Bumblebee Conservation Trust

BeeWalk
10 Year Report

Dr Richard Comont & Helen Dickinson

BeeWalk 10-Year Report

10 years?

This may in some ways seem an odd time to release a 10-year report – after all, BeeWalk began 14 years ago, in 2008! But any project takes time to establish, and for BeeWalk, 2008 and 2009 were scoping years, seeing what was feasible and establishing the recording protocol. In 2010 the scheme was opened to Trust members, and then in 2011 to the general public, as a national citizen science project. It is the last of these which we mark here.

About BeeWalk

BeeWalk is the standardised bumblebee-monitoring scheme active across Great Britain, running since 2008 (opened to the public from 2011). Volunteer BeeWalkers survey a fixed-route transect once a month between March and October (inclusive), recording the abundance of each bumblebee species seen. This data is submitted via the BeeWalk website (hosted by the Biological Records Centre), enabling population trend analysis to be undertaken. The outputs of BeeWalk are now widely used to inform policy and conservation interventions.

The BeeWalk team

BeeWalk is run by Dr Richard Comont (Science Manager) and Helen Dickinson (Surveys Officer) of the Bumblebee Conservation Trust.

Contact us

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Acknowledgements

We would like to thank the financial and in-kind contributions to the BeeWalk scheme by the many organisations, charitable trusts and individuals who have over the years supported the BeeWalk scheme in particular, and the Bumblebee Conservation Trust in general. Thanks to the Biological Records Centre who have provided website support and data storage free of charge.

We would also like to thank the photographers who have allowed their images to be used as part of this BeeWalk Annual Report.

Online resources

Detailed information on the scheme, its methods and a variety of support resources are available on the BeeWalk website www.beewalk.org.uk

Citation

Comont, R. F., & Dickinson, H. (2022).
BeeWalk 10-Year Report. Bumblebee Conservation Trust, Stirling, UK.

This report can be downloaded from www.bumblebeeconservation.org

Further information on the scheme can be found on the BeeWalk website, www.beewalk.org.uk.

Cover photo: *B. pascuorum* © Allan Watson

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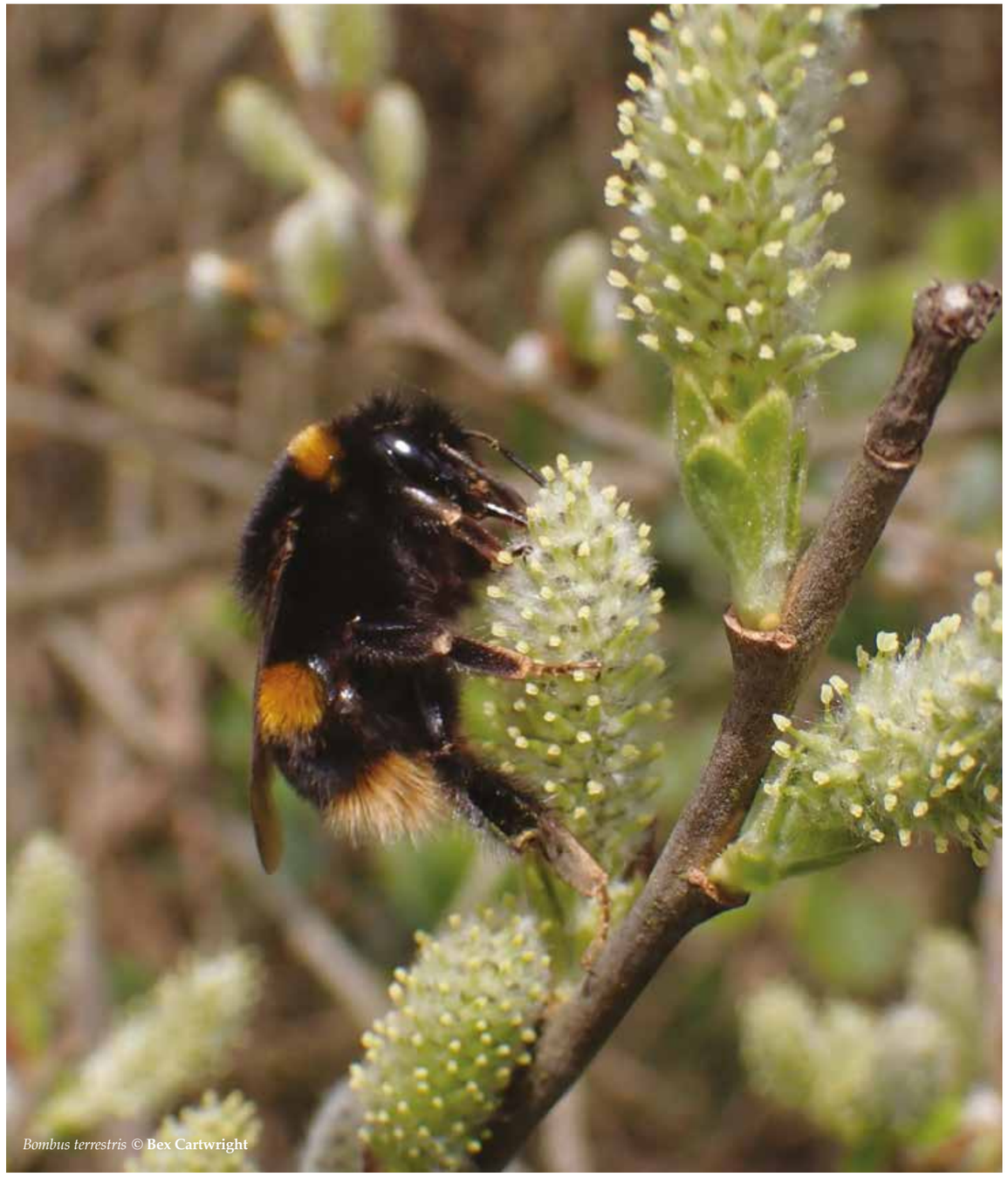
Thank you!

We are indebted to the volunteer BeeWalkers, BeeWalk Mentors and organisations past and present who have contributed data to the scheme or have helped recruit or train others in connection with it. Thanks, must also go to all the individuals and organisations who allow or even actively promote access to their land for bumblebee recording.

BeeWalk background, aims and methods



Bombus terrestris © **Bex Cartwright**

BeeWalk background and aims

The Bees, Wasps and Ants Recording Society (BWARS) has been collecting data on the distribution of hymenoptera since 1978. Whilst providing understanding of the distribution of bumblebee species across the UK, there was a lack of data on bumblebee abundance. Knowing the size of populations and how these change over time, is key to monitoring population trends, identifying species at risk and acting as an early warning system for declines.

Lack of abundance data, alongside the need to better understand what's happening to all our species, not just the rarest, led to the development of BeeWalk. BeeWalk collects bumblebee data from across Britain* to gain an accurate understanding of current bumblebee populations and distributions.

Key aims:

- **Collect long-term data on bumblebee distribution and abundance.**
- **Analyse data to identify population trends and drivers.**
- **Use the findings to inform policy and conservation interventions, including improved understanding of forage plants & identification of management impacts.**
- **Encourage public understanding of bumblebees.**

*The All-Ireland Bumblebee Monitoring Scheme collects data on Irelands bumblebee populations: https://biodiversityireland.ie/surveys/bumblebee-monitoring-scheme/

BeeWalk survey methods

BeeWalk transects (fixed monitoring routes) are established and monitored by volunteers (BeeWalkers) using standardised methodology to ensure accurate and comparable data is gathered. Transects are around 1-2 km in length, taking in flower rich habitat. Transects are walked a minimum of once a month between March and October (the main bumblebee flight period). BeeWalkers record the abundance of each bumblebee species seen in a 4m x 4m x 2m 'recording box' in order to standardise between habitats and recorders.

Bumblebees are identified to species and caste where possible (recorded as 'unknown bumblebee' or 'unknown caste' where not) and the number of each entering the 'recording box' is recorded. Those confident in plant ID record which flower species bumblebees are visiting. Survey results are submitted via the BeeWalk website.

BeeWalk data analysis

Each year data is downloaded and prepared for analysis, requiring an intensive period of data validation and verification. This is essential to meet the high standards required for monitoring scheme data to be viewed as scientifically robust and reliable. Records of rare/difficult to identify species and species which appear outside know ranges, are queried with the recorder to establish supporting evidence. Data received provide an annual estimation of the abundance of a species. This is a relative measure which requires statistical interpretation to evaluate changes over time.

Estimates of population trends are calculated using statistical modelling. A list is generated of sites each species has ever been recorded on within BeeWalk. This is used to establish the sites each species could be expected to occur at, and from this we calculate the distance walked each month across those sites. Bumblebee counts submitted by BeeWalkers are added up to produce total counts of each caste of each species, for each month surveyed. These monthly counts are analysed using statistical modelling to work out the monthly counts as a rate; bees seen per kilometre walked. This allows for the fact that the distances walked per month varies between months, years, and species.

We can use the results to demonstrate the abundance of each species in a given year against the 2010-21 mean monthly abundance per kilometre surveyed, in order to see whether a given year was statistically a 'good', 'bad', or 'standard' year for each species.

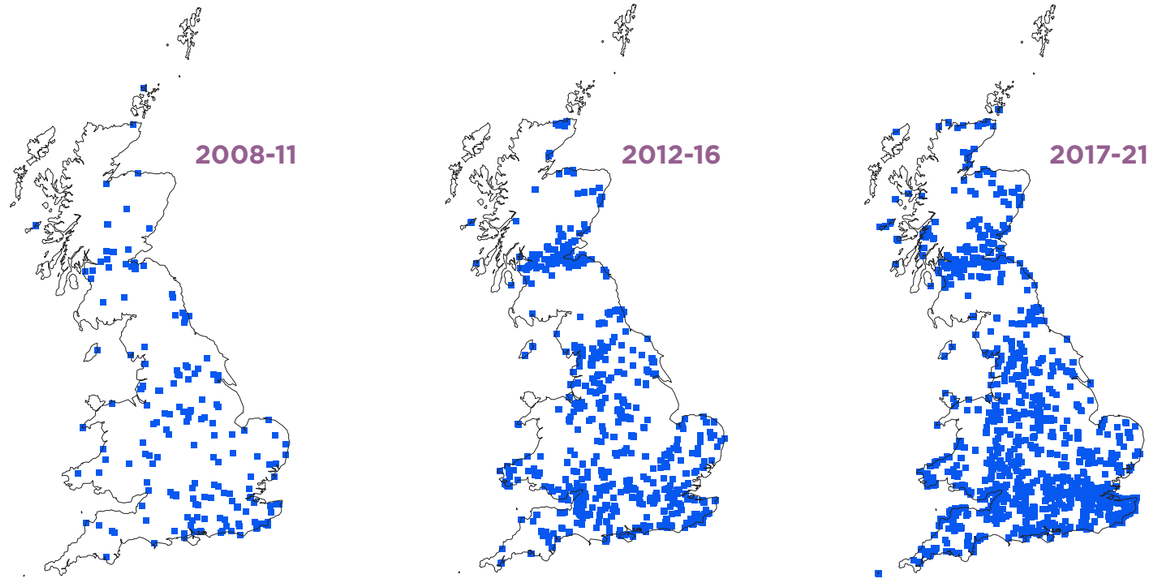
© **Nikki Gammans**

BeeWalk from the beginning

To date **1,813 BeeWalkers** have submitted over **200,000 records** for **1,796 transects** equating to over **900,000** individual **bees.**


© Moira Brookes

Transect Growth



2008/9
- 13 Transects
- 12 BeeWalkers
- 584 Records
- BeeWalk trialled as part of University of Stirling PhD project

2010
- 1,000+ Records received for the first time

2011
- 87 Transects
- 81 BeeWalkers
- 3,209 Records
- BeeWalk launched to the public as a citizen science scheme

2012

2013
- 178 Transects
- 203 BeeWalkers
- 8,604 Records

2014
- BeeWalk website goes live
- 10,000+ Records received for the first time

2015
- 309 Transects
- 271 BeeWalkers
- 15,318 Records
- 50,000 Individual bees recorded

2016
- 20,000+ Records received for the first time

2017
- 471 Transects
- 424 BeeWalkers
- 26,065 Records
- BeeWalk Mentors start officially supporting BeeWalkers locally

2018

2019
- 633 Transects
- 560 BeeWalkers
- 33,550 Records
- 100,000 Individual bees recorded

2020
- Covid-19 restrictions limit BeeWalkers activity

2021
- 775 Transects
- 644 BeeWalkers
- 36,607 Records

BeeWalkers

© Louise Gorrigan

Without our huge team of volunteer BeeWalkers, the recording scheme could not exist. We are incredibly fortunate to have had over 1,800 BeeWalkers contribute records to the scheme since its inception, and our current active team of BeeWalkers (644 submitted data during 2021) continue to provide us with valuable data.

Our BeeWalkers range from those completely new to biological recording, to experienced ecologists. Anyone with some basic identification skills (which are often gained form Trust training workshops) and a few hours to spare each month, can become a BeeWalker and actively contribute to bumblebee conservation. The option to submit records as unknown (indeterminate) bumblebee and unknown caste, allow novice recorders who may only be confident identifying a few common species, to be actively involved and grow their skills as they survey.

BeeWalkers are not only making a valuable contribution to conservation of bumblebees, but they are benefitting from regular sustained access to outdoor spaces, which has its own increasingly acknowledged well-being benefits.

Training and support

On average, the project itself leads 20 to 30 bumblebee ID and surveying training days each year; at basic, intermediate and advanced levels. A further 20 plus equivalent training days are carried out across the Trust via our additional projects. As a result of the Covid-19 pandemic, there has been a move to delivering online training and we now deliver a hybrid mix of online and in person sessions.

Across the core BeeWalk project and the Skills for Bees projects, in a single year over 1,000 people have attended training (online or in person) and targeted survey days across Britain.

BeeWalkers are supported year-round at a national level via a dedicated Trust staff member (Surveys Officer) who is available via phone and email three days a week, to answer queries and provide guidance and support.

BeeWalker Mentors

We are lucky to have experienced BeeWalk volunteers in several locations across Britain, providing local support for those new to the recording scheme. Our BeeWalk Mentors give up their time to provide advice and support in the early stages of a BeeWalkers journey.

Mentors offer a range of help including assisting in identifying suitable transect routes, supporting the online set up of transects, providing guidance on the survey method in the field and assisting with basic ID skills. This has been incredibly helpful in providing some new BeeWalkers with the in-person support and confidence boost they needed to get going, and to stick with BeeWalk.

197,730
kilometres walked by BeeWalkers in the last 10 years

24
of our current active BeeWalkers have been recording for 10 years

276
transects surveyed by BeeWalkers for over 5 years

© Nikki Gammans

BeeWalker Spotlight

BeeWalker Jess, Perth

How long have you been walking your transect? *I started learning how to ID Bumblebees in May 2021 and started walking the transect at Denmarkfield at the start of June 2021. Surveyed for the rest of the season and in 2022 did a full summer survey season.*

What type of habitat does your transect cover? *Mostly rewilded areas of land that used to be used for farming, that mostly dominated by docks, rosebay willowherb and small willowherb. With some patches of wildflower, white clover and buttercups.*

What made you want to become a BeeWalker? *To help the rewilding project monitor bumblebee population numbers and I thought the data I collected would also be useful to BeeWalk*

What do you enjoy most about being involved with BeeWalk? *Learning about all the different bumblebees, before I started, I knew nothing about bee ID and it's been fascinating learning about all the different species.*

What advice would you give to a potential new BeeWalker? *It may seem challenging to ID bees at first, but it does get easier the more you do it. Also just enjoy being outdoors and in the nature around you.*

BeeWalkers Tim & Karen, Cardiff

How long have you been walking your transect?
Karen and I met on a fantastic BBCT bee identification training course lead by Sinead Lynch in June 2016. Sinead gave us confidence to set up our walk and we have been recording the bees and the flowers they visit ever since.

