufficient data for inclusion in the indicator.

Background

The measure is a composite indicator of 395 species from 20 taxonomic groups (8 of the 28 groups originally modelled did not contain any species with sufficient data to be included in the final analysis), see the technical background document for a detailed breakdown of the species and groups in the indicator. The priority species identified in each of the 4 UK countries were highlighted as being of conservation concern for a variety of reasons, including their scarcity, their iconic nature or a rapid decline in their population. They are not representative of wider species in general. They do however include a range of taxonomic groups, and will respond to the range of environmental pressures that biodiversity policy aims to address, including land use change, climate change, invasive species and pollution. The short-term assessment of change can be used to assess the impact of recent conservation efforts and policy aimed at halting and reversing species declines. However, natural fluctuations (particularly in invertebrate populations) and short-term response to weather may have a strong influence on the short-term assessment.

Regardless of advances in statistical techniques and the increase in the number of biological records collected, there are likely to be species on the priority lists for which little monitoring or occurrence data is available. Reasons for this include rarity, difficulty of detection, or those for which monitoring methods are unreliable or unavailable. In order for the indicator to be representative of priority species, a method of assessing the changing status of these remaining data poor species would need to be considered.

The Bayesian occupancy approach enables an estimation of species occurrence even though the data used in this indicator were collected without a standardised survey design (van Strien *et al.*, 2013; Isaac *et al.*, 2014a and b). For each species, records were extracted at the 1km grid square scale with records on different days being treated separately, and an annual time-series of the proportion of sites occupied was calculated. Each species-specific time series was scaled so the first value in 1970 was set to 100. The annual index was estimated as the arithmetic mean of the scaled species-specific occupancy estimates. Each species was given equal weighting within the indicator. Uncertainty in the species-specific annual occupancy estimates is represented by the 90% credible intervals. See the technical background document for further detail on production of the indicator.

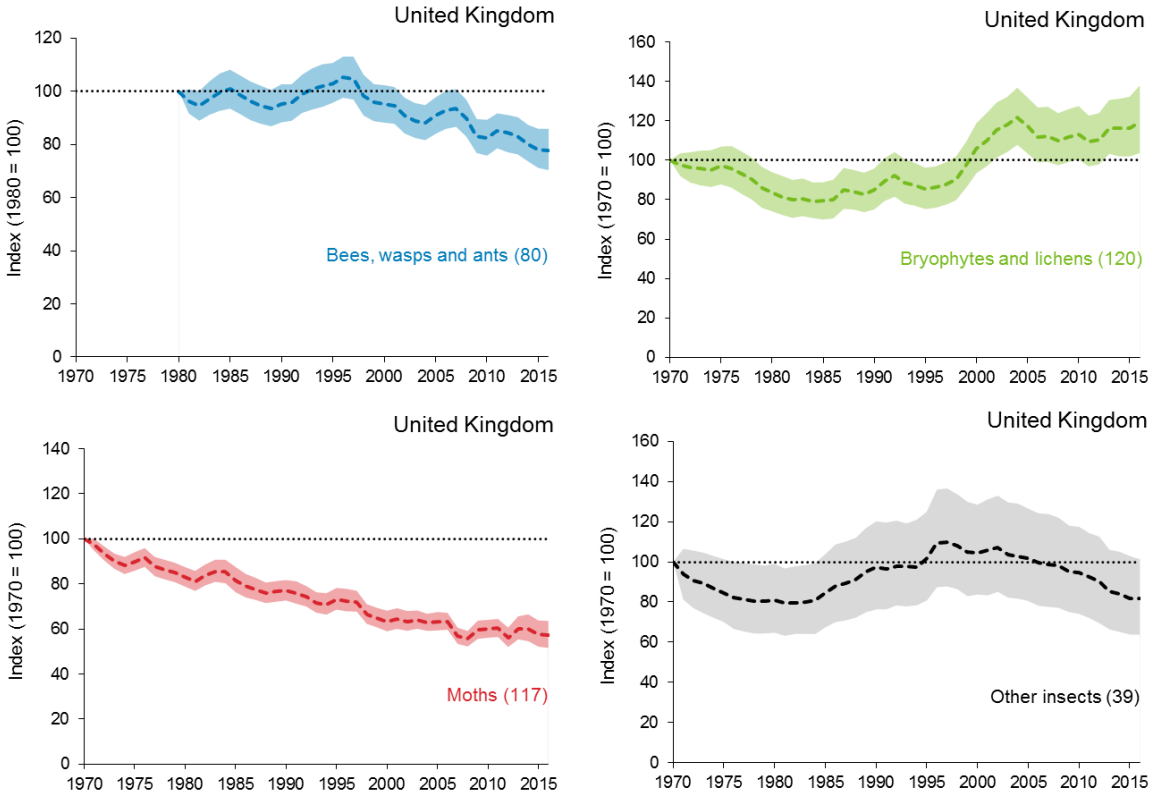
Species were grouped into one of 5 categories based on both their short-term (over the most recent 5 years of data) and long-term (all years) mean annual change in occupancy. The threshold values for each category were based on those of the wild bird indicator. See the technical background document on the Bayesian indicator development for further detail on the calculation of the species-specific trends.

