UK Biodiversity Indicators 2019

This document supports
D1c. Status of pollinating insects

Fiche

For further information on D1c. Status of pollinating insects visit jncc.gov.uk/ukbi-D1c

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D1. Biodiversity and ecosystem services

D1c. Status of pollinating insects

Type: State / Benefit indicator

Summary

This indicator has been updated to include 14 additional species of hoverfly across the entire time series; this update has impacted on the long-term and short-term trends.

There was an overall decrease in the pollinator indicator from 1987 onwards. In 2016, the indicator had declined by 31% compared to its value in 1980. The long-term trend was assessed as declining (Figure D1ci).

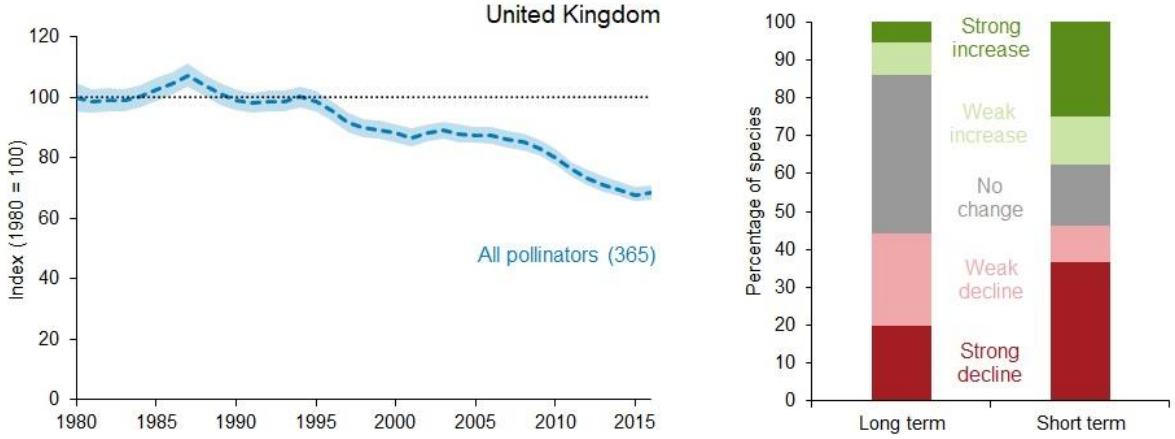
Between 2011 and 2016, the indicator showed a decrease of 10%; the short-term trend was also assessed as declining.

Indicator Description

This indicator illustrates changes in pollinator distribution (bees and hoverflies) in the UK. The indicator is based on 365 species of pollinator (137 species of bee and 228 species of hoverfly), and measures change in the number of 1km grid squares across the UK in which they were recorded in any given year – this is referred to as the 'occupancy index'. Many insect species are involved in pollination but bees and hoverflies are known to be important and are presented here as an indicator of overall pollinator trend.

Over the long term, 14% of pollinator species became more widespread (5% showed a strong increase), and 44% became less widespread (20% showed a strong decrease). Similarly, a greater proportion of species were decreasing than increasing over the short term, with 46% of species decreasing and 38% of species increasing.

Figure D1ci. Change in the distribution of UK pollinators, 1980 to 2016.



Notes:

1. The line graph shows the unsmoothed composite indicator trend with variation around the line (shaded) within which we can be 90% confident that the true value lies (credible interval).
2. The figure in brackets shows the total number of species included in the index (137 wild bee and 228 hoverfly species).
3. The bar chart shows the percentage of species within the indicator that have increased, decreased or shown no change in occupancy, based on set thresholds of change.
4. This indicator is not directly comparable with the previous publication. Hoverfly trends have been updated to 2016 (previously 2013) and 14 additional hoverfly species have been included across the entire time series, increasing the total number of hoverfly species in the indicator from 214 to 228.

Source: Bees, Wasps & Ants Recording Society; Biological Records Centre (supported by Centre for Ecology & Hydrology and Joint Nature Conservation Committee); Hoverfly Recording Scheme.

Assessment of change in the distribution of pollinators in the UK			
	Long term	Short term	Latest year
Distribution of UK pollinators	1980–2016	2011–2016	No change (2016)

