

England Biodiversity Indicators 2021

This document supports

4b. Status of priority species in England: distribution

Technical background document

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<https://www.gov.uk/government/statistics/england-biodiversity-indicators>

Indicator 4b. Status of priority species in England: distribution

Technical background report, 2021

Note well, this paper should be read together with Indicator 4a [Status of priority species in England: relative abundance](#) which presents a companion statistic based on time series of the relative abundance of priority species.

1. Introduction

This paper presents one of the 2 indicators which aim to provide a robust measure of the status of threatened species in the UK, with 'species identified as conservation priorities' being taken as a proxy for 'threatened species'. Although biodiversity monitoring in England is probably as good as anywhere else in the world, and a wide range of data and novel analytical approaches have been used, it should be recognised from the outset that any indicator on the status of priority species will be hampered by shortcomings in the availability of data.

2. Species List

The species considered for inclusion in the England Priority Species Indicator are those on the [S41 list](#). Species on the S41 list are those on the 2007 UK Biodiversity Action Plan (UK BAP) list that are present in England with the addition of Hen Harrier. There are a small number of taxa below the species level (that is, sub-species) on the S41 lists. Such infra-specific taxa were only retained if the associated species was not included. This led to the removal of three sub-species and reduced the total taxa on the S41 list from 943 to 940. Indicator 4a is limited to species for which annual estimates of abundance are available, however for indicator 4b biological records are available for a broader set of taxa than those that have available abundance data. When analysed with occupancy-detection models, these records provide evidence on changes in species' distributions over time. Species groups with suitable data span a wide range of taxonomic groups including bryophytes, lichens, insects, freshwater invertebrates, and other invertebrates. While the species included are characteristic of a broad range of habitat types across England, there are plans to include more species as additional data become available.

3. Data Sources

Biological records are observations of species at a particular location and at a particular time. Most records are made by volunteer recorders and, whilst these data may be collected following a specific protocol, the majority of records are opportunistic. As the intensity of recording varies in both space and time (Isaac *et al.* 2014), it can be difficult to extract robust trends in species' distributions from unstructured data. Fortunately, a range of methods now exist for extracting signals of change using these data (for example, Szabo *et al.* 2010; Hill, 2012; Isaac *et al.* 2014). Of these methods - occupancy-detection models - are best-able to produce robust trends in occupancy (Isaac *et al.* 2014). Occupancy-detection models comprise 2 hierarchically coupled sub-models: an

occupancy sub-model (that is, presence versus absence), and a detection sub-model (that is, detection versus non-detection). Together, these sub-models estimate the conditional probability that a species is detected when present. One distinctive feature of occupancy-detection models is that data need not be available for every year-site combination in order to infer a species' occupancy (van Strien *et al.* 2013).

Occurrence records were extracted at the 1 kilometre grid square scale and with a temporal precision of one day. Data were collated through the Biological Records Centre and include data from the following recording schemes: Aquatic Heteroptera Recording Scheme; Bees, Wasps and Ants Recording Society; British Arachnological Society Spider Recording Scheme; British Bryological Society; British Lichen Society; British Myriapod and Isopod Group - Millipede Recording Scheme & Centipede Recording Scheme; Bruchidae & Chrysomelidae Recording Scheme; Conchological Society of Great Britain and Ireland; Crane-fly Recording Scheme; British Dragonfly Society; Empididae, Hybotidae & Dolichopodidae Recording Scheme; Fungus Gnat Recording Scheme; Gelechiid Recording Scheme; Grasshopper Recording Scheme; Ground Beetle Recording Scheme; Hoverfly Recording Scheme; Lacewings and Allies Recording Scheme; National Moth Recording Scheme; Riverfly Recording Schemes: Ephemeroptera, Plecoptera and Trichoptera; Soldierbeetles and Allies Recording Scheme; Soldierflies and Allies Recording Scheme; Terrestrial Heteroptera Recording Schemes; UK Ladybird Survey; Weevil and Bark Beetle Recording Scheme.