The trends of the taxonomic groups included within a multi-species indicator are often obscured by its composite nature. Indicator lines have been generated for a number of sub groups using the same method so that the trends for these groups can be seen more clearly (see Figure C4bii). The bees, wasps and ants group experienced an overall decline, with an index value in 2016, 78% of that in 1980. These are counterbalanced by increases in bryophytes and lichens, which had an index value of 120 in 2016. The moths have

undergone the most dramatic decline with an index value in the final year 57% of the value in 1970. Similar strong declines in moths were noted in C4a. The underpinning causes of this decrease are not completely understood.

Since 2018, data updates to the Biological Records Centre database for 3 groups (craneflies, hoverflies, and leaf and seed beetles) have been received for this indicator. In addition, a methodological revision has been conducted to improve reliability in the index.

Figure C4bii. Change in distribution of priority species, by taxonomic group, 1970[3] to 2016.



Notes:

1. The graphs show the unsmoothed trend (dashed line) and variation around the line (shaded area) within which users can be 90% confident that the true value lies for each of the taxonomic groups included in the composite indicator.
2. The figures in brackets show the number of species included in each measure.
3. All species in the indicator are present on one or more of the country priority species lists (Natural Environmental and Rural Communities Act 2006 – Section 41 (England), Environment (Wales) Act 2016 section 7, Northern Ireland Priority Species list, Scottish Biodiversity List).
4. The indicator for bees, wasps and ants starts in 1980.
5. These charts are not directly comparable to previous versions of the indicator. As a result of methodological improvements and more stringent criteria in the occupancy model analysis, fewer species have been included in the 2019 iteration of this indicator compared with the 2018 iteration (714 versus 395). Also since 2018, data updates to the Biological Records Centre database for 3 groups (craneflies, hoverflies and leaf and seed beetles) have been received for this indicator (see method changes section for further details).

Source: Biological records data collated by a range of national schemes and local data centres.

Method changes from C4b 2018

For the 2019 update of indicator C4b, a more stringent record threshold for species inclusion has been applied than in 2018, increasing the minimum number of records from 10 to 50. Species were also excluded if they had either a 10 year gap in records or less than 10 years of occupancy estimates. The time series for individual species has also been restricted to after their first record and to not extend beyond the last records available for their taxonomic group. This has reduced the number of species included within the indicator (from 714 in 2018 to 395 in 2019) but has focussed it upon the species which are most likely to have robust trends.