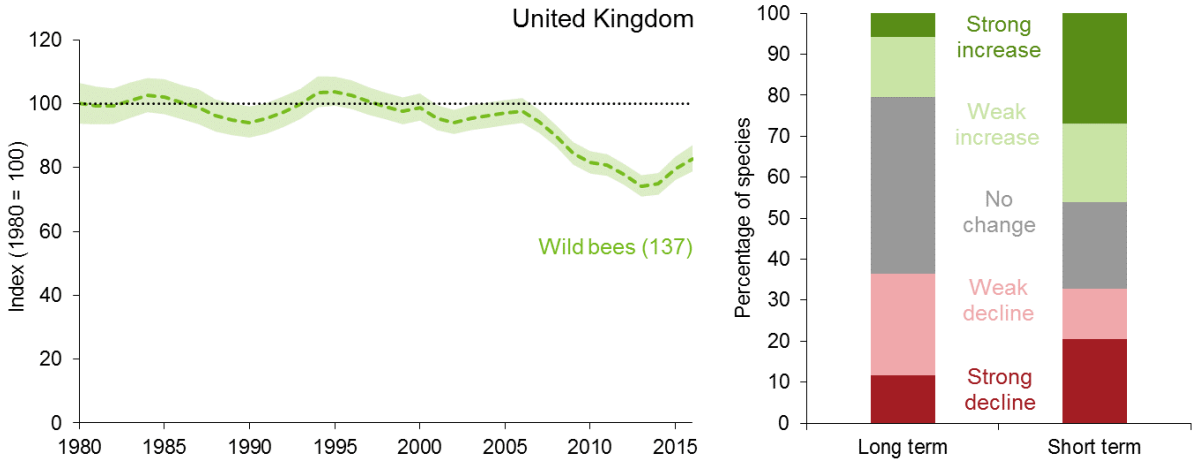
Note: Analysis of the underlying trends is carried out by the data providers – see Assessing Indicators.

Indicator description

As individual pollinator species become more or less widespread, the communities in any given area become more or less diverse, and this may have implications for pollination as more diverse communities are, in broad terms, more effective in pollinating a wider range of crops and wild flowers. Despite the inter-annual variation, the overall trend for pollinators remains downward.

The indicator occupancy index was also produced for the bee (Figure D1cii) and hoverfly (Figure D1ciii) species separately. The bee index was relatively stable up to 2006, before undergoing several years of decline. From 2013 onwards, there was evidence of a recovery, however, the bee index in 2016 was estimated to be 17% lower than in 1980. A larger proportion of bee species had decreased than increased over the long term (37% decreased and 20% increased), however, over the short term, a greater number increased (46%) than decreased (33%).

Figure D1cii. Change in the distribution of wild bee species in the UK, 1980 to 2016.



Notes:

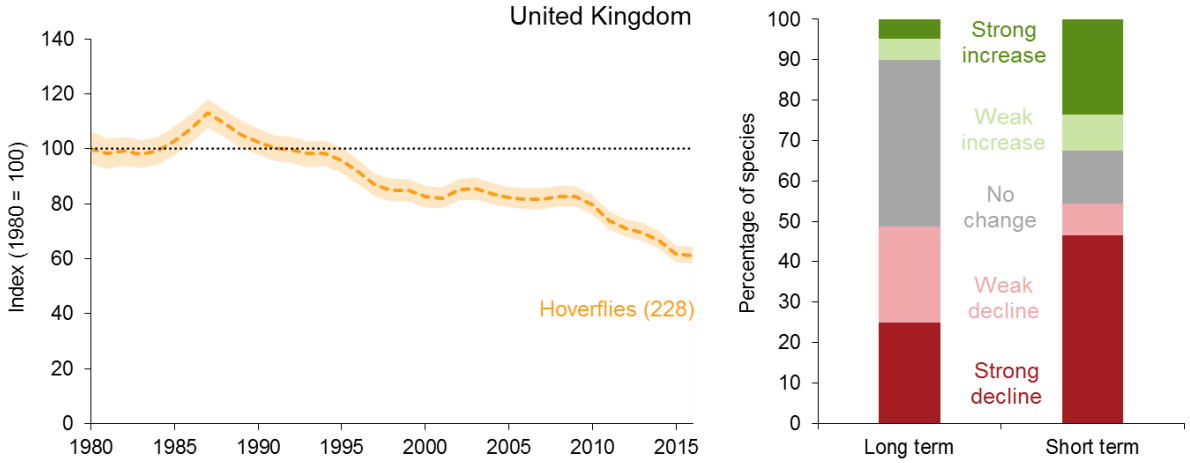
1. The line graph shows the unsmoothed composite indicator trend with variation around the line (shaded) within which we can be 90% confident that the true value lies (credible interval).
2. The figure in brackets shows the number of species included in the index.
3. The bar chart shows the percentage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

Source: Bees, Wasps & Ants Recording Society; Biological Records Centre (supported by Centre for Ecology & Hydrology and Joint Nature Conservation Committee).

There was a noticeable decline in the bee index from 2007 to 2014. Loss of foraging habitat is understood to be a major driver of change in bee distribution (Vanbergen *et al*., 2014) and pesticide use has been shown to have an effect on bee behaviour and survival (Stanley *et al*., 2015). Weather effects, particularly wet periods in the spring and summer, are also likely to have had an impact. Further research would help to better understand the relative importance of these potential drivers of change.