Data from between 1970 and 2016 were extracted as this represents the core period of recording for many of the taxonomic groups. However, some datasets do not cover the whole period. Since the 2018 indicator the Biological Records Centre has received updates of the scheme data from some taxonomic groups (Table 1). This has enabled the improvement of model estimates for certain years (particularly 2016). Note that approximately 60 of the 105 moth species also appear in 4a.

Table 1: Summary of species' time-series included in the Priority Indicator (4b). Only species in taxonomic groups for which the Biological Records Centre receives data are presented.

Taxonomic group	Number of species on S41 list	Number of species on S41 list with sufficient data for Priority Indicator	Models updated since Outhwaite <i>et al.</i> (2018)
Ants	5	3	YES
Aquatic Bugs	1	1	NO
Bees	17	13	YES

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Taxonomic group	Number of species on S41 list	Number of species on S41 list with sufficient data for Priority Indicator	Models updated since Outhwaite <i>et al.</i> (2018)
Bryophytes	77	9	NO
Carabids	13	6	NO
Centipedes	1	0	NO
Craneflies	5	1	NO
Dragonflies	2	1	YES
Empidid & Dolichopodid	4	3	NO
Ephemeroptera	2	1	NO
Fungus Gnats	2	0	NO
Gelechiids	2	0	NO
Hoverflies	5	1	NO
Ladybirds	0	0	NO
Leaf and Seed Beetles	11	4	NO
Lichens	86	16	NO
Millipedes	3	0	NO
Molluscs	7	4	NO

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Taxonomic group	Number of species on S41 list	Number of species on S41 list with sufficient data for Priority Indicator	Models updated since Outhwaite <i>et al.</i> (2018)
Moths	105	93	NO
Neuropterida	1	0	NO
Orthoptera	3	2	NO
Plant Bugs	1	0	NO
Plecoptera	1	1	NO
Shield Bugs	0	0	NO
Soldier Beetles	0	0	NO
Soldierflies	5	4	NO
Spiders	24	9	NO
Trichoptera	3	0	NO
Wasps	5	7	YES
Weevils	2	2	NO
Total	393	181	

An occupancy-detection model, following van Strien *et al.* (2013) and Isaac *et al.* (2014), with improvements based on Outhwaite *et al.* (2018), was applied to all species from those taxonomic groups for which data were available. For each site-year combination, the model estimates presence or absence for the species in question given variation in detection probability: from this the proportion of occupied sites, 'occupancy' was estimated for each year. The models are analysed in a Bayesian framework, meaning

that, in addition to point estimates of occupancy, credible intervals (a measure of uncertainty) can be generated for each species' time-series based on multiple iterations (here 999) of model fitting. A detailed description of the occupancy model can be found in Outhwaite *et al.* (2019).

4. Indicator method

From the occupancy model for each species we extract the proportion of occupied sites within England. We used only those species with at least 10 records in England and which passed data availability thresholds (Pocock *et al.* 2019), to ensure reliable inference. Although, due to the size of the dataset for moths, model quality tests were unavailable, so only those moth species with greater than or equal to 10 records in England and greater than or equal to 50 records across all regions (Outhwaite *et al.* 2019) were included. Given these data requirements, 181 species contributed to the Priority Species Indicator - 4b (Table 1).

To create the composite index, a new hierarchical modelling method for calculating multi-species indicators within a state-space formulation was used (Freeman *et al.* 2020), as for 4a. The method produces an estimate of the annual geometric mean occupancy across species. The resulting index is the average of the constituent species' trends, set to a value of 100 in the start year (the baseline). Changes subsequent to this reflect the average change in species occupancy; if on average species' trends doubled, the indicator would rise to 200, if they halved it would fall to a value of 50. A smoothing process is used to reduce the impact of between-year fluctuations - such as those caused by variation in weather - making underlying trends easier to detect. The smoothing parameter (number of knots) was set to the number of years divided by 3.

The Freeman method combines the individual species abundance trends taking account of the confidence intervals around the individual trends. However, because the method is Bayesian, it produces credible intervals to show the variability around the combined index, as well as in the trends of individual species.

Each species in the indicator was weighted equally. When creating a species indicator weighting may be used to try to address biases in a dataset, for example, if one taxonomic group is represented by far more species than another, the latter could be given a higher weight so that both taxonomic groups contribute equally to the overall indicator. Complicated weighting can, however, make the meaning and communication of the indicator less transparent. The main bias on the data is that some taxonomic groups are not represented at all, which cannot be addressed by weighting. For this reason, and to ensure clarity of communication, equal weighting was used.