What type of habitat does your transect cover?
Amenity and unimproved grassland, a river bank, scrub, plantations, two 'wild flower' patches and bramble patches. We have recorded 2940 bees of nine species visiting 72 plants. Bramble are the most important for numbers and diversity of bees followed by – shock horror - Himalayan balsam as the next most visited plant.

What made you want to become a BeeWalker?
Seeing Sandra Ronca's use of our plant DNA barcode database for her PhD to show the range of pollen collected by bumblebees in Wales, and realising I knew nothing about the bees but ought to.

What do enjoy most about being involved with BeeWalk?
Sharing the walk with Karen, the continual learning and seeing how the bees, walks and flowers change from year to year.

What advice would you give to a potential new BeeWalker?
Do some trials first before fixing on your route and join others to keep your identification skills sharp.

BeeWalker Sarah, London

How long have you been walking your transect? *Since 2017.*

What type of habitat does your transect cover? *Inner City +90% impervious surfaces with pocket parks.*

What made you want to become a BeeWalker? *Curiosity about which species can survive in this hostile habitat and to identify which plants are best for bees. Inspired me to do an MSc in Ecology and do a study on bumblebees and honey bees in this urban environment.*

What do enjoy most about being involved with BeeWalk? *Walking with other volunteers and raising awareness of wild bees in the City.*

What advice would you give to a new BeeWalker? *Get started as soon as possible and learn on the job!*


© Miranda Shephard

BeeWalker Mentor Spotlight

BeeWalk Mentor John, Somerset

How long have you been walking your transect? *I set up my first BeeWalk transect in 2013 at Lytes Cary Manor (a National Trust property in Somerset), added a second transect in 2014 and a third in 2015. I have been on the Mentor's list since 2019 but have been mentoring new BeeWalkers from 2016.*

What made you want to become a Mentor? *Mentoring developed out of my role as Somerset Local Volunteers Co-ordinator as requests for help from potential BeeWalkers in Somerset found their way to me.*

How have you helped local BeeWalkers as a Mentor? *The input and assistance required by potential new BeeWalkers has varied considerably between individuals and groups. Sometimes several site visits have been necessary, almost always guidance is requested for the transect routeing, and on occasions ID help is required.*

What do you enjoy most about being involved with BeeWalk? *As a Mentor I have visited tucked away corners of Somerset I would not otherwise have seen; As a BeeWalker witnessing the quiet regularity of the changing seasons whilst noting how different a transect can be in consecutive years. There is also the element of surprise when, for example, an unexpected bee species is recorded.*

What advice would you give to a potential new BeeWalker? *Don't be overwhelmed by all the detail in the 26 page full guidance document. Read the quick start guide, then get out there and record some bumblebees, possibly with assistance from a Mentor if there is one in your area. Refer back to the full guidance document as necessary during your first year to build up knowledge and recording skills.*

BeeWalk Mentor Louise, Cardiff

How long have you been walking your transect? *I have been BeeWalking since 2014 - for 8 years and a Mentor since 2017*

What made you want to become a Mentor? *I was asked by a Trust staff member Sinead Lynch if I would be interested in becoming a Mentor. I really enjoy training people and I love bumblebees, so I was more than happy to be involved.*

How have you helped local BeeWalkers as a Mentor? *I have visited potential BeeWalk routes when new/potential BeeWalkers feel they need a little guidance with setting up their transect.*

New BeeWalkers often e-mail photographs of bumblebees they have found tricky to ID. If I am not 100% certain of the ID, I know I have a fabulous network of staff at the Trust who are always helpful. *I usually send out an open invite out for individuals to join me on my own BeeWalk where they can practise their catching, potting and ID skills. It's also a great opportunity to find out if there is anything else individuals need to know about BeeWalk.*

What do you enjoy most about being involved with BeeWalk? *It is a great excuse as an adult to go and play in the park! I love the fact that the little bit of data I gather each month becomes part of something much bigger and is ultimately important to science and the conservation of our bumblebees.*

What advice would you give to a potential new BeeWalker? *Make the most of the fabulous resources the Trust has. There is a selection of great videos available on YouTube, and if you are able to make it to any training sessions in the field, even better. Consider in the height of summer when you are seeing large numbers of bumblebees, your BeeWalk will take longer than it does early in the season when there are just a few queens around. It's easy to be over ambitious when deciding the length of your transect. You can set up your new BeeWalk at any time of the year, but spring is a great time for beginners. At any time it is fine to say you don't know and simply log the species as 'bumblebee' or the caste as unknown, it will still become a valuable record.*

Spotlight on a BeeWalk Mentor Lina-Elvira, Aberdeenshire

How long have you been walking your transect? *Since 2013 and I have been a mentor since 2017*

What made you want to become a Mentor? *I really valued the support I received early on from the Trust, and therefore wanted to give back! When the scheme was brought in, I saw that there was perhaps a geographical disjoint and that I was in a bit of a 'black spot' for Mentors, so I decided to give it a go.*

How have you helped local BeeWalkers as a Mentor? *I have co-hosted bumblebee identification workshops a couple of times with BBCT staff. I have also taken individuals out when I've done my own BeeWalk to show them how it works in practice, and also sneak in some tips of identifying different bees. Many times it's also been to be a supporting figure when they go to set up their transects online, as for some, the digital world can be a bit overwhelming.*

What do you enjoy most about being involved with BeeWalk? *Seeing the trends in the numbers at my own site year after year, and how multiple factors such as weather and land management can affect abundance and diversity.*

What advice would you give to a potential new BeeWalker? *Dare to randomly reach out to people including local records centres and local authority Rangers service or Biodiversity Officers as well as Mentors - there is more passion and knowledge close to you than you realise! If you are unsure about identification, classifying a specific area on your transect, or anything really, there is help out there and there is no such thing as a stupid question!*

Skills for Bees


© Clare Flynn

The need for good quality bumblebee records (via both BeeWalk and ad hoc recording), particularly in under recorded areas, has led to the development of the Skills for Bees projects. Significant parts of Britain have very few bumblebee records and poor coverage in terms of BeeWalk transects and many of these areas potentially hold populations of rare and scarce bumblebees.

The main BeeWalk training approach to date, has been at the national level. The move to more online sessions has allowed us to reach more potential BeeWalkers, but a different approach to training has been required for those areas with low human populations and few bumblebee records.

Skills for Bees' projects focus on targeted training sessions in areas of importance for increasing bumblebee records. Training includes follow up and continued support over the life of the project, it is hoped this approach will increase the likelihood of retaining recorders and BeeWalk transects in those areas.

The key Aims encompass five strands:

- Raising awareness of bumblebees and the need for recording
- Building partnerships with key organisations, groups and individuals
- Training and transferring skills, knowledge and confidence to a wider group of people.
- Data – improving distribution and abundance data for bumblebees
- Mentoring volunteers to maintain action for bumblebees beyond the end of the project.

We hope to use these projects as a way to establish the effectiveness of this training and support approach, with the hope to expand the coverage of Skills for Bees projects in the future. We have come to end of the second field season in Wales and the first field season in Scotland, and both projects are already increasing our knowledge of bumblebees in these locations. We hope to provide a legacy of skilled bumblebee recorders who will continue to monitor in these unique areas.

Skills for Bees: Cymru

Skills for Bees Cymru is a three year project (2021-2024). It covers the whole of Wales and is delivered by the Skills for Bees Project Officer, Clare Flynn.

We aim to increase our reach in areas of Wales where there are few or no BeeWalkers or where there are large gaps in data for particular species. For each year of the project we have targeted specific areas in Wales and established networks of people, both individuals, and staff and volunteers within organisations linked to specific sites.

Beginner ID sessions and Introductions to BeeWalk have been delivered through Zoom sessions, which have then been followed up with field days in our designated regions in Wales. In 2021, we were privileged to work with groups in Pembrokeshire, Montgomeryshire, Radnorshire and Conwy. In 2022 we delivered a number of ID training days and Beeblitz survey days in North Wales with extremely enjoyable and productive days at Chirk, Morfa Dyffryn, Coed-y-Morfa, Rhinog, Errdig and Bodnant to name but a few. We also enjoyed working with volunteers at Ynyslas and Cors Fochno in Ceredigion and in the Brecon Beacons National Park.

We are hugely grateful for the enthusiasm and willingness of people to take part in the training and help us organise these sessions. We have built excellent relationships with people in Natural Resources Wales, the Wildlife Trusts, the National Trusts, The National Parks in Wales and also local Authority countryside staff, amongst others. We also ran the All Wales Bilberry Bumblebee hunt, in partnership with the four Local Environmental Record Centres in Wales. Despite its rather flamboyant looks, this beautiful species is still probably under-recorded in Wales and more data is required to further understand it's apparent declines.

Skills for Bees: Cymru – first two years in numbers

We are currently evaluating our 2022 season and making plans for next year based on the numbers opposite and critically on participant feedback. 2023 will be the final season of this project and we hope to focus on Snowdonia, Carmarthenshire and the Vale of Glamorgan with repeat visits to other areas.

Ongoing support for current volunteers is also an essential part of the project and this winter we will be running online refresher sessions and troubleshooting for new or tentative BeeWalkers who may need a helping hand.

731 people attended online training (many repeat visitors)

279 people attended field training days or survey days

33 sites visited across Wales (most previously unvisited)

15 different species records


© Clare Flynn


© Clare Flynn

Skills for Bees: Scotland

This three-year project (2021-2024) focuses on training and mentoring across the Cairngorms National Park, delivered by Project Officer Annie Ives.

By running an extensive program of bumblebee identification and surveying workshops and building a fully-trained and supported network of local bumblebee recorders, we will increase the amount of data we have on all bumblebee species in the area.

Skills for Bees: Scotland will be supporting people living, working and enjoying the National Park to become BeeWalkers as well as promoting ad-hoc recording using iRecord. We are also carrying out targeted work and survey days looking for three scarce and under-recorded species: the Broken-belted bumblebee (*B. soroeensis)*, Blaeberry bumblebee (*B. monticola*) and Moss carder bee (*B. muscorum*) in key areas identified as having the appropriate habitat for these species, but with no recent records.

Our first year of delivery has involved lots of partnership building within the project area. We have had the pleasure of working with and delivering workshops for North East Scotland Biological Records Centre (NESBReC), Glenlivet Estate (Crown Estate Scotland), Glen Tanar Estate, Muir of Dinnet National Nature Reserve (NatureScot), John Muir Trust, Rare Invertebrates in the Cairngorms, Grant Arms Bird & Wildlife Watching Club, Tayside Biodiversity Partnership and Scotland's Rural College (SRUC).

We have also been working closely with the Cairngorms National Park Authority and we are very grateful to them for their enthusiasm and support. This season, we delivered bumblebee identification training for Cairngorms National Park Authority Junior, Voluntary, Seasonal, Trainee and Permanent Rangers across online and in-person events, and we are looking forward to continuing to work with them to set up BeeWalks transects in key locations across the National Park. Training professional organisations, land managers and land owners in the Cairngorms National Park is a priority for Skills for Bees: Scotland, building their knowledge and confidence in identifying bumblebees, and supporting them to record their sightings and engage others in the community through their work.

Skills for Bees: Scotland – first year in numbers

This season, events were mainly delivered on the east and north sides of the Cairngorms, primarily in the counties of Aberdeenshire and Moray. Over the next two years, we look forward to branching out west and south to increase our coverage of the Cairngorms National Park.

© Annie Ives

5 targeted Survey Days covering 8 unique sites, with 30 attendees

8 beginner's ID workshops with 102 attendees

4 intermediate workshops with 65 attendees

3 BeeWalk demonstration / walk-through sessions with 24 attendees

8 other events, including project talks, bumblebee safaris, and volunteer drop-in sessions with a total of 206 attendees

The data

B. terrestris © **Helen Dickinson**

BeeWalk was established with the aims of collecting abundance and distribution data on all Britain's bumblebee species, and using this data as widely as possible. The BeeWalk dataset has grown over the past decade into one of the largest bumblebee datasets in the world. Because it includes abundance as well as distribution, it can be used for estimation of population trends, as well as range change analysis. This lets us see what's happening with bumblebee populations now, or over the past few years, much more clearly than looking at range changes over the same period. This means that BeeWalk can function as an early warning for bumblebee declines, detecting declines in the abundance of populations before the species is lost from large enough areas that declines can be seen in their inhabited range sizes.

It's important to note that the increases and decreases seen in BeeWalk are separate from, and different to, changes in range size. BeeWalk's population trends are calculated as bees seen per kilometre walked, across all the transects which that species has been recorded on. A change in range size will essentially just change the number of transects, rather than altering the abundance measure.

How BeeWalk data is used

The Trust use the dataset to carry out a range of research in-house; such as the trend analysis presented here, but we also share data and collaborate widely with other researchers. We have supplied the data directly to at least 27 students (11 BSc, 10 MSc, 6 PhD) to examine various aspects of bumblebee biology, and it has been used in another four scientific papers as well as every year's BeeWalk Annual Report.

BeeWalk's growing profile means that the reach of the dataset is ever increasing, which is vital for our policy and advocacy work, and a range of organisations now use the monitoring protocol to survey the bees present on their sites. These include the RSPB, a range of county Wildlife Trusts, individual nature reserves, National Trust properties, Sustrans (who monitor 1km stretches of the National Cycle Network as transects), the Open University's Floodplain Meadows Partnership, amongst many others. This data all flows into the central database as well, so it can be used both by the local organisation and as part of the overall BeeWalk dataset.

We want all the data to be used as widely as possible, and so we make the data as widely available as we can. Once it's cleaned, validated and verified, the dataset is added to the online data-sharing platform Figshare (https://doi.org/10.6084/m9.figshare.12280547.v1), where it is available for anyone to use as long as they credit the scheme as the source. Amongst others, the data has been supplied to the Hutton Institute, UK Centre for Ecology & Hydrology, all four Welsh Local Environmental Records Centres, and the Office for National Statistics.

The data are also added to the National Biodiversity Network (NBN) Atlas and the Global Biodiversity Information Facility (GBIF), where they are displayed alongside similar data from other sources. Through these sites, the BeeWalk data has been downloaded more than 643 million times and cited in 46 scientific papers.