Combined long-term change in the relative abundance and distribution of priority species

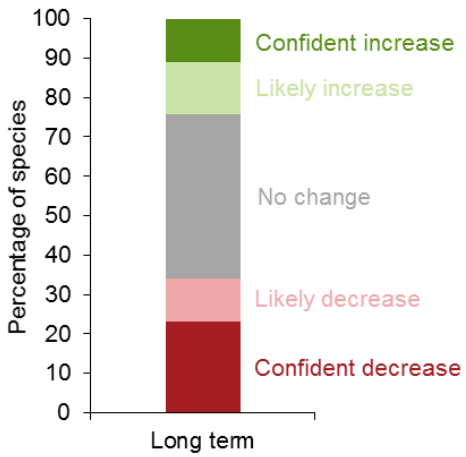
The assessment given here is based on the indicators published in 2018; it has not been updated in 2019 and does not reflect new data published in the fiches for C4a or C4b.

The priority species indicator currently comprises of 2 measures; C4a based on abundance data and this indicator (C4b) based on distribution data. The assessments are made separately for these 2 indicators, which can result in potentially different messages. Ideally, these would be combined into a single assessment for priority species, however such a combined indicator needs to address challenges about differences in the data types that contribute to C4a and C4b. Simply combining the species trends would assume equivalence across the 2 datatypes, i.e. that a 10% change in abundance is equivalent to a 10% change in distribution. This has, to date, been deemed an unreasonable assumption to make. Furthermore combining change from different datatypes leads to a lack of clarity around what the indicator is actually measuring when using magnitude of change.

The Centre for Ecology & Hydrology have proposed a technique to produce a combined evaluation of priority species, using both abundance and distribution data. The key development is that rather than assessing the indicator based on magnitude of change, the assessment is based on the balance of increasing verses decreasing species. This is consistent with existing indicators, in that the assessment is a statement of confidence in whether the overall trend line has increased, decreased or showed no overall change. It also sidesteps the challenges of combining different data types by only assuming that the confidence with which a species is assigned an increasing or decreasing trend can be compared across data types (see the technical background document for further details). As this technique is currently being refined, it has only been used to produce a measure of the combined long-term change in the 2 priority species indicators (Figure C4biii).

Figure C4biii. Combined long-term change in the relative abundance and distribution of priority species in the UK, 1970 to 2015.

C4b. Status of UK priority species: Distribution



Notes:

1. Based on 929 species included in the 2018 update of indicators C4a and C4b. Each species contributes once only – so either to C4a or to C4b.
2. The graph provides information on the percentage of species which have increased, decreased or remained unchanged; it does not assess the amount of change in those species.

Source: Distribution data from: Biological records data collated by a range of national schemes and local data centres. Abundance data from: Bat Conservation Trust, British Trust for Ornithology, Butterfly Conservation, Centre for Ecology & Hydrology, Defra, Joint Nature Conservation Committee, People's Trust for Endangered Species, Rothamsted Research, Royal Society for the Protection of Birds.

Of the 929 priority species included in the 2018 update of C4a and C4b, 225 (24%) have increased, 317 (34%) have decreased and 387 (42%) have shown no significant change in either abundance or distribution between 1970 and 2015. Overall, the long-term trend for the combined measure of priority species abundance and distribution in the UK is declining.

Goals and targets

Aichi Targets for which this is a primary indicator

Strategic Goal C. To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

Target 12: By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Aichi Targets for which this is a relevant indicator

Strategic Goal B. Reduce the direct pressures on biodiversity and promote sustainable use.

Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Strategic Goal C. To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.

Web links for further information

Reference	Title	Website
Aquatic Heteroptera Recording Scheme	Home page	https://www.britishbugs.org.uk/recording.html
British Arachnological Society Spider Recording Scheme,	Home page	http://srs.britishspiders.org.uk/
Bees, Wasps and Ants Recording Society	Identification guides to download	http://www.bwars.com/index.php?q=content/identification-guides-download
British Bryological Society	Home page	http://www.britishbryologicalsociety.org.uk/
British Isles Neuropterida Recording Scheme	Home page	http://lacewings.myspecies.info/
British Lichen Society	Home page	http://www.britishlichensociety.org.uk/
British Dragonfly Society	Recording Dragonflies and Damselflies in the British Isles	http://www.british-dragonflies.org.uk/content/recording-dragonflies-and-damselflies-britain
British Myriapod and Isopod Group	Centipede and Millipede recording schemes	http://www.bmig.org.uk/
Bruchidae & Chrysomelidae Recording Scheme	Relevant BRC webpage	https://www.brc.ac.uk/term/scheme/bruchidae-chrysomelidae-recording-scheme
Butterfly Conservation	Butterflies and Moths	https://butterfly-conservation.org/
Centre for Ecology & Hydrology – Biological Records Centre	Home page	http://www.brc.ac.uk/
Centre for Ecology & Hydrology – Biological Records Centre	Recording Schemes	http://www.brc.ac.uk/recording-schemes
Conchological Society of Great Britain and Ireland	Home page	http://www.conchsoc.org/