5. Thresholds for species-specific trends

To illustrate the interspecific variation in trends, bar-charts are published alongside the indicator. These show the percentage of species showing different trends – strong increase, increase, little change, decrease, strong decrease – over 2 time periods (Table 2). The long-term period is that since the start of the indicator (1970 in most cases) although for species entering into the indicator in subsequent years the period is shorter (the longest available trend is used, as long as it exceeds that used within the short-term

change measure). The short-term period is the last 5 years of data (for example, currently 2011 to 2016).

Table 2: Thresholds used to define individual species trends

Category:

A **strong increase** is defined as an increase of more than 2.81% per annum; this is equivalent to an increase of more than 100% over 25 years.

A **weak increase** is defined as an increase of between 1.16% and 2.81% per annum; this is equivalent to an increase of between 33% and 100% over 25 years.

Little change is assigned when the change is between +1.16 % and -1.14% per annum; this is equivalent to a change of between +33% and -25% over 25 years.

A **weak decrease** is defined as a decrease of between 1.14% and 2.73% per annum; this is equivalent to a decrease of between 25% to 50% over 25 years.

A **strong decrease** is defined as a decrease of more than 2.73% per annum; this is equivalent to a decrease of more than 50% over 25 years.

Asymmetric percentage change thresholds are used to define these classes as they refer to proportional change, where a doubling of a species index (an increase of 100%) is counterbalanced by a halving (a decrease of 50%).

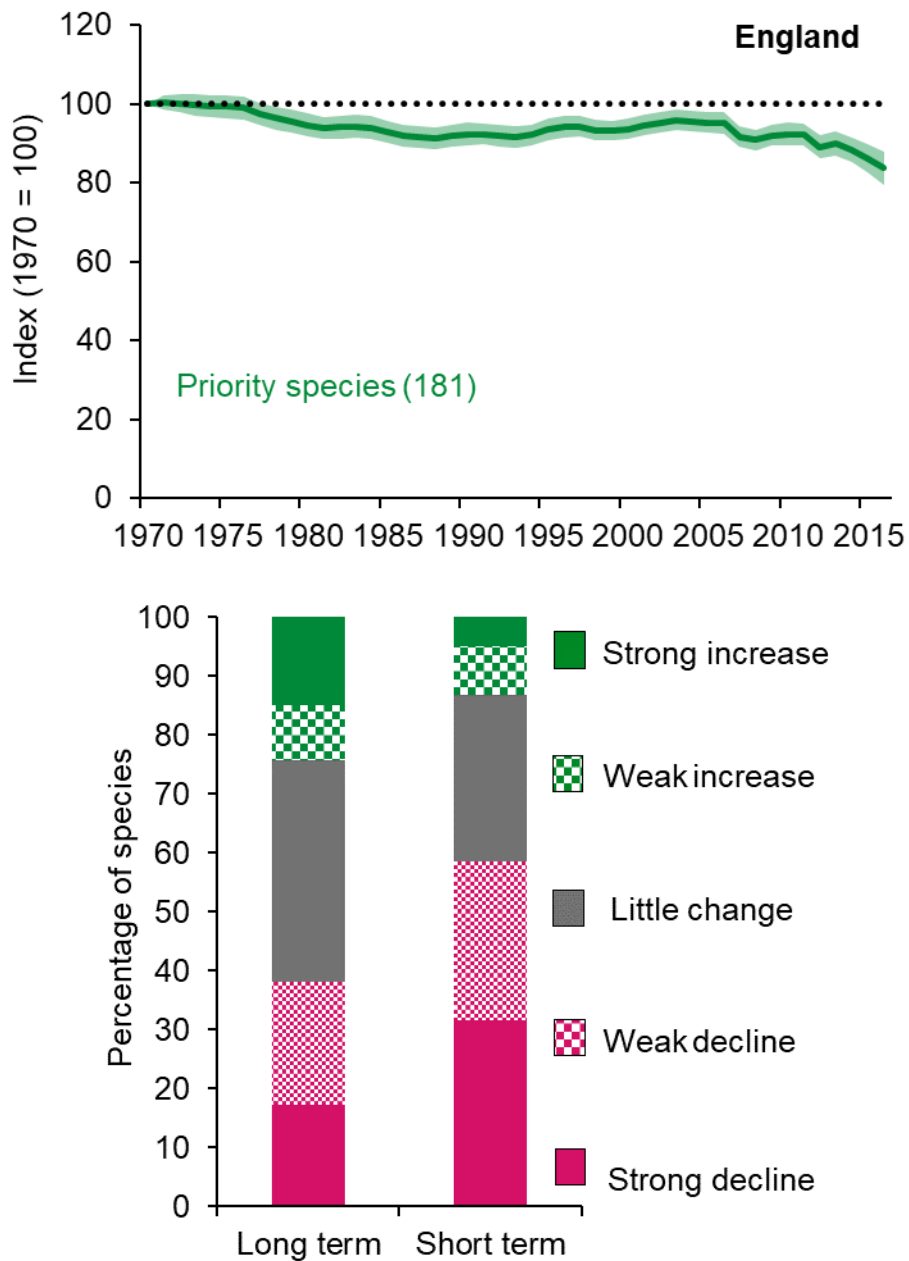
The threshold values for each category were based on those of the wild bird indicator; whether an individual species is increasing or decreasing has been decided by its rate of annual change over the time period (long or short) of interest. If the rate of annual change would lead to an occupancy increase or decrease of between 25% and 49% over 25 years, the species is said to have shown a 'weak increase' or a 'weak decline' respectively. If the rate of annual change would lead to a population increase or decrease of 50% or more over 25 years, the species is said to have shown a 'strong increase' or a 'strong decline' respectively. These thresholds are used in the [Birds of Conservation Concern](#) (PDF 1.6MB) status assessment for birds in the UK.