© Tilly Hopkins

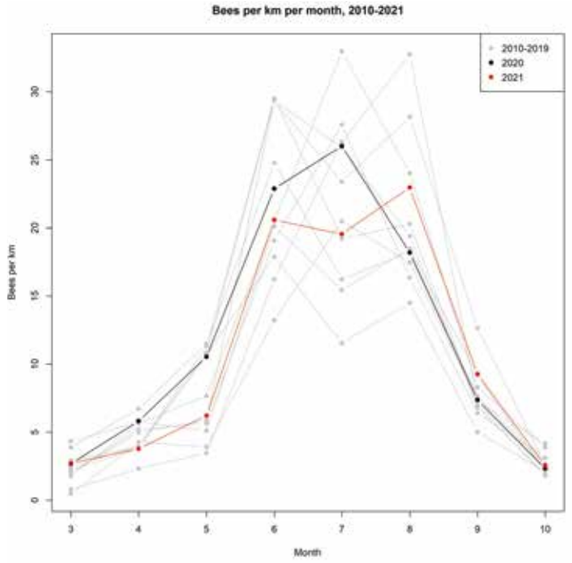
2021 Overview

Climatically, 2021 was an average year according to the Met Office, but this hides some considerable variation. The spring got off to an early start, with temperatures in late March topping 20°C in many places, but April although sunny, had more days of air frost than any April for 60 years.

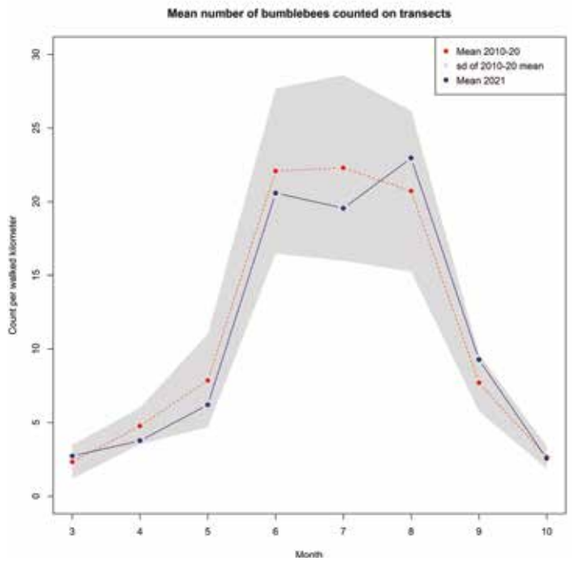
With May colder than average as well as exceptionally wet, bumblebees in many cases emerged early but then struggled to get going as the poor weather took hold. Spring specialists were generally pushed later: the Early bumblebee (*B. pratorum*) was recorded in below-average numbers on transects throughout March, April and May, but were more numerous than expected in June before dropping back to the average.

The overall effect of this on the populations appears to have been minimal; 2021 was a middling year for Early bumblebee (*B. pratorum*) numbers overall, for example.

© Richard Comont



The mean number of bumblebees per kilometre recorded per month (March-October) for each year the BeeWalk survey has been in operation.

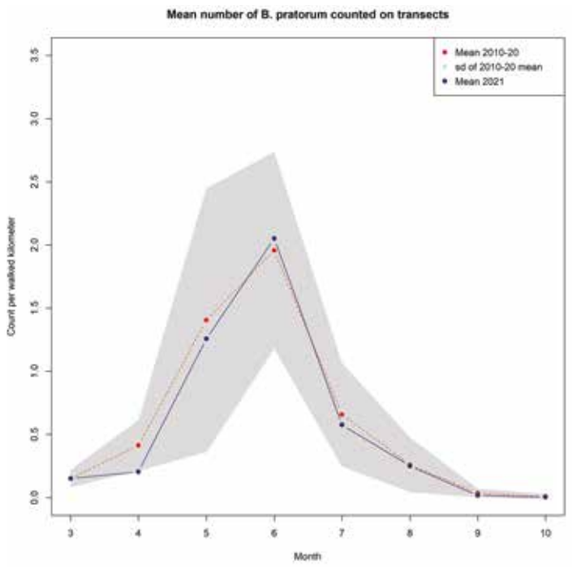


The mean number of bumblebees per kilometre recorded per month (March-October). Results for 2021 (blue line) are plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average – where the blue (2021) line is outside this grey area the count is significantly different to what would be expected.

This is mostly because the summer weather was bumblebee-friendly, warm with a bit of rain, and so colonies could recover from the poor spring.

Total bumblebee numbers across the transect network were above-average in August after four months of below-average sightings. High autumn temperatures (it was the third-warmest autumn on record) also helped extend the season, and later species tended to do well, with the Common carder bee (*B. pascuorum*) reaching above-average numbers in August, September and October (and in fact having its second-best September figures since BeeWalk began).

B. pratorum © **Helen Dickinson**

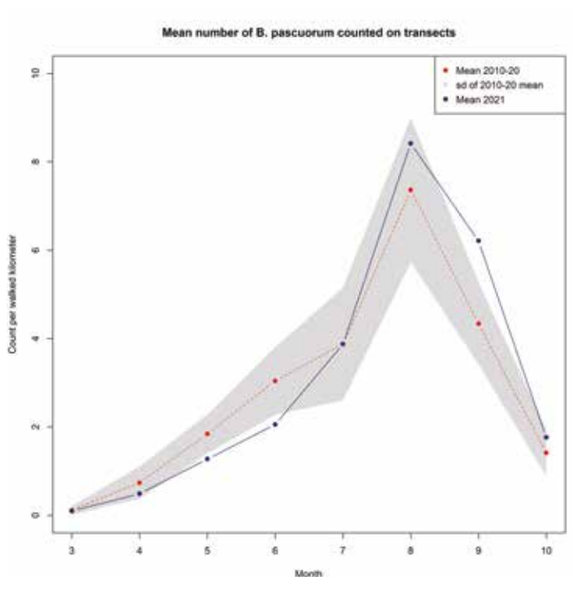


The mean number of Early bumblebee *B. pratorum* per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation).

B. pascuorum © **Bex Cartwright**

One striking feature of the late warmth was a lot of late-season activity for the Tree bumblebee (*B. hypnorum*).

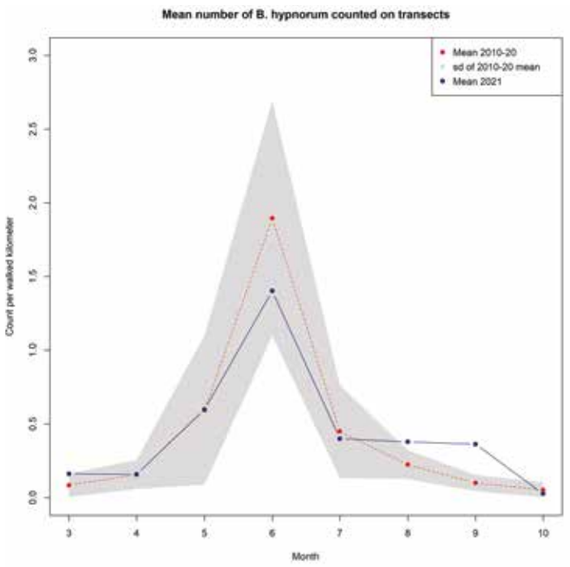
This is usually something of an early species, with numbers peaking in May and June before dropping rapidly in July and subsiding gradually after that. However, in 2021, it got off to a slow start (a below-average May and the lowest June numbers on record), but sightings continued at July's levels into August and September (both months had their highest Tree bumblebee (*B. hypnorum*) numbers on record) before numbers dropped off rapidly in October.



The mean number of Common Carder *B. pascuorum* per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation).

The species is thought to have a partial second generation each summer, and it is likely that, in 2021, this was pushed later than normal as a result of the slow build-up of the first generation and the favourable early-autumn weather. It is intriguing to speculate about the possibility of a partial third generation for the species, but this – if it does happen – is more likely to occur in a year with both a warm spring and a mild autumn, to increase the overall season length.

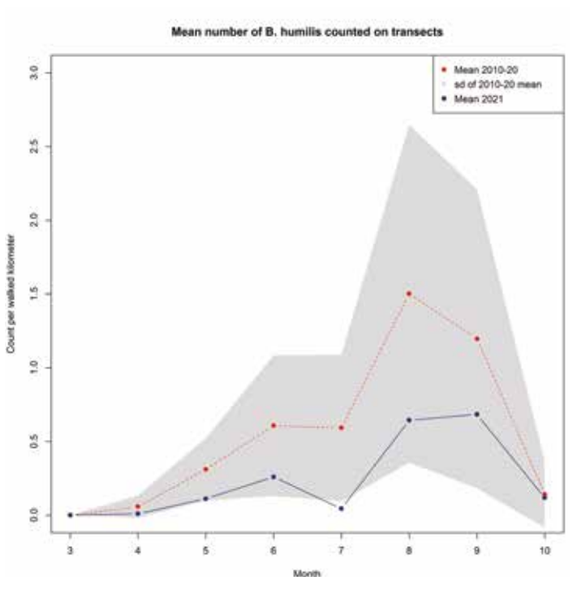
B. hypnorum © **Kirsten Patterson**



The mean number of Tree bumblebee *B. hypnorum* per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation).

The poor spring did seem to have longer-term consequences for some of our rarer species, however. Both the Brown-banded (*B. humilis*) and Shrill carder (*B. sylvarum*) bumblebees tend to do better in hotter years and so might be expected to have thrived in a summer which saw the first ever official Amber Heat Warning

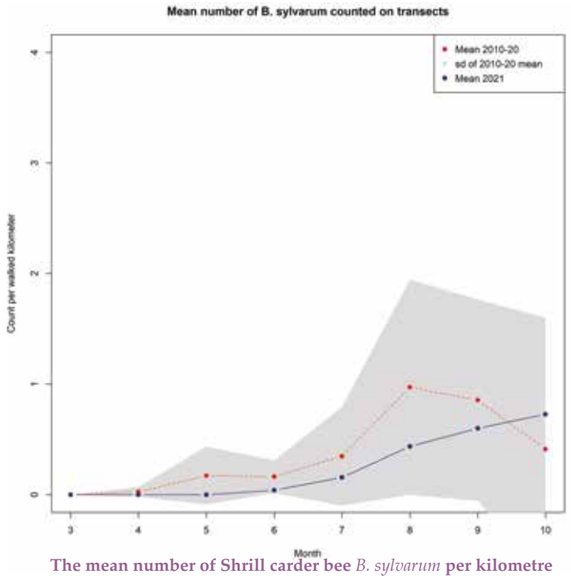
B. humilis © **Dave Clarke**



The mean number of Brown-banded carder bee *B. humilis* per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation).

This is likely to be because of difficult conditions for queens to found nests and establish colonies, and possibly from increased competition as numbers of all species increased together in June.

B. sylvarum © Bex Cartwright

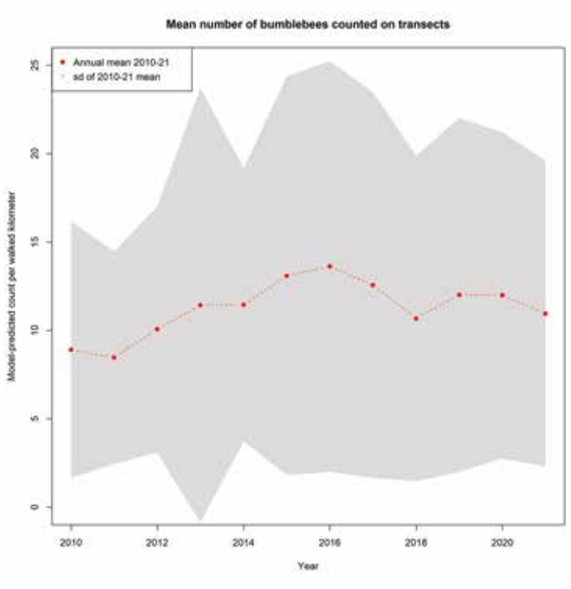


The mean number of Shrill carder bee *B. sylvarum* per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation).

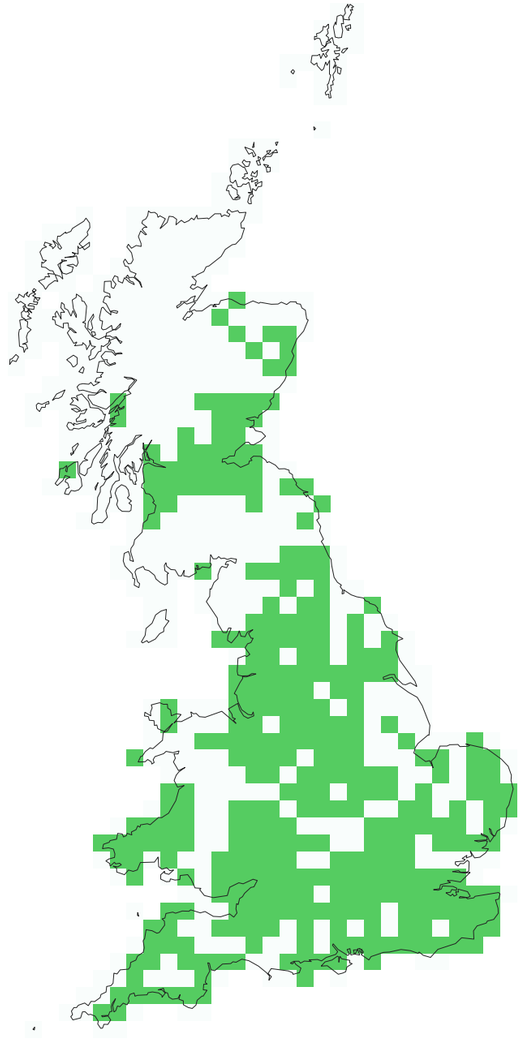
Long term trends 2010-2021

[illegible] average number of bumblebees recorded per kilometre of transect walked) increased year-on-year from 2011 to 2016, with mixed fortunes 2017-21 including a sharp drop in 2018, probably because of the summer heatwave [illegible] hindered colony establishment.

There are just two species which show noticeable increases in abundance over the course of the BeeWalk dataset. The most obvious year-by-year increase is shown by the Tree bumblebee (*B. hypnorum*).



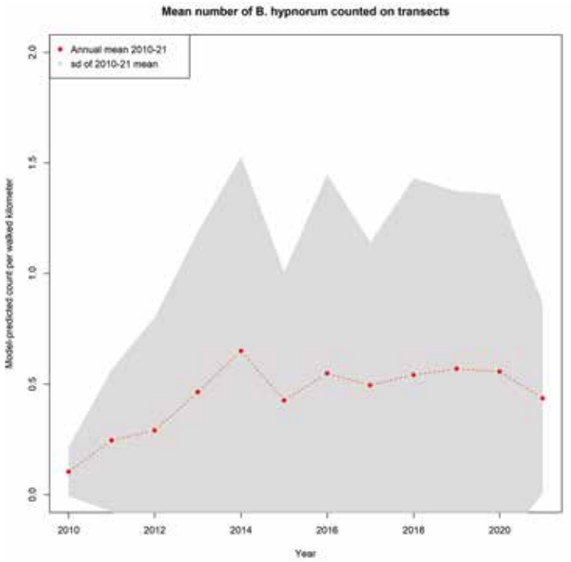
The abundance trend of all bumblebees recorded on BeeWalk transects between 2010 and 2021, including individuals not identified to caste or to species. This is shown as the mean number of bumblebees counted per kilometre walked each year (red line). The grey cloud is a measure of the annual variation around this average (standard deviation)



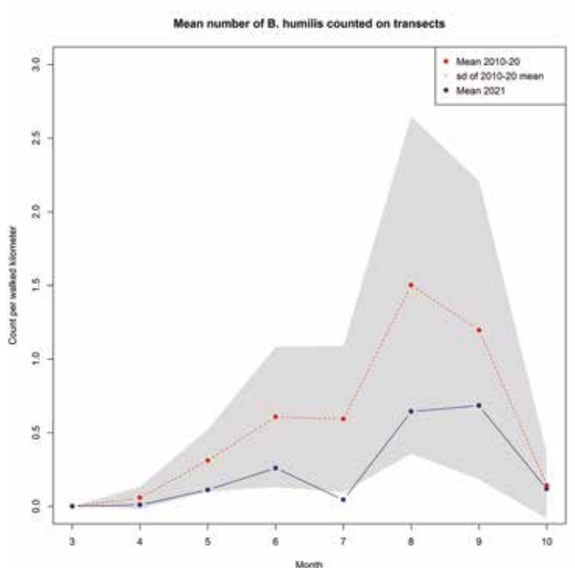
Tree bumblebee *B. hypnorum* distribution on BeeWalk transects

In some ways this isn't surprising – after arriving in 2001, the species has spread rapidly across the country – but it is interesting to see that numbers recorded on transects continue to rise, alongside this range expansion. It's likely that the increase is linked to the continuing range expansion – for example, as the species moves northwards, it reaches transects where it had not previously been recorded, initially in low numbers but increasing in abundance as the species becomes established in the new area.