In contrast to bees, the hoverfly index (Figure D1ciii) shows a gradual decline between 1987 and 2000. In 2000, the composite index was approximately 82% of the value in 1980. The trend was then relatively stable up to 2009, before declining again, ending 39% lower than the value in 1980. A greater proportion of hoverflies have declined than increased in occupancy over both the long and short term (1980 to 2016: 49% decreased and 10% increased; 2011 to 2016: 54% decreased and 32% increased). It is not clear why hoverflies show a different trend to bees, although differences in the life cycle will mean they respond differently to weather events and habitat change.

Figure D1ciii. Change in the distribution of hoverfly species in the UK, 1980 to 2016.



Notes:

1. The line graph shows the unsmoothed composite indicator trend with variation around the line (shaded) within which we can be 90% confident that the true value lies (credible interval).
2. The figure in brackets shows the number of species in the index.
3. The bar chart shows the percentage of species within the indicator that have increased, decreased or shown no change in occupancy, based on set thresholds of change.
4. This indicator is not directly comparable with the previous publication because 14 additional species of hoverfly have been included across the entire time series, increasing the total number from 214 to 228.

Source: Biological Records Centre (supported by Centre for Ecology & Hydrology and Joint Nature Conservation Committee), Hoverfly Recording Scheme.

Relevance

Nature is essential for human health and well-being. Pollination is an important ecosystem service that benefits agricultural and horticultural production, and is essential for sustaining wild flowers. Bees and hoverflies are also popular insects and people enjoy seeing them in towns, cities and the wider countryside. Insect pollination depends on the abundance, distribution and diversity of pollinators. Knowledge of the population dynamics and distribution of those species that provide the service, the pollinators, helps us assess the risk to these values. Many wild bees and other insect pollinators have become less widespread,

particularly those species associated with semi-natural habitats. At the same time, a smaller number of pollinating insects have become more widespread. This may have implications for the pollination service they provide to crops and wild flowers and is an area of active research (Potts *et al*., 2010; Garratt *et al*., 2014).

Background

Occupancy of pollinators refers to the overall area where each species is found and does not refer directly to their abundance. The reduction in the index shows that overall pollinators are becoming more restricted in their distributions so that on average, in any one place the diversity of pollinator species found is reduced.

The indicator is the average trend across all 365 species included in the analysis. Individual species within the indicator will have different time-series trends (i.e. some may be increasing while others may show strong declines). The shaded region on Figures D1ci, D1cii and D1ciii is the 90% credible interval of the annual occupancy estimates and represents the statistical uncertainty surrounding the annual occupancy estimates. Credible intervals are similar to the confidence intervals used in parametric statistics, but are the appropriate metric to use with Bayesian statistics. Estimates will be revised as new data become available.

The Bayesian occupancy approach is an established analytical method that enables an estimation of species occurrence even though the data utilised in this indicator were collected without a standardised survey design (van Strien *et al.*, 2013; Isaac *et al.*, 2014). For each species, records were extracted at the 1km grid cell scale with day precision, 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 1980 was set to 100. The annual index (the pollinator occupancy indicator) 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 and the Bayesian technical report for further detail on the production of this indicator.

As species become more or less widespread, individual grid squares will have richer (more species) or poorer (fewer species) pollinator communities; pollination services are generally likely to be higher where the pollinator community is richer (Vanbergen *et al.*, 2013). The area occupied does not necessarily relate to pollinator abundance, as a species with one individual in each of 10 grid squares would receive the same occupancy score as a species with 100 individuals in each of the same grid squares, although generally, species with greater occupancy are likely to be more abundant. National level data on changes in abundance of pollinators is not currently available.

The short-term trends tend to have fewer species falling into the ‘stable’ category than the long-term trends. This is likely to be a result of the high level of short-term variation in invertebrate populations. The species-specific trends were calculated as the mean percentage change in occupancy per year, therefore across a 36-year period, the influence of short-term variation on the trend is reduced compared to its influence on a shorter 5-year period.

Goals and targets

Aichi Targets for which this is a primary indicator

Strategic Goal D. Enhance the benefits to all from biodiversity and ecosystems.

Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Aichi Targets for which this is a relevant indicator

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

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Strategic Goal D. Enhance the benefits to all from biodiversity and ecosystems.

Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Web links for further information

Reference	Title	Website
Bees, Wasps & Ants Recording Society	BWARS homepage	http://www.bwars.com/
Centre for Ecology & Hydrology	Biological Records Centre homepage	http://www.brc.ac.uk/
Defra	The National Pollinator Strategy: for bees and other pollinators in England	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370199/pb14221-national-pollinator-strategy.pdf (PDF, 3.37MB)
Hoverfly Recording Scheme	HRS homepage	http://hoverfly.org.uk/portal.php

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Isaac, N. J. B., van Strien, A. J., August, T. A., de Zeeuw, M. P. and Roy, D. B. (2014). Statistics for citizen science: extracting signals of change from noisy ecological data. *Methods in Ecology and Evolution*, **5**, 1052–1060.

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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**, 1450–1458.

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Full details of this indicator, including a datasheet and technical documentation are available at: jncc.gov.uk/ukbi-D1c

Last updated: September 2019

Latest data: 2016