6. Headline 4b Indicator

The headline distribution indicator was generated by combining 181 priority species' time-series (4b) charting changes in the proportion of occupied sites using multi-species methods (Figure 1).

As for 4a, 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) average annual change in occupancy (Table 2).

Figure 1: Change in the occupancy (proportion of occupied sites) of priority species in England between 1970 and 2016



Notes:

1. The line graph shows the smoothed trend (solid line) with its 95% credible interval (shaded area). The width of the credible interval (CI) is in part determined by the proportion of species in the indicator for which data are available.
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 (weekly or strongly), decreased (weekly or strongly) or shown little 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 the priority species list for England (Natural Environmental and Rural Communities Act 2006 – Section 41).
5. This indicator is not directly comparable with the previous publication; for the 2021 publication, this indicator has been updated with England-only level data for the first time.

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

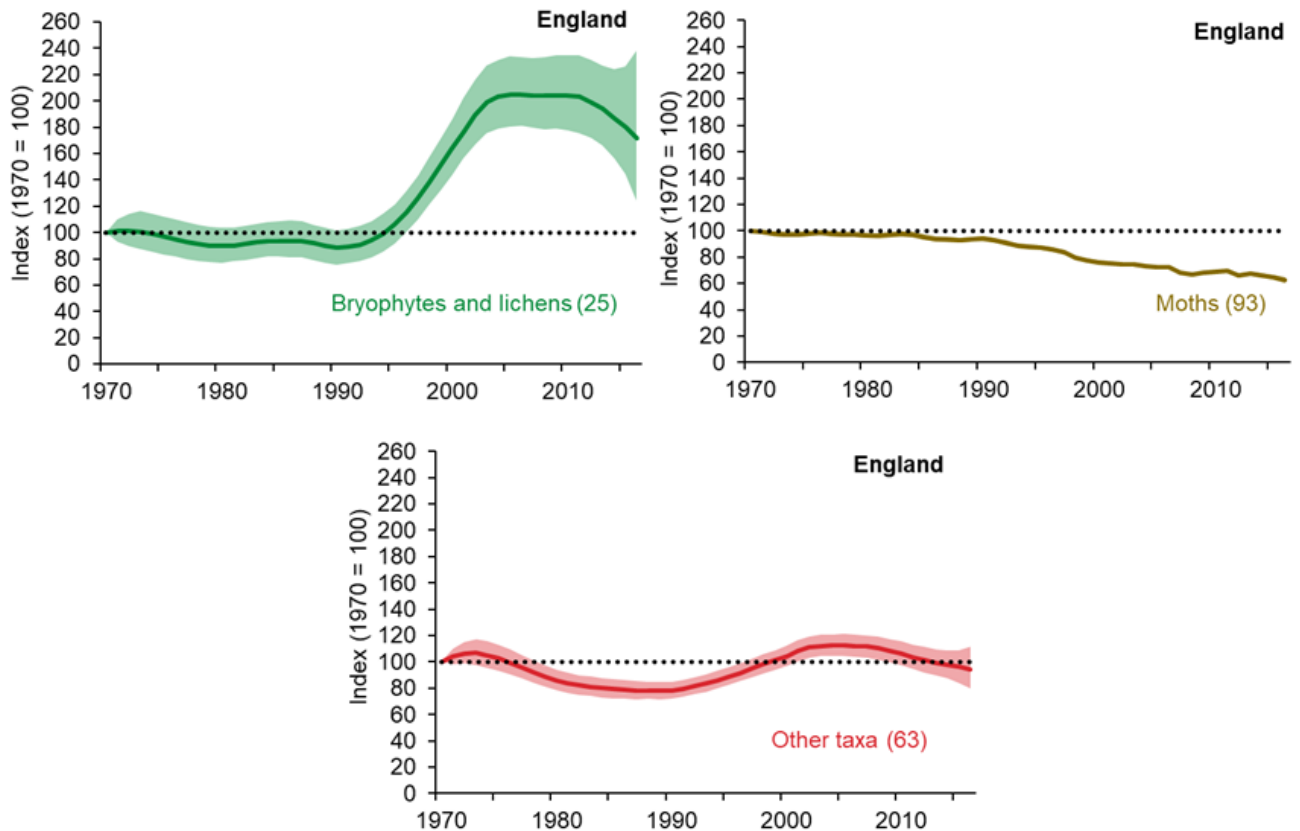
By 2016, the index of distribution of priority species in England decreased to 84, a statistically significant decrease of 16% of the 1970 value (Figure 4a.2). Over this long-term period, 24% of species showed a strong or weak increase and 38% showed a strong or weak decline.

More recently, between 2011 and 2016, the distribution index declined from 92.3 to 83.7, that is, by 9% of the 2011 value – again a statistically significant decrease. Over this short-term period, 13% of species showed a strong or weak increase and 58% showed a strong or weak decline.

7. Change in priority species by taxonomic group

The headline indicator (Figure 1) masks variation within and between taxonomic groups. Figure 2 shows indicators for each taxonomic group separately. These were generated using the same methods as the overall indicator.

Figure 2: Change in distribution of priority species in England, by taxonomic group, 1970 to 2016



Notes:

1. The graphs show the smoothed trend (solid line) with its 95% credible interval (shaded area) for each of the taxonomic groups included in the composite indicator. The width of the credible interval (CI) is in part determined by the proportion of species in the indicator for which data are available.
2. The figures in brackets show the number of species included in each measure.
3. Other taxa includes a number of insect groups, molluscs and spiders.
4. All species in the indicator are present on the priority species list for England (Natural Environmental and Rural Communities Act 2006 – Section 41).
5. This indicator is not directly comparable with the previous publication; for the 2021 publication, this indicator has been updated with England-only level data for the first time.

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 2). The group for other taxa experienced an overall decline, with an index value in 2016, 95% of that in 1970. These are counterbalanced by increases in

bryophytes and lichens, which had an index value of 172 in 2016. The moths have undergone the biggest decline with an index value in the final year 63% of the value in 1970. Similar strong declines in moths were noted in 4a. The underpinning causes of this decrease are not completely understood.