However, this is not the case for the other species which shows a noticeable increase – the Shrill carder bee (*B. sylvarum*).



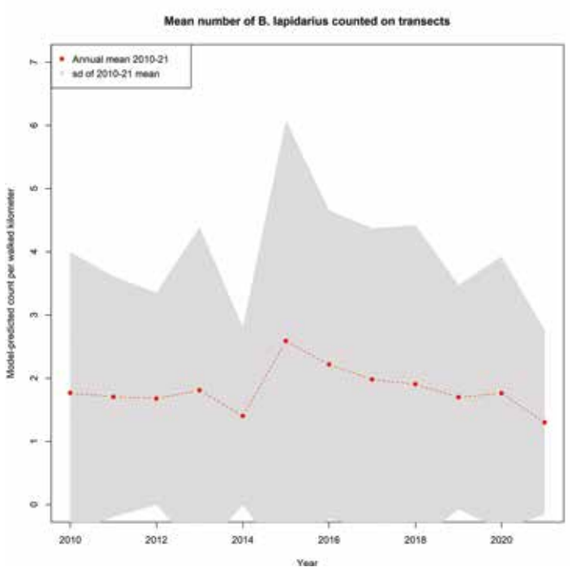
Abundance trends for Tree bumblebee *B. hypnorum*, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).



Abundance trends for Shrill carder bumblebee *B. sylvarum* 2010-21, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).

Shrill carder bee *B. sylvarum* distribution on BeeWalk transects

This is a species which has shown a considerable decrease in its occupied range during the 20th and early 21st centuries, and is now one of Britain's most endangered bumblebee species with just five remaining populations in the country. It's great news, therefore, to see the species increasing considerably between 2012 and 2020, with 7 year-to-year increases from a possible 8 over that period. However, there are caveats to this success: BeeWalk currently mostly monitors the two English populations, with few transects covering the three Welsh populations (something that Skills for Bees: Cymru is seeking to change), so the BeeWalk picture isn't the full situation.



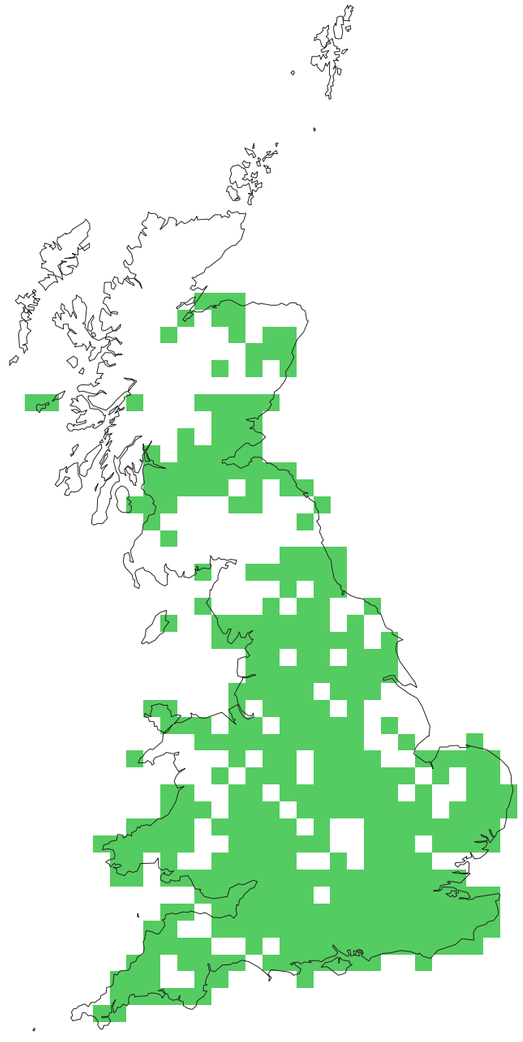
Abundance trends for the Red-tailed bumblebee *B. lapidarius* 2010-21, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).

More worryingly, the fragility of such gains is demonstrated by how the species fared in 2021: a major drop in abundance, to the lowest average numbers since 2016. It's not yet clear what has driven such a sharp decline, though weather conditions are likely to have played a role.

At the Great Britain* level most species populations have remained broadly stable. Most, if not all, show fluctuations – sometimes considerable – between years and areas, but the overall picture for the majority of species is of no significant change. Of course, set against a background of ongoing declines, that's no bad thing.

A handful of species have shown a decline in abundance over the BeeWalk survey period. The most striking of these is one of the Big 8 widespread and abundant species, the Red-tailed bumblebee (*B. lapidarius*).

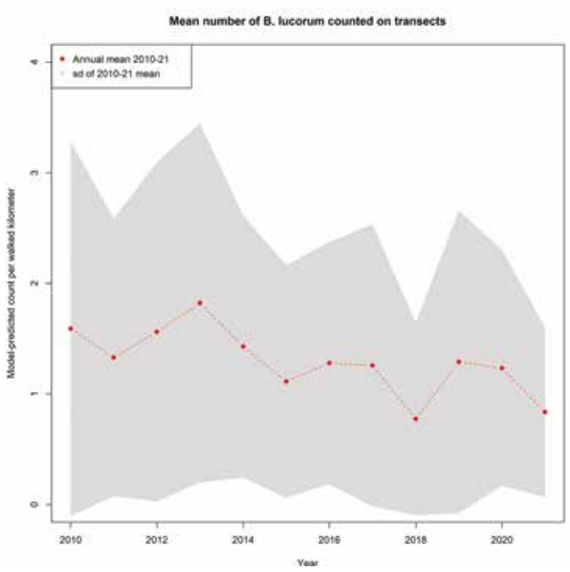
*** The All-Ireland Bumblebee Monitoring Scheme https://biodiversityireland.ie/surveys/bumblebee-monitoring-scheme/ collects data on Irelands bumblebee populations.**



Red-tailed Bumblebee *B. lapidarius* distribution on BeeWalk transects

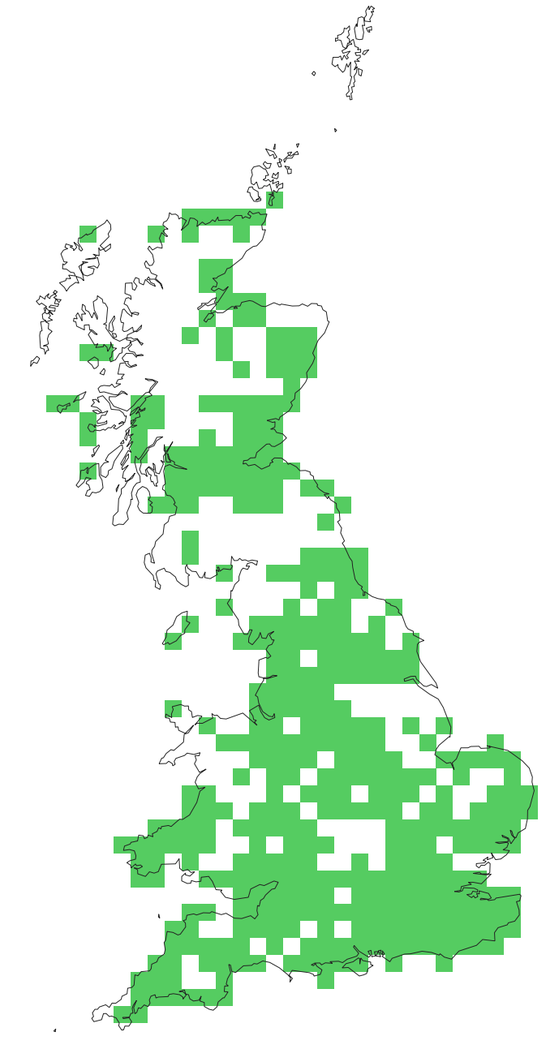
Although the species' trend over the full period is not strongly downwards, it has shown a year-on-year decrease in five of the six years since 2016.

Another member of the Big 8, the White-tailed bumblebee, also shows a broad downwards trend, but in this case, things are complicated by the fact that, for recording, three species (*B. lucorum, B. magnus, & B. cryptarum*) are lumped together as they are functionally indistinguishable in the field.



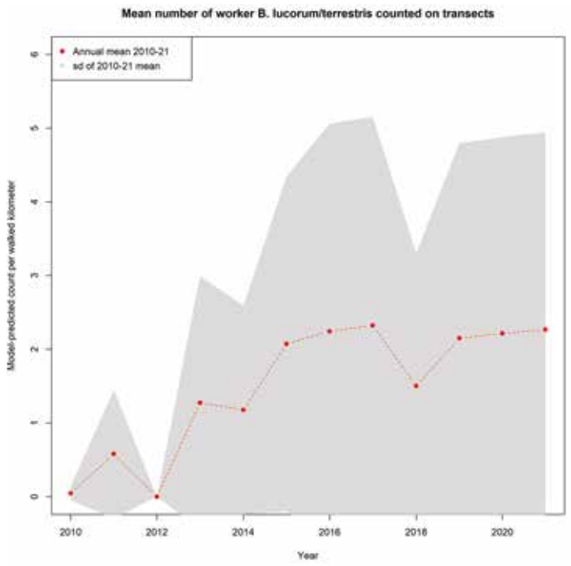
Abundance trends for the White-tailed bumblebee *B. lucorum* 2010-21, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).

B. lapidarius © **Clare Flynn**



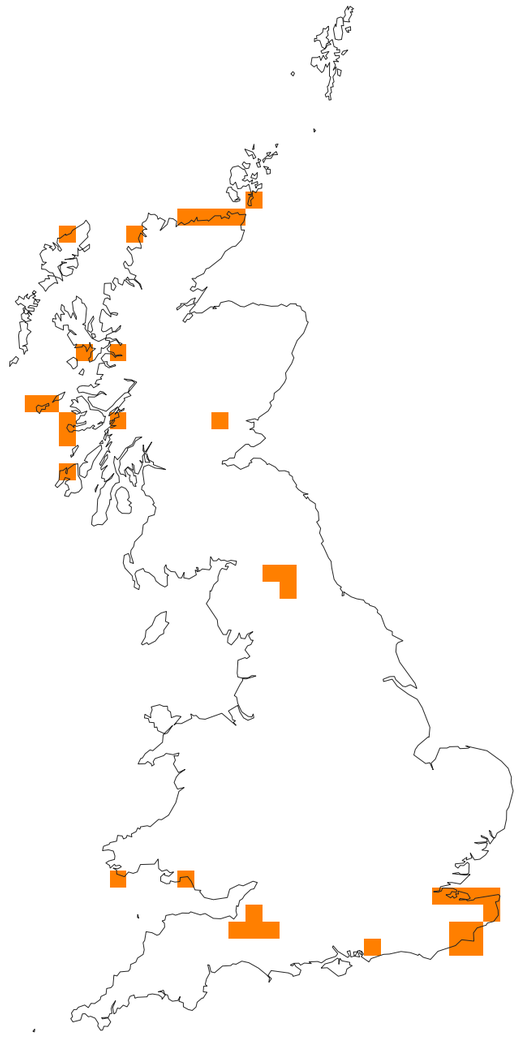
White-tailed Bumblebee *B. lucorum* **agg. distribution on BeeWalk transects**

Differing trends across the three species could easily confuse the overall trend. A further mitigating factor here is that the workers are often indistinguishable from workers of the Buff-tailed bumblebee, so workers of all four species are combined as White/Buff-tailed bumblebee workers – and this recording aggregate is broadly increasing in abundance.



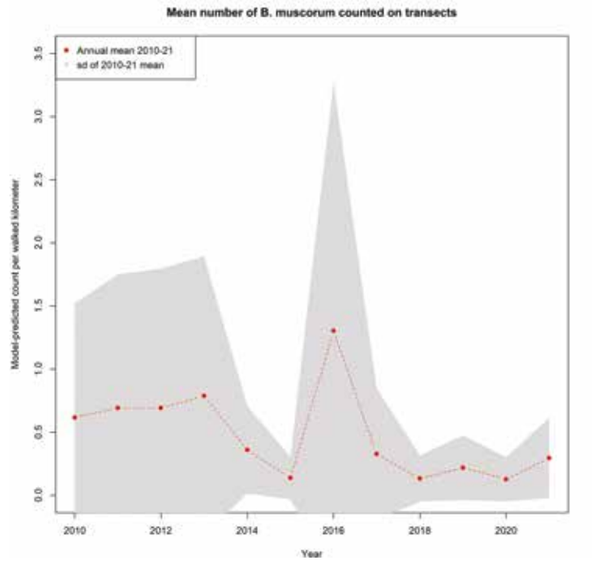
Bombus lucorum & B. terrestris **often cannot be reliably split as workers, so records submitted as '***B. lucorum/terrestris* **workers' are plotted in addition to both species.**

B. lucorum © **Helen Dickinson**



Moss carder bee *B. muscorum* **distribution on BeeWalk transects**

The abundance declines evident for the species in the BeeWalk dataset, where it largely occurs on transects in the south of England and Wales, are a sign that the species declines in those regions are ongoing.



Abundance trend for Moss carder bee *B. muscorum* **2010-21, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).**

B. muscorum © **Nick Withers**

The analysis and subsequent findings of the data help us plan, refine and pinpoint the next steps needed for the conservation of bumblebees in general, and for specific species where needed. This could be anything from further investigations into the data, to targeting areas of importance for increasing data collection, to planning for future on the ground conservation interventions.

What's next? The future of BeeWalk

© Jamie Buxton-Gould

Training and support

The continued increase in transects and bumblebee records shows the commitment of BeeWalk supporters to improving bumblebee knowledge. With the Skills for Bees projects putting plans into action, our focus will become increasingly directed towards improving the training and long-term support of BeeWalkers. We aim to improve BeeWalker and transect retention, alongside maintaining a high standard of data quality, by ensuring as many BeeWalkers as possible have access to quality training and resources, continued support and troubleshooting. Funding permitting, the Skills for Bees projects will continue to grow and form the basis of how we support BeeWalkers across Britain.