Reference	Title	Website
Diperists Forum	Cranefly,Empididae & Dolichopodidae, Fungus gnat Recording Schemes	http://www.dipteristsforum.org.uk/
Gelechiid Recording Scheme	Home page	http://www.gelechiid.co.uk/
Ground Beetle Recording Scheme	Homepage	http://www.coleoptera.org.uk/carabidae/recording
Hoverfly Recording Scheme	Home page	http://www.hoverfly.org.uk/portal.php
National Moth Recording Scheme	Homepage	http://www.mothscount.org/text/27/national_moth_recording_scheme.html
Orthoptera Recording Scheme	Homepage	http://www.orthoptera.org.uk/
Riverfly Recording Schemes: Ephemeroptera, Plecoptera and Trichoptera	Home page	http://www.riverflies.org/riverfly-recording-schemes
Soldierflies and Allies Recording Scheme	Home page	http://www.brc.ac.uk/soldierflies-and-allies/home
Staphylinidae Recording Scheme	Relevant BRC webpage	https://www.brc.ac.uk/scheme/staphylinidae-recording-scheme
Terrestrial Heteroptera Recording Scheme - Shield bugs and allied species	Homepage	http://www.britishbugs.org.uk/recording.html
Weevil and Bark Beetle Recording Scheme + Scolytidae	Relevant BRC webpage	https://www.brc.ac.uk/scheme/weevil-and-bark-beetle-recording-scheme
UK Biodiversity Partnership	UK Biodiversity Action Plans	http://jncc.defra.gov.uk/page-5155
The Scottish Government	Scottish Biodiversity List	http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL

Reference	Title	Website
Wales Biodiversity Partnership	Section 7 priority species in Wales	https://www.biodiversitywales.org.uk/Environment-Wales-Bill
Natural England	S41 List of priority species in England	http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx
Northern Ireland Environment Agency	Northern Ireland Priority Species List	http://www.habitas.org.uk/priority/intro.html

References

Isaac, N. J. B., August, T. A., Harrower, C. and Roy, D. B. (2013). Trends in the Distribution of UK native species 1970-2010. Preliminary report to JNCC. JNCC Report No 488. http://jncc.defra.gov.uk/pdf/488_Web.pdf (PDF, 205kb).Isaac, N. J. B., van Strien, A. J., August, T. A., de Zeeuw, M. P. and Roy, D. B. (2014a). Statistics for citizen science: extracting signals of change from noisy ecological data. *Methods in Ecology and Evolution*. https://doi.org/10.1111/2041-210X.12254

Isaac, N. J. B., van Strien, A. J., August, T. A., de Zeeuw, M. P. and Roy, D. B. (2014b). Extracting robust trends in species' distributions from unstructured opportunistic data: a comparison of methods. *BioRXiv*. https://doi.org/10.1101/006999

Van Strien, A. J., van Swaay, C. A. M. and Termaat, T. (2013). Opportunistic citizen science data of animal species produce reliable estimates of distribution trends if analysed with occupancy models. *Journal of Applied Ecology*, **50**(6), 1450–1458. https://doi.org/10.1111/1365-2664.12158

Full details of this indicator, including a datasheet and technical documentation is available at: jncc.gov.uk/ukbi-C4b

Last updated: September 2019

Latest data: 2016