8. References

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Appendix 1 – Species List

Taxonomic aggregate	Taxonomic group	Scientific name
Other taxa	Ants	<i>Formica exsecta</i>
Other taxa	Ants	<i>Formica rufibarbis</i>
Other taxa	Ants	<i>Formicoxenus nitidulus</i>
Other taxa	Aquatic Bugs	<i>Hydrometra gracilentata</i>
Other taxa	Bees	<i>Andrena ferox</i>
Other taxa	Bees	<i>Andrena tarsata</i>
Other taxa	Bees	<i>Bombus muscorum</i>
Other taxa	Bees	<i>Bombus ruderarius</i>
Other taxa	Bees	<i>Bombus ruderatus</i>
Other taxa	Bees	<i>Bombus subterraneus</i>
Other taxa	Bees	<i>Bombus sylvarum</i>
Other taxa	Bees	<i>Colletes floralis</i>
Other taxa	Bees	<i>Colletes halophilus</i>
Other taxa	Bees	<i>Eucera longicornis</i>
Other taxa	Bees	<i>Lasioglossum angusticeps</i>
Other taxa	Bees	<i>Nomada armata</i>
Other taxa	Bees	<i>Osmia parietina</i>
Bryophytes and Lichens	Bryophytes	<i>Physcomitrium eurystomum</i>
Bryophytes and Lichens	Bryophytes	<i>Tortula freibergii</i>
Bryophytes and Lichens	Bryophytes	<i>Didymodon tomaculosus</i>
Bryophytes and Lichens	Bryophytes	<i>Scopelophila cataractae</i>
Bryophytes and Lichens	Bryophytes	<i>Bryum warneum</i>
Bryophytes and Lichens	Bryophytes	<i>Dicranum spurium</i>
Bryophytes and Lichens	Bryophytes	<i>Ditrichum subulatum</i>

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Taxonomic aggregate	Taxonomic group	Scientific name
Bryophytes and Lichens	Bryophytes	<i>Orthodontium gracile</i>
Bryophytes and Lichens	Bryophytes	<i>Orthotrichum pallens</i>
Other taxa	Carabids	<i>Amara fusca</i>
Other taxa	Carabids	<i>Carabus intricatus</i>
Other taxa	Carabids	<i>Cicindela sylvatica</i>
Other taxa	Carabids	<i>Cylindera germanica</i>
Other taxa	Carabids	<i>Harpalus froelichii</i>
Other taxa	Carabids	<i>Poecilus kugelanni</i>
Other taxa	Craneflies	<i>Lipsothrix nervosa</i>
Other taxa	Dragonflies	<i>Coenagrion mercuriale</i>
Other taxa	Empid & Dolichopodid flies	<i>Campsicnemus magius</i>
Other taxa	Empid & Dolichopodid flies	<i>Dolichopus laticola</i>
Other taxa	Empid & Dolichopodid flies	<i>Dolichopus nigripes</i>
Other taxa	Ephemeroptera	<i>Potamanthus luteus</i>
Other taxa	Hoverflies	<i>Eristalis cryptarum</i>
Other taxa	Leaf and Seed Beetles	<i>Cryptocephalus coryli</i>
Other taxa	Leaf and Seed Beetles	<i>Cryptocephalus nitidulus</i>
Other taxa	Leaf and Seed Beetles	<i>Donacia bicolora</i>
Other taxa	Leaf and Seed Beetles	<i>Psylliodes luridipennis</i>
Bryophytes and Lichens	Lichens	<i>Anaptychia ciliaris subsp. ciliaris</i>
Bryophytes and Lichens	Lichens	<i>Arthonia invadens</i>
Bryophytes and Lichens	Lichens	<i>Caloplaca luteoalba</i>