Transect increase

There will always be a need for more transects, the more data we have the better! but we are particularly keen to up our focus on improving coverage in key areas which are low on transects. There are huge gaps across much of Scotland, especially the far north and west, including the Hebrides, Orkney and Shetland, but also the Borders. Gaining transects in the far north and on the islands, would enable us to start looking at population trends for the remote, beautiful, endangered Great Yellow bumblebee (*B. distinguendus*). In England East Anglia and the East Midlands are under-represented, and in Wales the upland areas (including Snowdonia) have almost no current transects. Filling in some of these geographical gaps would massively increase our understanding of the upland bumblebee species, the Bilberry (*B. monticola*) and Broken-belted (*B. soroeensis*) bumblebees in particular. An increase in coverage will also be key to helping us monitor species moving northwards from the species-rich Thames estuary area.

Data use

BeeWalk data continues to drive the science behind the work of the Trust. The extent to which the BeeWalk dataset can be used is large and it's hoped in the future, additional time will be available to dedicate to more in-depth analysis. We aim to increase the number and range of priority questions we can start to investigate, ensuring the data is used as widely as possible towards the conservation and protection of bumblebees.

Currently two PhD students are starting to use the BeeWalk dataset to examine relationships between cuckoo bumblebees and their hosts; and between honeybees and bumblebees, in high and low-quality habitat. These are key questions that have had little previous investigation and will improve our understanding of species interactions and any knock-on impacts on bumblebee conservation.

Within the Trust, we're using the BeeWalk data to evaluate the impact on bumblebees of our on the ground conservation work, and this will be extended as we begin to gather more information about how habitat changes in areas where we're providing management advice.

Further on, we're hoping to be able to really drill down into the colony dynamics and how they change between species, habitats, and good or bad weather – for example emergence times of the different castes and length of seasonal activity.

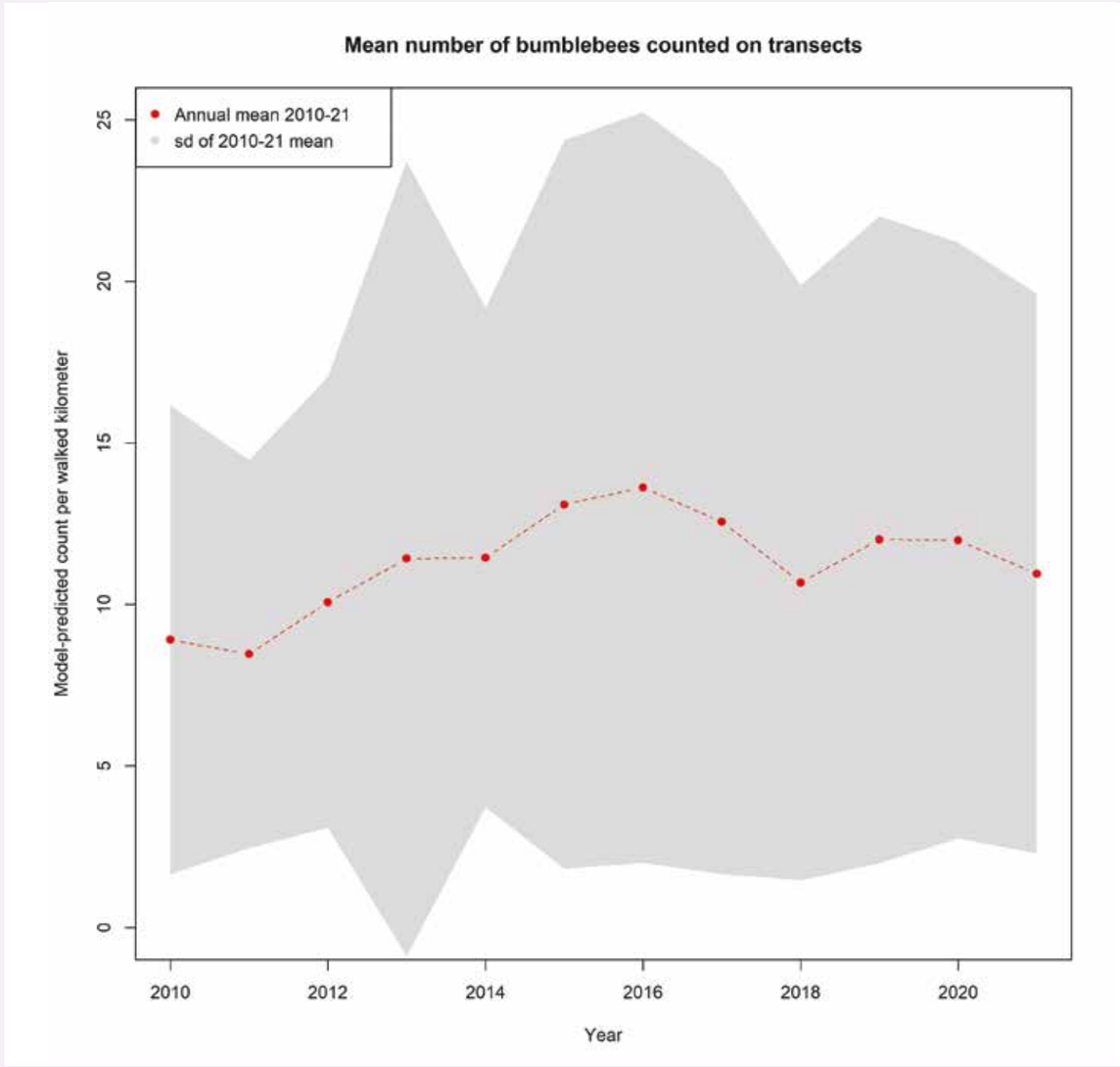
The ongoing success of the UK Butterfly Monitoring Scheme provides a fantastic model for us to follow. Established in the 1970s', with more than a thousand transects, many running for decades, and with the data used for a massive number of reports and papers, the result is a huge positive impact on butterfly's survival in the UK. We are well into our journey to reaching these heights, and we hope BeeWalk will become one of the most important sources of data for influencing insect conservation in the Britain. We can't thank all our BeeWalkers, supporters and funders enough, the collective team means BeeWalk is set to continue the great success we have seen over the past ten years.

©Tilly Hopkins

B. soroeensis & *B. monticola* © Annie Ives

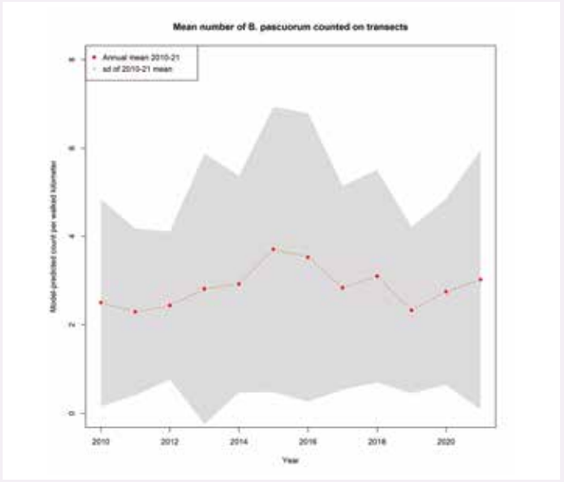
Appendix

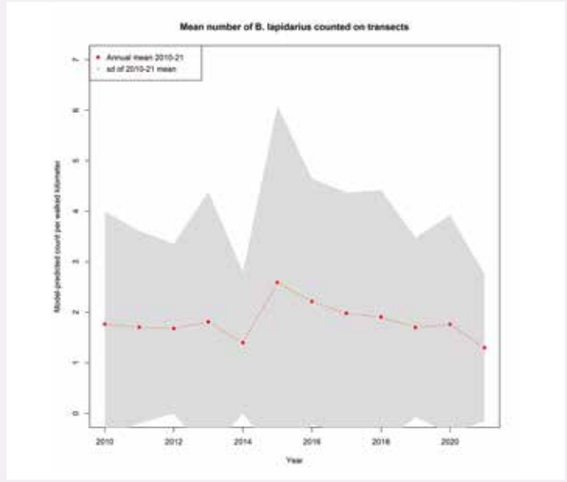
Yearly trends in overall abundance for UK bumblebees

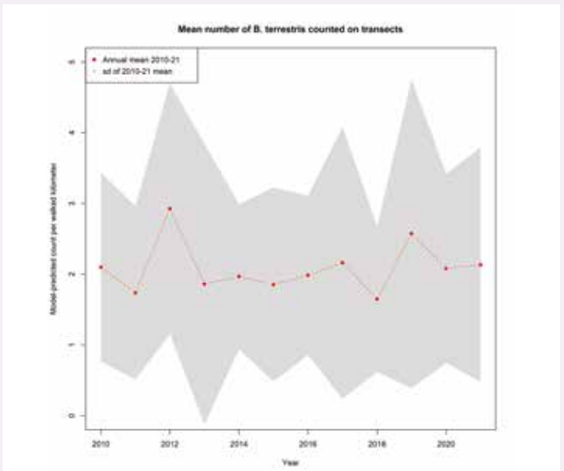


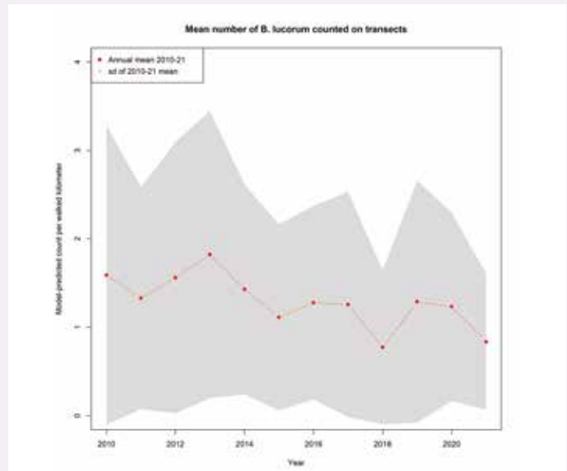
The abundance trend of all bumblebees recorded on BeeWalk transects between 2010 and 2021, including individuals not identified to caste or to species. This is shown as the mean number of bumblebees counted per kilometre walked each year (red line). The grey cloud is a measure of the annual variation around this average (standard deviation)

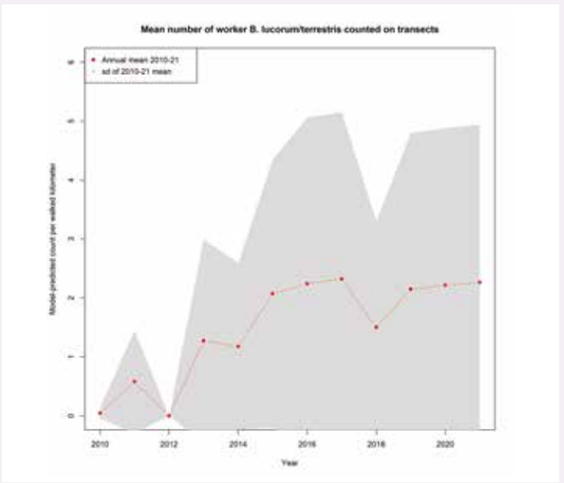
Widespread bumblebees









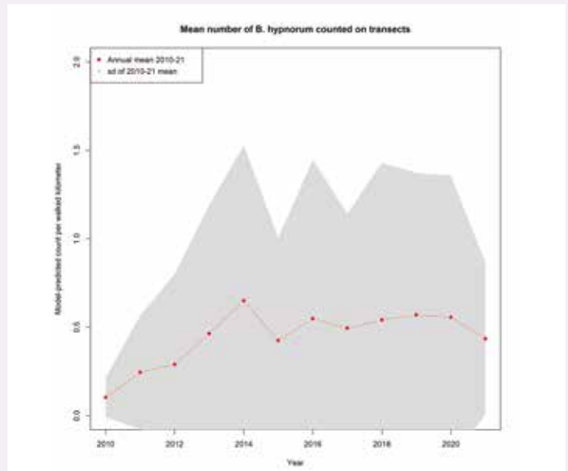


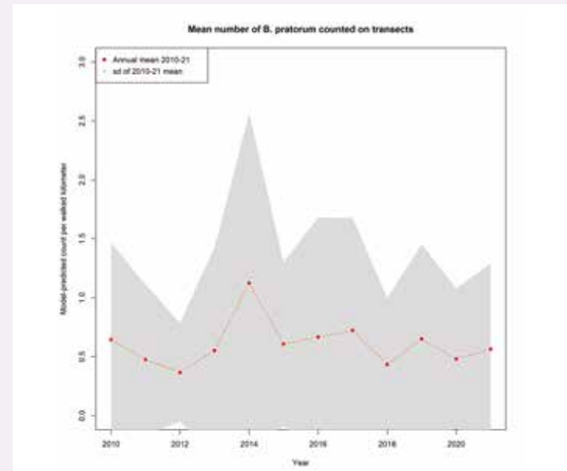
Abundance trends for the eight widespread British bumblebee species 2010-21, shown as the mean number of bumblebees of that species counted per kilometre walked each year on transects where the species has ever been recorded (red line). The grey cloud is a measure of variability (standard deviation).

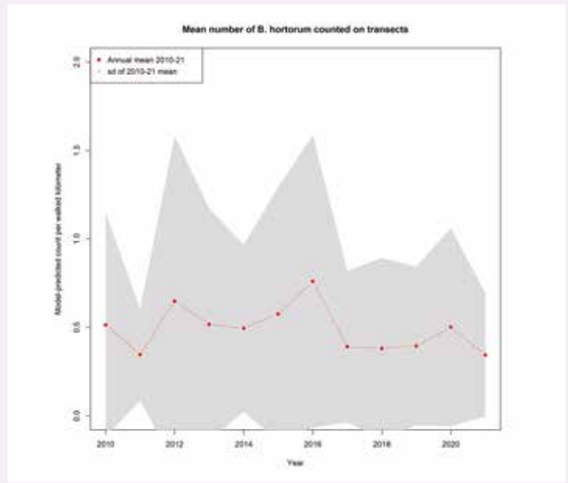
Note: the vertical axis varies with species' abundance and thus differs between plots

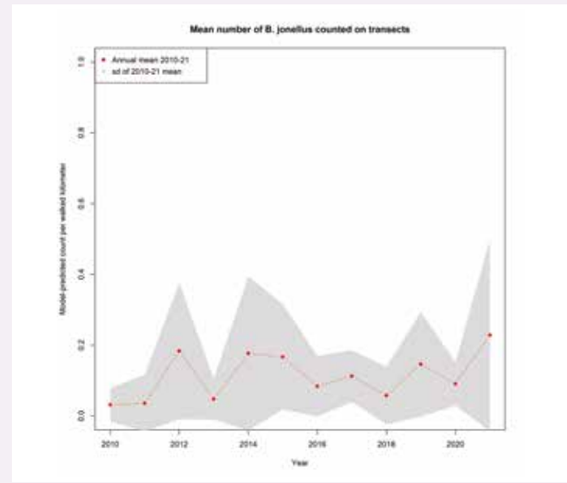
Bombus lucorum & B. terrestris often cannot be reliably split as workers, so records submitted as 'B. lucorum/terrestris workers' are plotted in addition to both species.