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Taxonomic aggregate	Taxonomic group	Scientific name
Bryophytes and Lichens	Lichens	<i>Collema dichotomum</i>
Bryophytes and Lichens	Lichens	<i>Collema latzelii</i>
Bryophytes and Lichens	Lichens	<i>Enterographa sorediata</i>
Bryophytes and Lichens	Lichens	<i>Fulgensia fulgens</i>
Bryophytes and Lichens	Lichens	<i>Lecanographa amylacea</i>
Bryophytes and Lichens	Lichens	<i>Megalaria laureri</i>
Bryophytes and Lichens	Lichens	<i>Opegrapha prosodea</i>
Bryophytes and Lichens	Lichens	<i>Ramonia chrysophaea</i>
Bryophytes and Lichens	Lichens	<i>Rinodina isidioides</i>
Bryophytes and Lichens	Lichens	<i>Solenopsora liparina</i>
Bryophytes and Lichens	Lichens	<i>Toninia sedifolia</i>
Bryophytes and Lichens	Lichens	<i>Usnea articulata</i>
Bryophytes and Lichens	Lichens	<i>Usnea florida</i>
Other taxa	Molluscs	<i>Anisus vorticulus</i>
Other taxa	Molluscs	<i>Segmentina nitida</i>
Other taxa	Molluscs	<i>Valvata macrostoma</i>
Other taxa	Molluscs	<i>Vertigo geyeri</i>
Moths	Moths	<i>Hepialus humuli</i>
Moths	Moths	<i>Cossus cossus</i>
Moths	Moths	<i>Adscita statices</i>
Moths	Moths	<i>Trichiura crataegi</i>

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Taxonomic aggregate	Taxonomic group	Scientific name
Moths	Moths	<i>Malacosoma neustria</i>
Moths	Moths	<i>Watsonalla binaria</i>
Moths	Moths	<i>Cymatophorima diluta</i>
Moths	Moths	<i>Aplasta ononaria</i>
Moths	Moths	<i>Thalera fimbrialis</i>
Moths	Moths	<i>Hemistola chrysoprasaria</i>
Moths	Moths	<i>Cyclophora pendularia</i>
Moths	Moths	<i>Cyclophora porata</i>
Moths	Moths	<i>Timandra comae</i>
Moths	Moths	<i>Scopula marginepunctata</i>
Moths	Moths	<i>Idaea dilutaria</i>
Moths	Moths	<i>Orthonama vittata</i>
Moths	Moths	<i>Xanthorhoe decoloraria</i>
Moths	Moths	<i>Xanthorhoe ferrugata</i>
Moths	Moths	<i>Scotopteryx bipunctaria</i>
Moths	Moths	<i>Scotopteryx chenopodiata</i>
Moths	Moths	<i>Epirrhoe galiata</i>
Moths	Moths	<i>Entephria caesiata</i>
Moths	Moths	<i>Pelurga comitata</i>
Moths	Moths	<i>Eulithis mellinata</i>
Moths	Moths	<i>Ecliptopera silaceata</i>
Moths	Moths	<i>Melanthia procellata</i>
Moths	Moths	<i>Pareulype berberata</i>
Moths	Moths	<i>Rheumaptera hastata</i>
Moths	Moths	<i>Chesias legatella</i>
Moths	Moths	<i>Chesias rufata</i>
Moths	Moths	<i>Lithostege griseata</i>
Moths	Moths	<i>Minoa murinata</i>
Moths	Moths	<i>Trichopteryx polycommata</i>
Moths	Moths	<i>Chiasmia clathrata</i>

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Taxonomic aggregate	Taxonomic group	Scientific name
Moths	Moths	<i>Macaria wauaria</i>
Moths	Moths	<i>Epione vespertaria</i>
Moths	Moths	<i>Ennomos quercinaria</i>
Moths	Moths	<i>Ennomos fuscantaria</i>
Moths	Moths	<i>Ennomos erosaria</i>
Moths	Moths	<i>Lycia hirtaria</i>
Moths	Moths	<i>Aleucis distinctata</i>
Moths	Moths	<i>Siona lineata</i>
Moths	Moths	<i>Hemaris tityus</i>
Moths	Moths	<i>Diloba caeruleocephala</i>
Moths	Moths	<i>Arctia caja</i>
Moths	Moths	<i>Spilosoma lubricipeda</i>
Moths	Moths	<i>Tyria jacobaeae</i>
Moths	Moths	<i>Euxoa tritici</i>
Moths	Moths	<i>Euxoa nigricans</i>
Moths	Moths	<i>Noctua orbona</i>
Moths	Moths	<i>Graphiphora augur</i>
Moths	Moths	<i>Eugnorisma glareosa</i>
Moths	Moths	<i>Diarsia rubi</i>
Moths	Moths	<i>Xestia castanea</i>
Moths	Moths	<i>Xestia agathina</i>
Moths	Moths	<i>Polia bombycina</i>
Moths	Moths	<i>Melanchra persicariae</i>
Moths	Moths	<i>Hadena albimacula</i>
Moths	Moths	<i>Tholera cespitis</i>
Moths	Moths	<i>Tholera decimalis</i>
Moths	Moths	<i>Orthosia gracilis</i>
Moths	Moths	<i>Brachylomia viminalis</i>
Moths	Moths	<i>Asteroscopus sphinx</i>
Moths	Moths	<i>Dasypolia templi</i>