Widespread bumblebee species

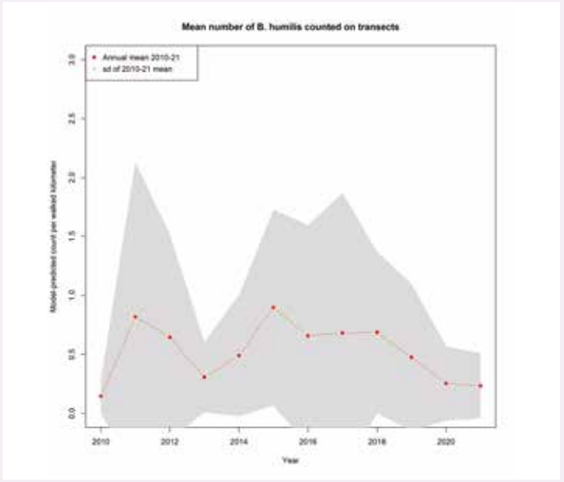


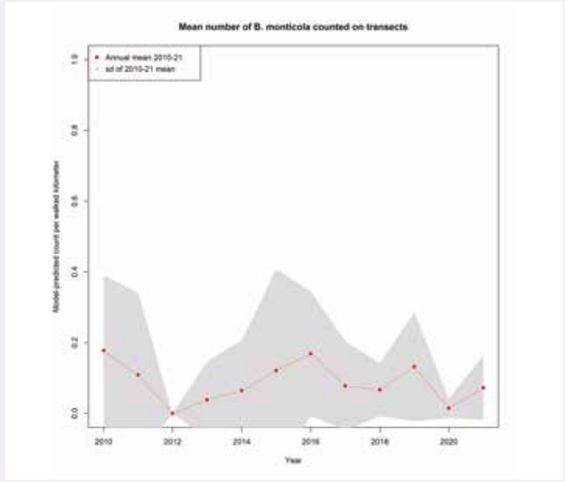


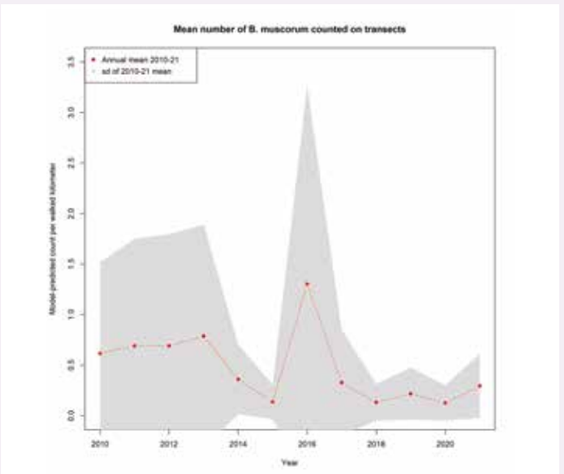


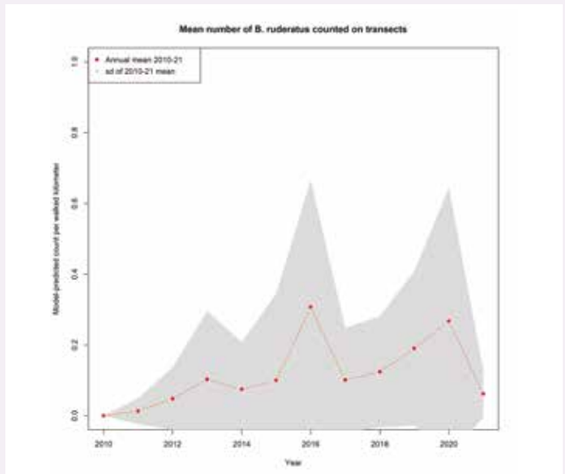


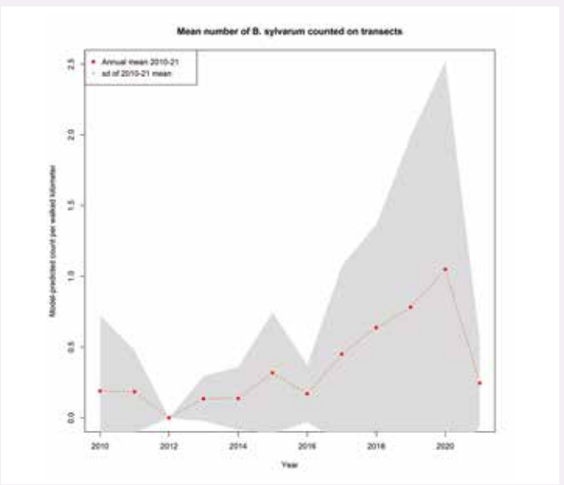
Conservation priority bumblebee species











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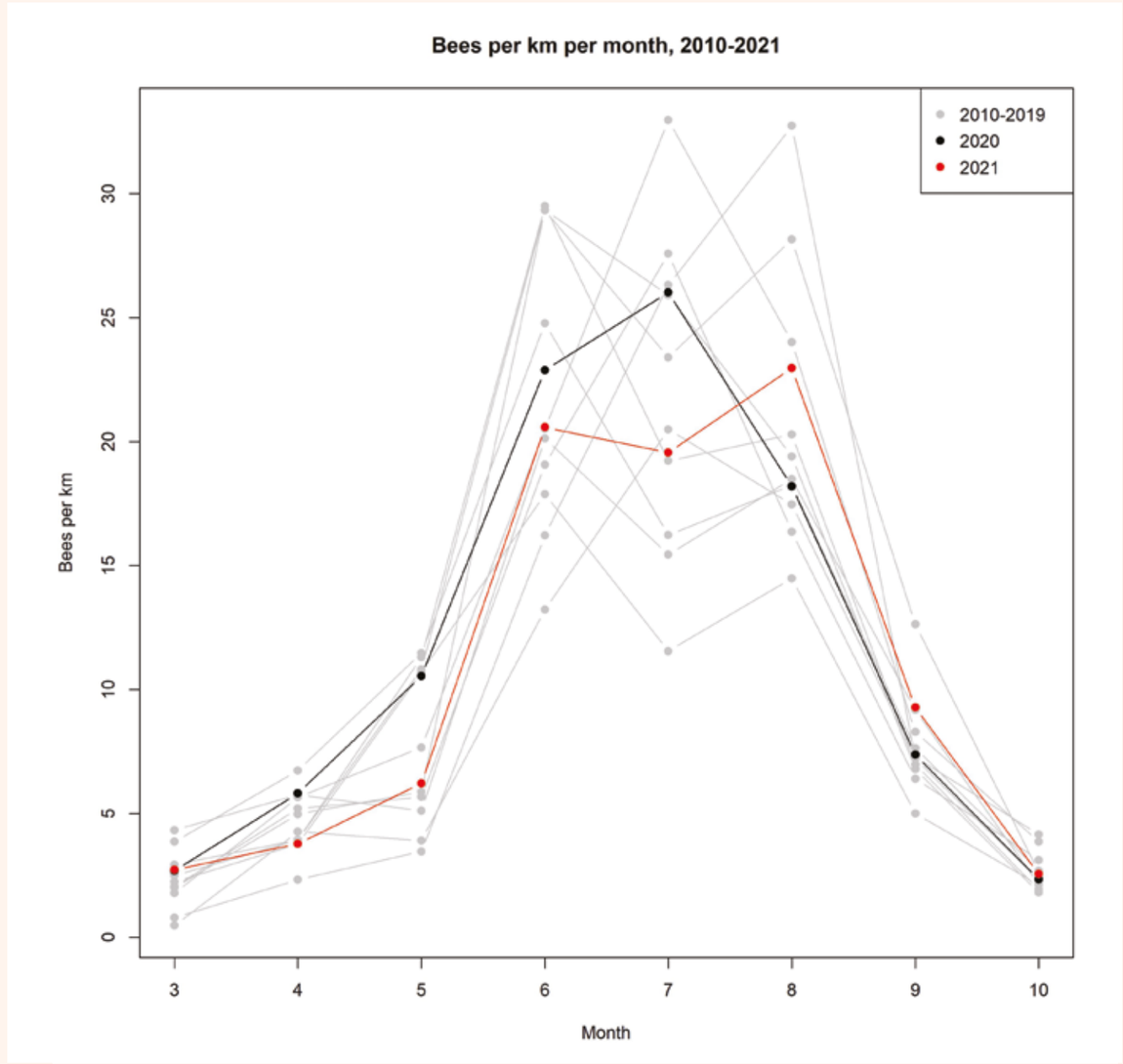
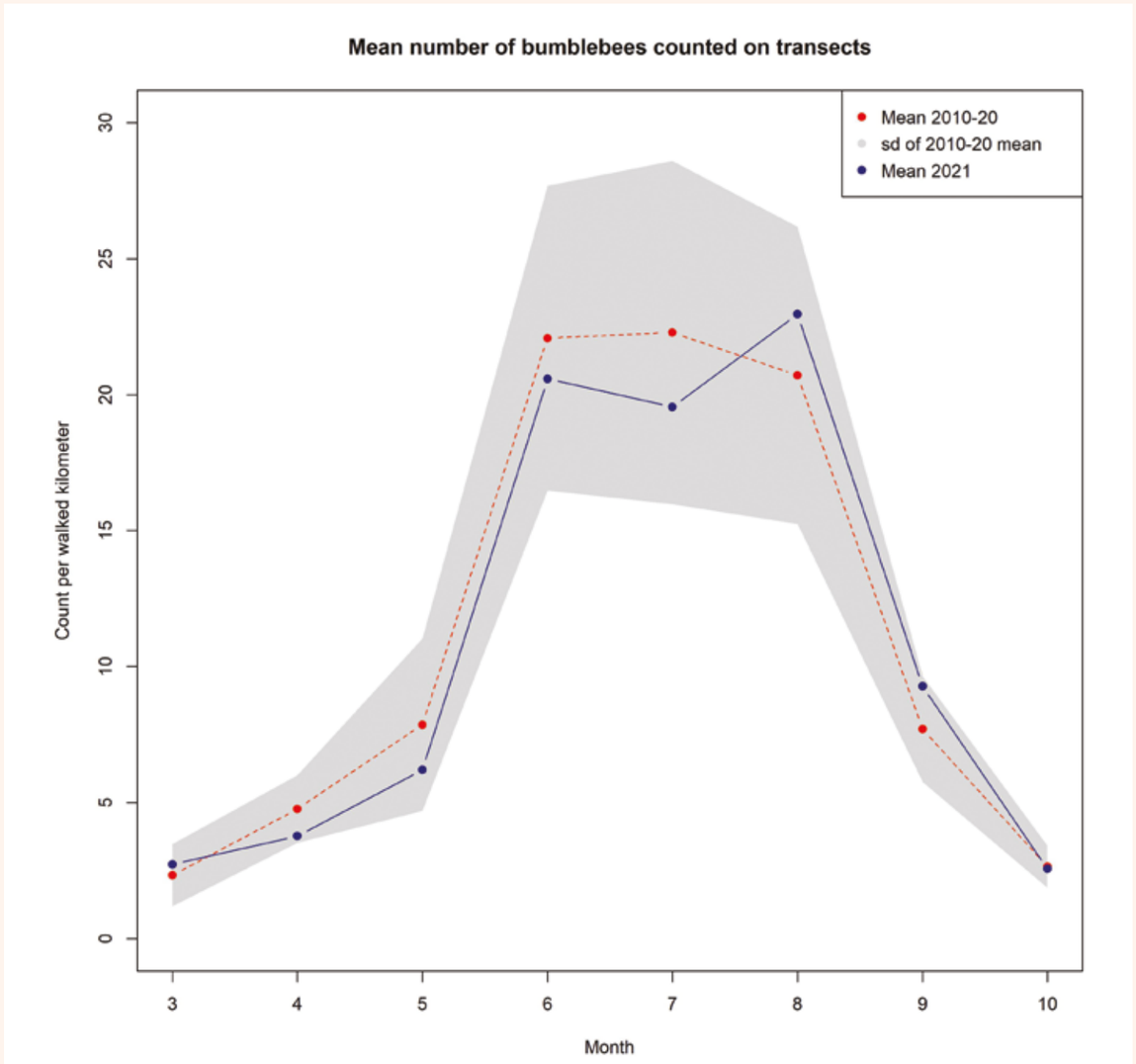
Bombus lucorum & B. terrestris often cannot be reliably split as workers, so records submitted as 'B. lucorum/terrestris workers' are plotted in addition to both species.

Bumblebee phenology plots, 2021

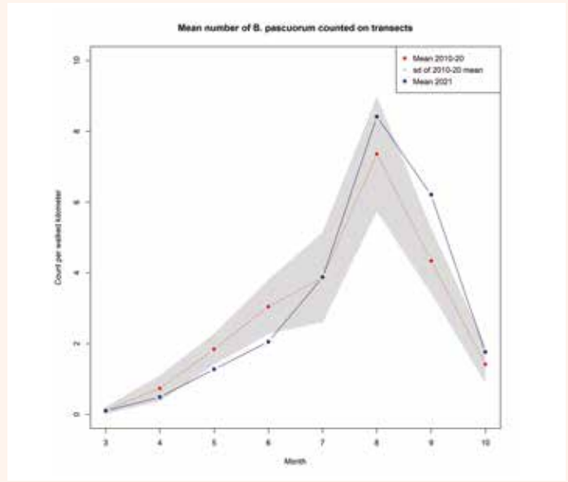


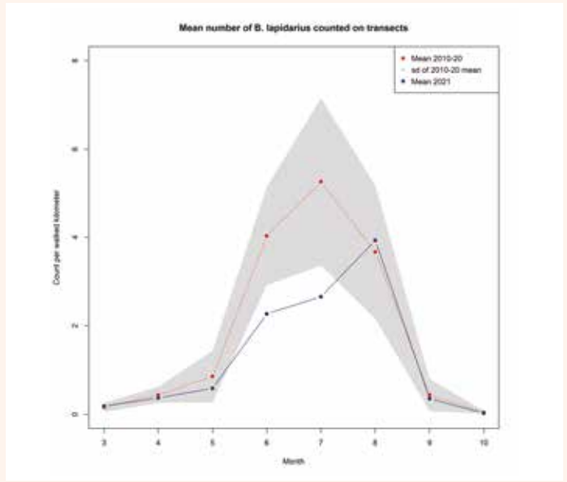
The mean number of bumblebees per kilometre recorded per month (March-October) for each year the BeeWalk survey has been in operation.

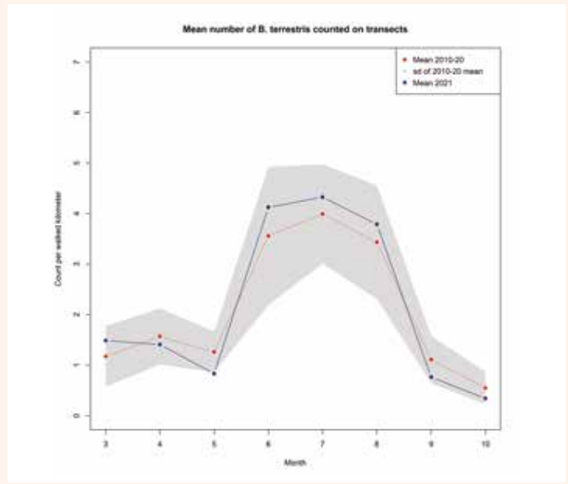


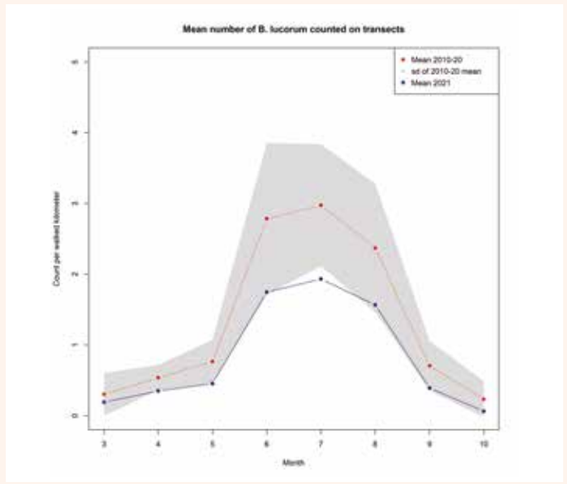
The mean number of bumblebees per kilometre recorded per month (March-October). Results for 2021 (blue line) are plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average – where the blue (2021) line is outside this grey area the count is significantly different to what would be expected.

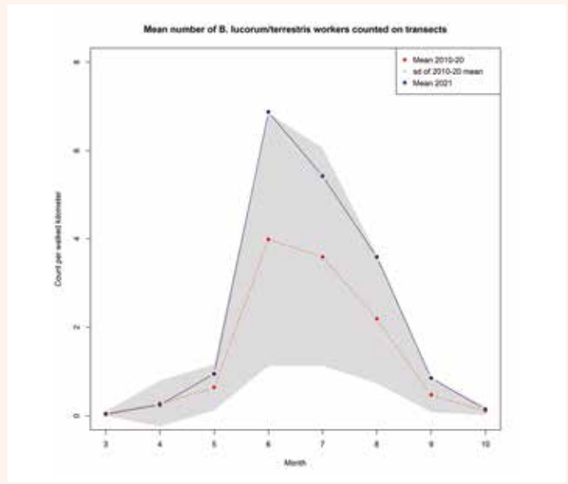
Widespread bumblebee species









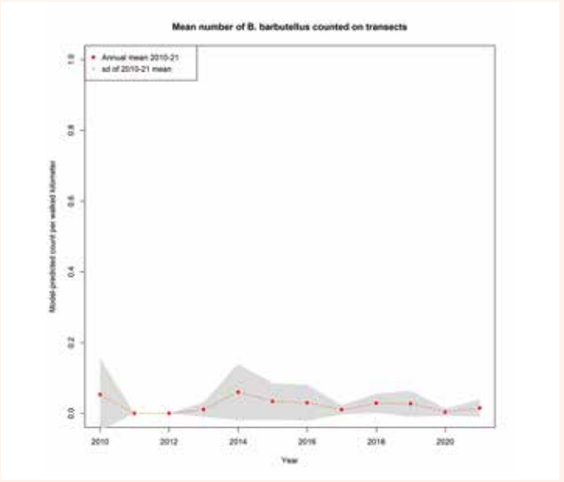


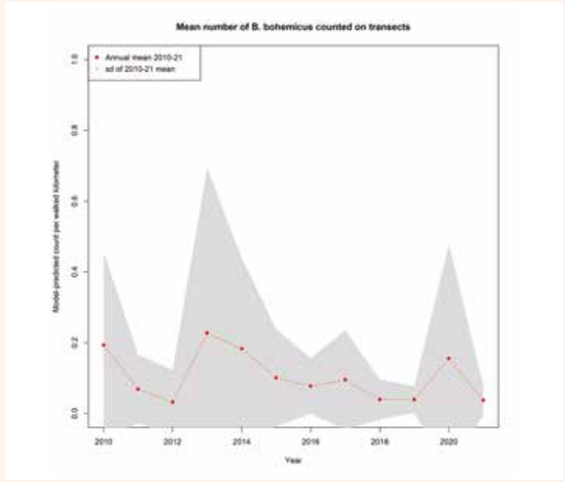
The mean number of bumblebees per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation.

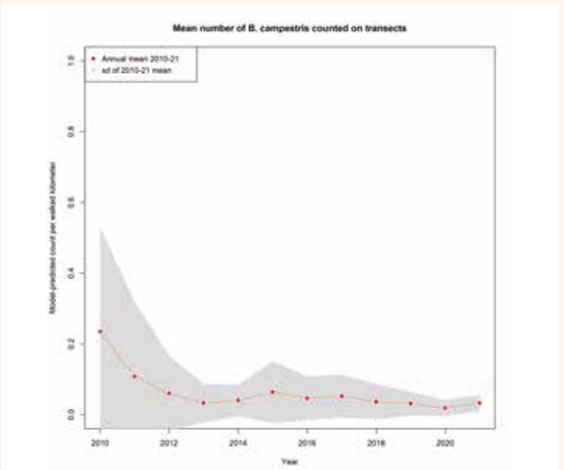
Note: the vertical axis varies with species' abundance and thus differs between plots

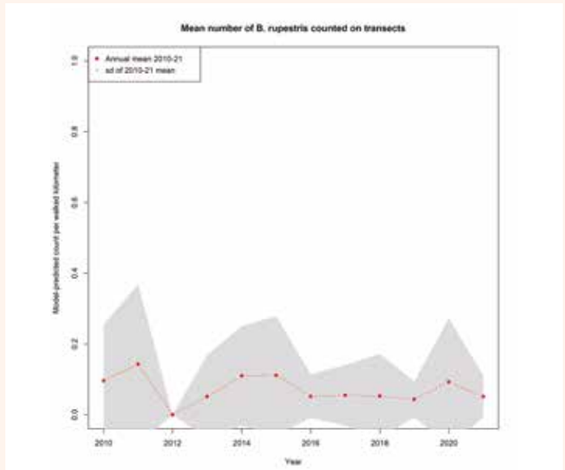
Bombus lucorum & B. terrestris often cannot be reliably split as workers, so records submitted as 'B. lucorum/terrestris workers' are plotted in addition to both species.