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Taxonomic aggregate	Taxonomic group	Scientific name
Moths	Moths	<i>Allophytes oxyacanthae</i>
Moths	Moths	<i>Agrochola helvola</i>
Moths	Moths	<i>Agrochola litura</i>
Moths	Moths	<i>Agrochola lychnidis</i>
Moths	Moths	<i>Atethmia centrago</i>
Moths	Moths	<i>Acronicta psi</i>
Moths	Moths	<i>Acronicta rumicis</i>
Moths	Moths	<i>Amphipyra tragopoginis</i>
Moths	Moths	<i>Dicycla oo</i>
Moths	Moths	<i>Cosmia diffinis</i>
Moths	Moths	<i>Apamea remissa</i>
Moths	Moths	<i>Apamea anceps</i>
Moths	Moths	<i>Amphipoea oculea</i>
Moths	Moths	<i>Hydraecia micacea</i>
Moths	Moths	<i>Celaena haworthii</i>
Moths	Moths	<i>Archanara neurica</i>
Moths	Moths	<i>Rhizedra lutosa</i>
Moths	Moths	<i>Hoplodrina blanda</i>
Moths	Moths	<i>Caradrina morpheus</i>
Moths	Moths	<i>Acosmetia caliginosa</i>
Moths	Moths	<i>Stilbia anomala</i>
Moths	Moths	<i>Heliothis maritima</i>
Moths	Moths	<i>Catocala promissa</i>
Moths	Moths	<i>Catocala sponsa</i>
Moths	Moths	<i>Tyta luctuosa</i>
Moths	Moths	<i>Pechipogo strigilata</i>
Moths	Moths	<i>Paracolax tristalis</i>
Moths	Moths	<i>Trisateles emortualis</i>
Other taxa	Orthoptera	<i>Decticus verrucivorus</i>
Other taxa	Orthoptera	<i>Stethophyma grossum</i>

4b Status of priority species in England: distribution

Taxonomic aggregate	Taxonomic group	Scientific name
Other taxa	Plecoptera	<i>Brachyptera putata</i>
Other taxa	Soldierflies	<i>Asilus crabroniformis</i>
Other taxa	Soldierflies	<i>Bombylius minor</i>
Other taxa	Soldierflies	<i>Clorismia rustica</i>
Other taxa	Soldierflies	<i>Thyridanthrax fenestratus</i>
Other taxa	Spiders	<i>Arctosa fulvolineata</i>
Other taxa	Spiders	<i>Centromerus serratus</i>
Other taxa	Spiders	<i>Dolomedes plantarius</i>
Other taxa	Spiders	<i>Haplodrassus dalmatensis</i>
Other taxa	Spiders	<i>Meioneta mollis</i>
Other taxa	Spiders	<i>Monocephalus castaneipes</i>
Other taxa	Spiders	<i>Notioscopus sarcinatus</i>
Other taxa	Spiders	<i>Saaristoa firma</i>
Other taxa	Spiders	<i>Sitticus caricis</i>
Other taxa	Wasps	<i>Cerceris quadricincta</i>
Other taxa	Wasps	<i>Cerceris quinquefasciata</i>
Other taxa	Wasps	<i>Chrysis fulgida</i>
Other taxa	Wasps	<i>Homonotus sanguinolentus</i>
Other taxa	Wasps	<i>Odynerus melanocephalus</i>
Other taxa	Wasps	<i>Odynerus simillimus</i>
Other taxa	Wasps	<i>Pseudepipona herrichii</i>
Other taxa	Weevils	<i>Byctiscus populi</i>
Other taxa	Weevils	<i>Melanapion minimum</i>