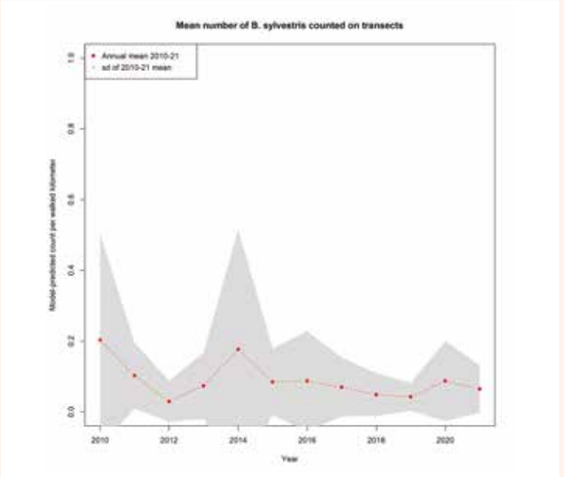
Cuckoo bumblebees

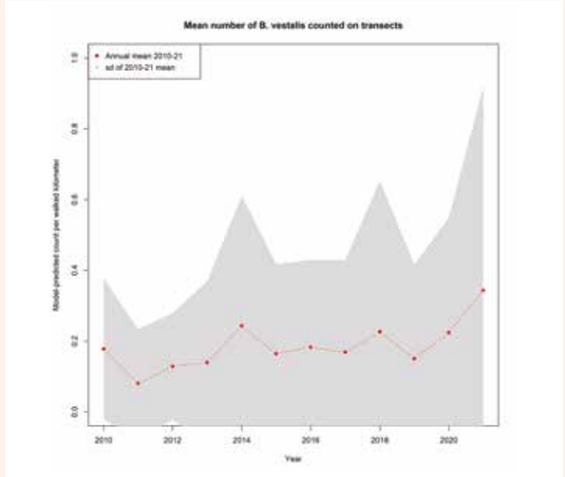




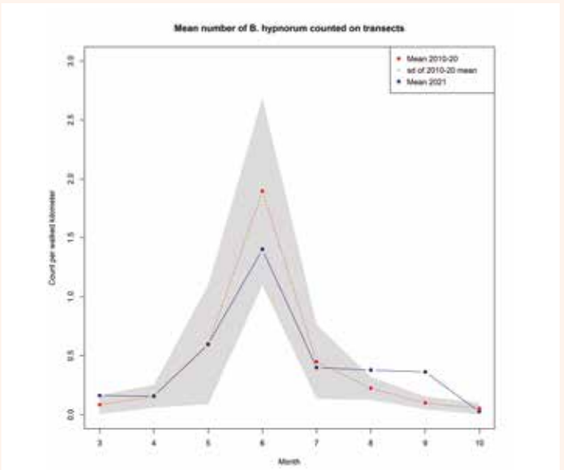


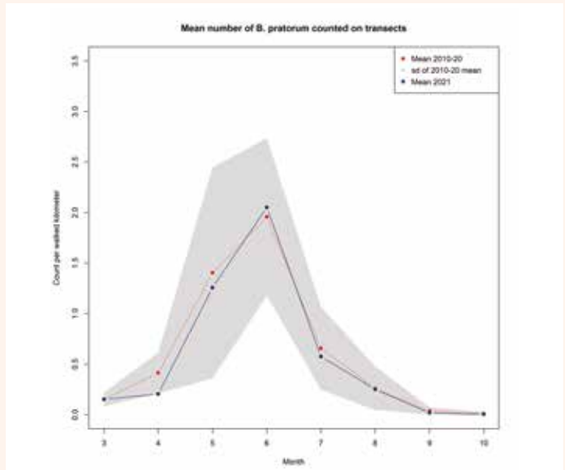


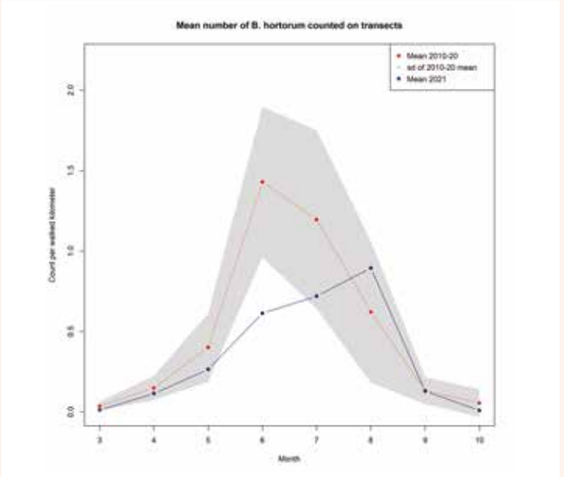


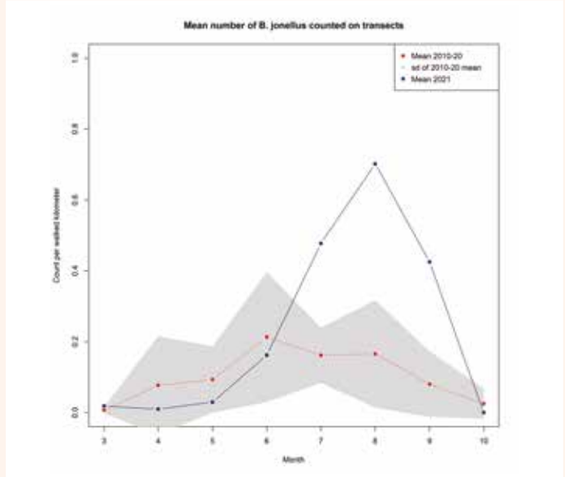


Widespread bumblebee species

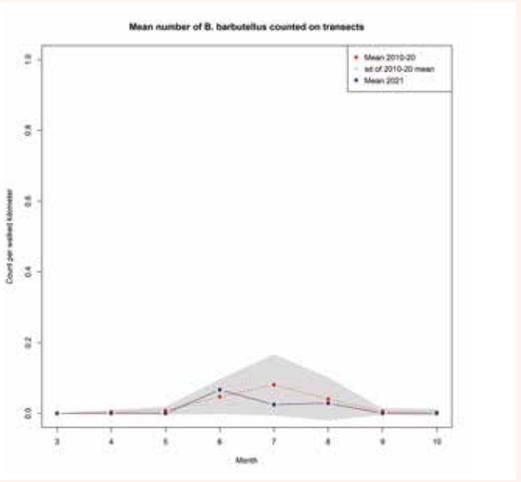


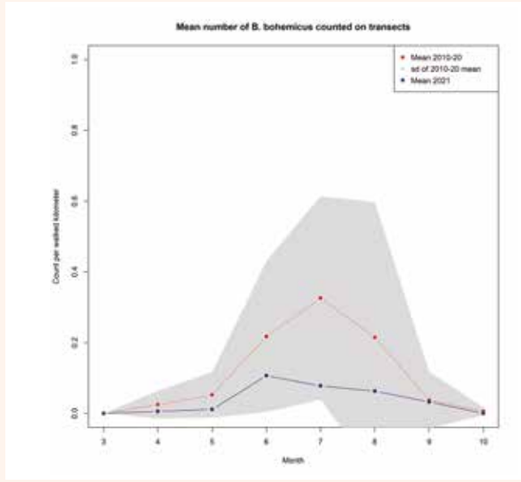


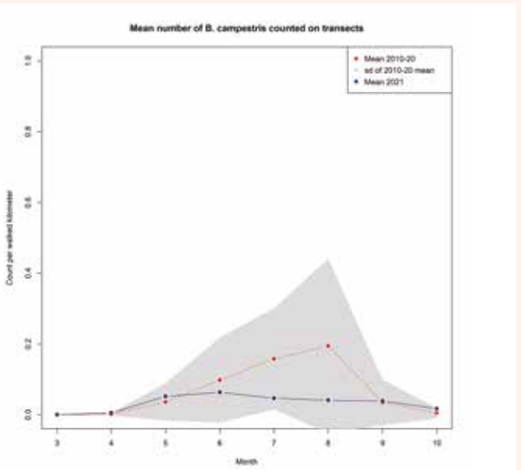


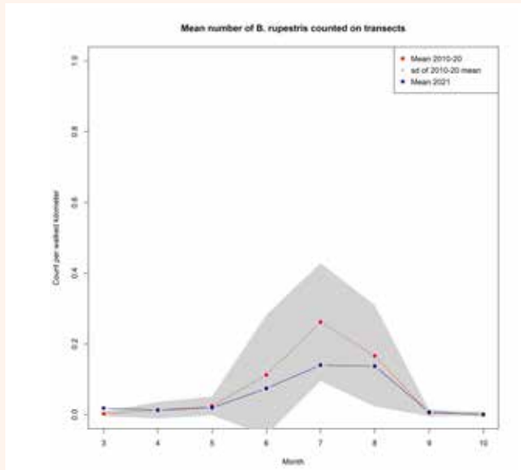


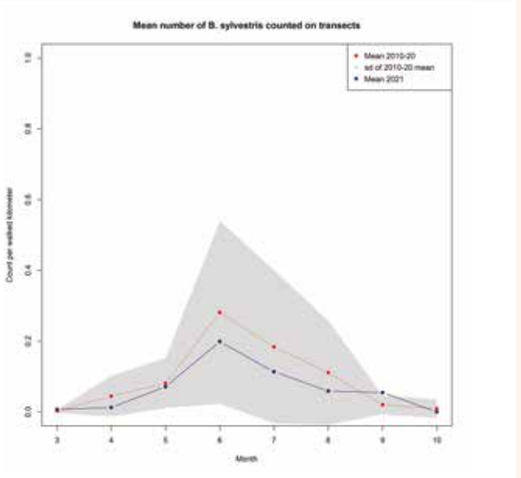
Cuckoo bumblebees

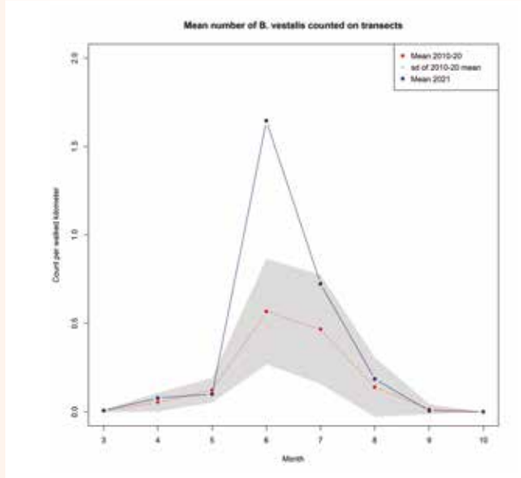




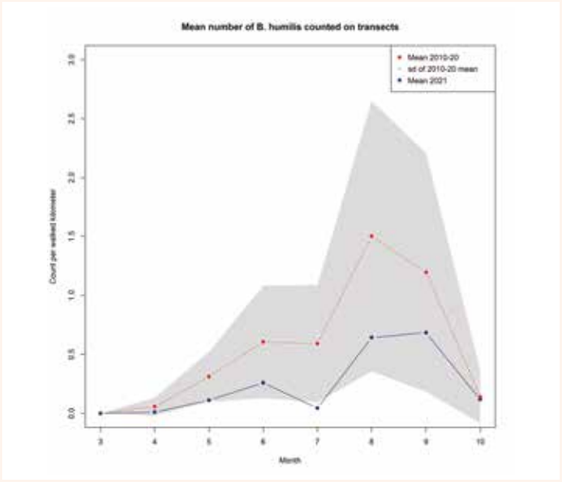


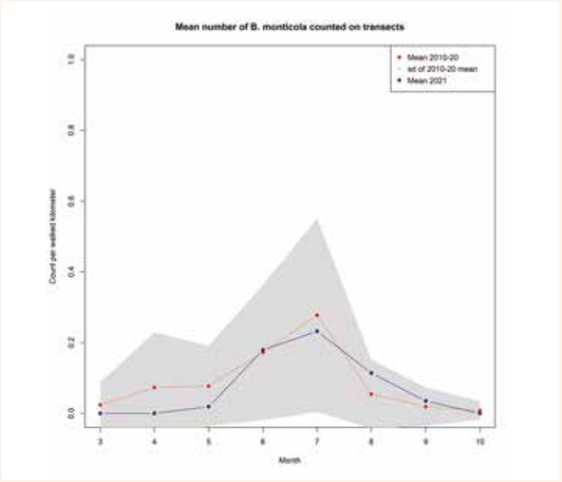


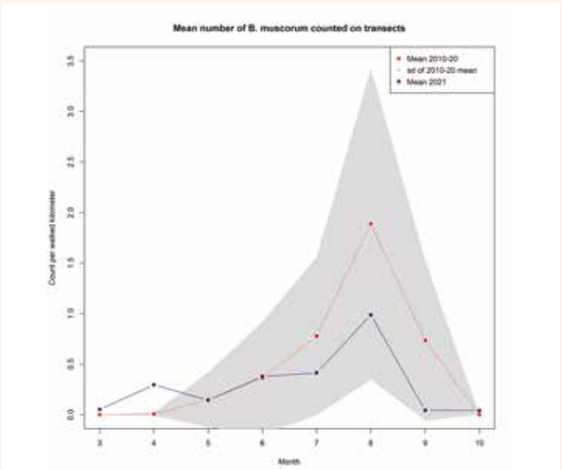


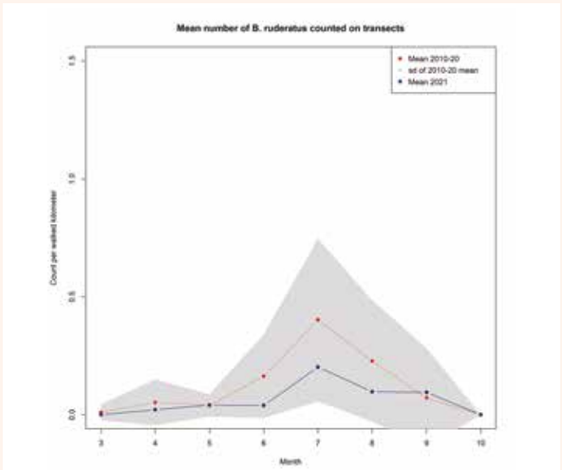


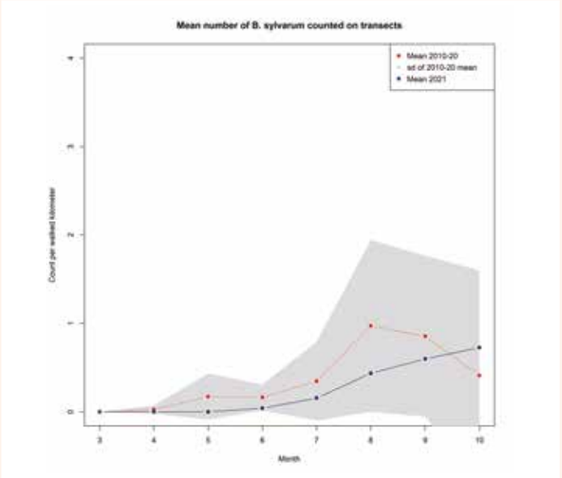
Conservation priority bumblebee species







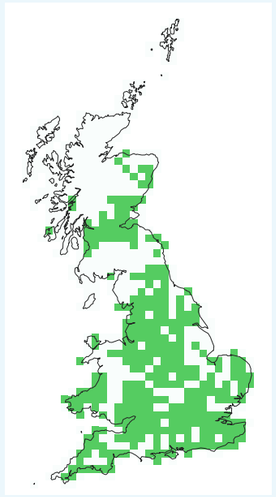




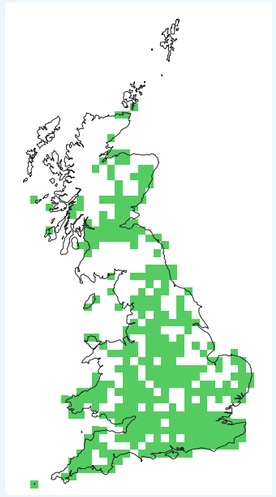
The mean number of bumblebees per kilometre per month between March and October 2021 (blue line), plotted against the average monthly abundance for the 2010-20 period (red line). The grey cloud indicates the variability of the 2010-20 average (standard deviation.

Note: the vertical axis varies with species' abundance and thus differs between plots

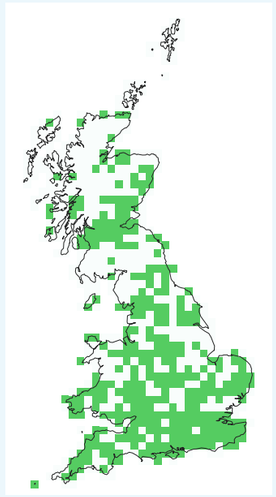
Widespread bumblebee species



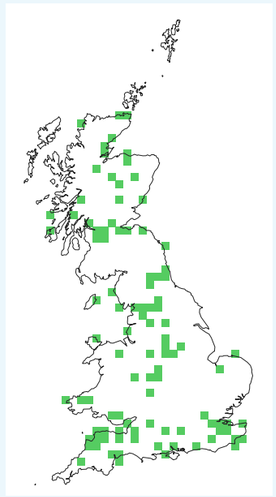
Tree bumblebee *B. hypnorum*



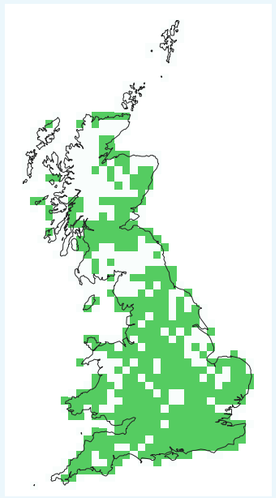
Early bumblebee *B. pratorum*



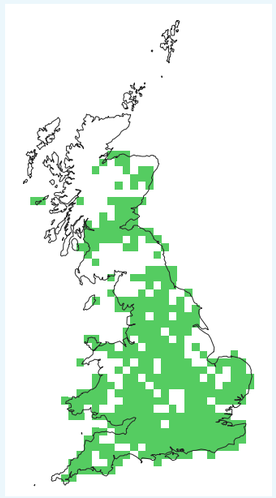
Garden bumblebee *B. hortorum*



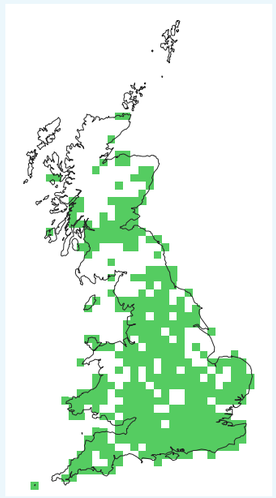
Heath bumblbee *B. jonellus*



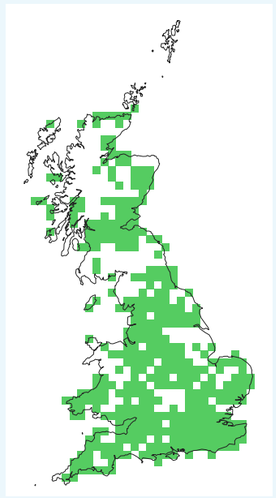
Common carder bee *B. pascuorum*



Red-tailed bumblbee *B. lapidarius*

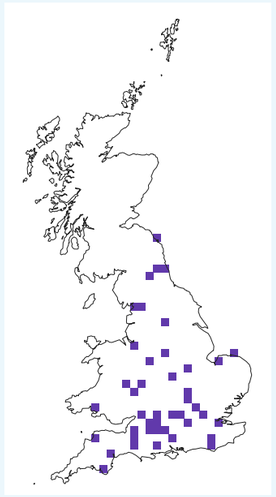


Buff-tailed bumblebee *B. terrestris*

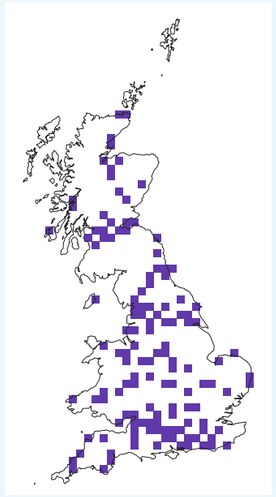


White-tailed bumblebee *B. lucorum*

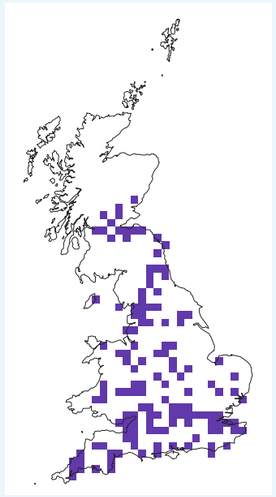
Cuckoo bumblebees



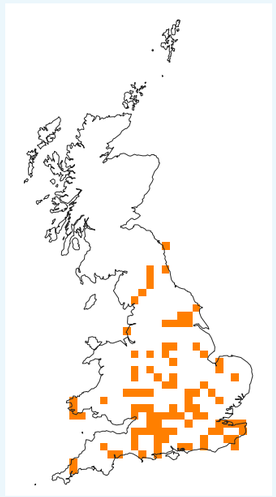
Barbut's cuckoo bee *B. barbutellus*



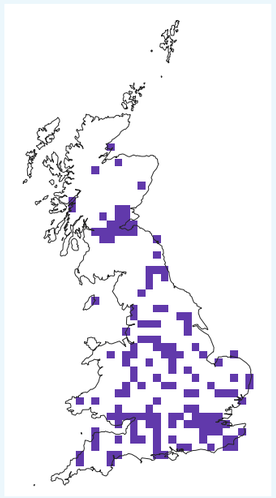
Gypsy cuckoo bee *B. bohemicus*



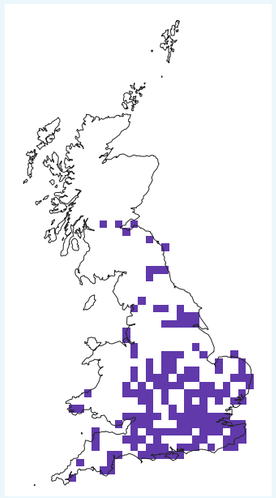
Field cuckoo bee *B. campestris*



Red-tailed cuckoo bee *B. rupestris*

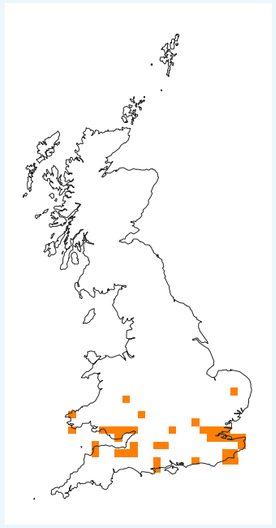


Forest cuckoo bee *B. sylvestris*

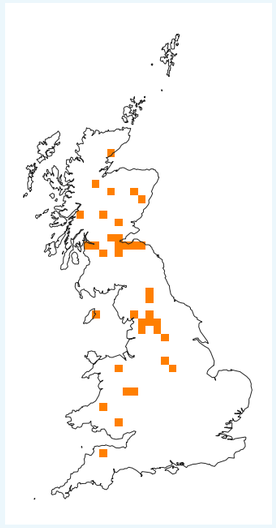


Southern cuckoo bee *B. vestalis*

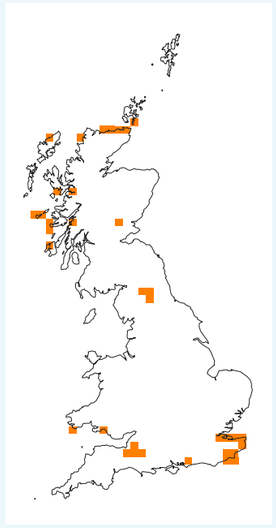
Conservation priority bumblebee species



Brown-banded carder bee *B. humilis*



Bilbery bumblebee *B. monticola*



Moss carder bee *B. muscorum*

Ruderal bumblebee *B. ruderatus*

Shrill carder bee *B. sylvarum*

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This report should be cited as Comont, R. F., & Dickinson, H. BeeWalk 10 year report. Bumblebee Conservation Trust, Stirling, Scotland UK.

It can be downloaded from www.bumblebeeconservation.org and further information can be found on the BeeWalk website, www.beewalk.org.uk.

The Bumblebee Conservation Trust is a registered charity (England & Wales 1115634 / Scotland SC042830).
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