

Bumblebees

Ecology & Surveying



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Bees in the UK

Around 270-280 bee species in Britain

- 1 honeybee
- 25 bumblebees (19 social)
- The rest are solitary bees







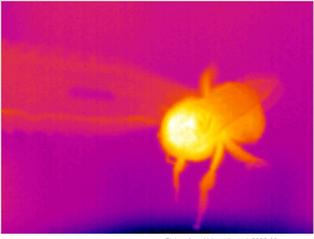

What are bumblebees?

- Order Hymenoptera; genus *Bombus*
- Around 250-270 species worldwide
 - Cryptic species
- Annual life cycle
 - Most social, some parasitic
- Feed exclusively on pollen and nectar
 - Adapted for efficient collection
- Cold-adapted
 - Predominantly northern hemisphere




Adaptations to cold

'Warm-blooded' – high energy requirements = they need a lot of flowers!



Picture from Volynskii et al. 2008. Microscopy Research and Technique 65: 903-912.

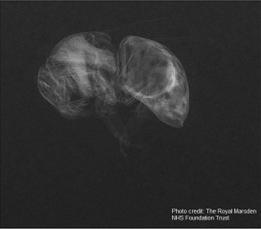


Photo credit: The Royal Marsden NHS Foundation Trust



The bumblebee's annual lifecycle



Spring

Summer

Late summer

Winter

Decline and fall

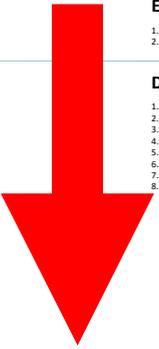
Extinct:

- Cullman's Bumblebee, *B. cullmanus* (1941)
- Short-haired Bumblebee, *B. subterraneus* (1988)

Declining/rare:

- Moss carder, *B. muscorum*
- Brown-banded carder, *B. humilis*
- Great Yellow Bumblebee, *B. distinguendus*
- Red-shanked carder, *B. ruderarius*
- Large Garden Bumblebee, *B. ruderatus*
- Stall carder, *B. sylvarum*
- Billberry Bumblebee, *B. monticola*
- Short-haired bumblebee, *B. subterraneus* (reintroduced population)

- 1980 *Atlas* of bumblebees found widespread declines from 1900
- Over a third of the social bumblebees (7 species) declined by more than 70% 1900-1980
- 2 species extinct
- 8 Conservation Priority

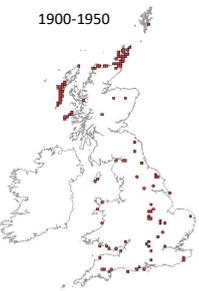




Great Yellow Bumblebee, *Bombus distinguendus*



1900-1950



2000-present



Bumblebee Conservation Trust

Why are bumblebees declining?

- Great loss of bumblebee habitat
 - 98% of flower-rich grassland has been lost in UK since 1930s-1940s
- Agricultural changes to more intensive methods
 - Cutting grass many times a year and heavy grazing
 - Removal of hedgerows and areas without crops



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Should we be worried?

- Huge commercial importance as pollinators
 - Insect pollination in the UK worth £603 million (2014) – 75% crop species
 - €14.2 billion in EU, €265 billion worldwide
 - Replacement cost £1.8 billion (2012)
- 90% of 9000 wild/garden flowering plants depend on insects for pollination
 - Bumblebees help to support networks of semi-natural flower-rich grassland
 - No bumblebees = sweeping changes to the countryside



bumblebee at commercial raspberry flower

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The pollinator guild




Range of plants visited by honey bees vs bumblebees



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Next steps – abundance and BeeWalk

- Many of the common species were found 'everywhere', historically
- Reasonable distribution records – so we know where the bees *are (were)*
- But we don't know very much about *abundance*
- Early warning
- Enter BeeWalk!



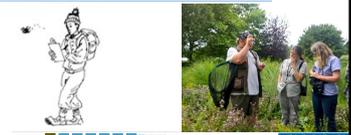
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Background

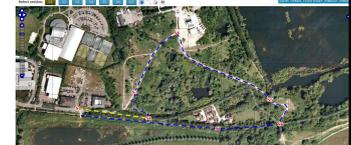
www.beewalk.org.uk

BeeWalk:

- Volunteers walk a monthly transect March-October
- 1-2km
- Count bees, ID species



- National scheme for abundance
- Detect population declines over time
- Early warning of losses



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BeeWalk Aims

- To gather **ABUNDANCE** and **DISTRIBUTION** data for the UK's bumblebees
- To analyse the data and report **trends** in bumblebee populations over time
- To investigate the causes of changing trends in bumblebees i.e. climate change/ habitat change



Guidelines – setting up a transect

- Establish transect in preferred location - make extra site visit to map your route
 - Choose route carefully - **convenient, accessible**
 - 1-2km**, taking about **60 minutes** to walk
 - Split into at least 3 sections based on **habitat**

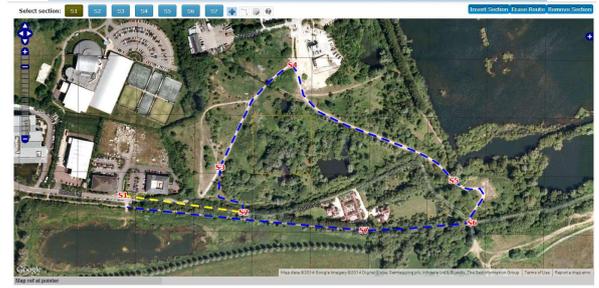


Register your transect on the website!

www.beewalk.org.uk

Draw out your transect route

www.beewalk.org.uk



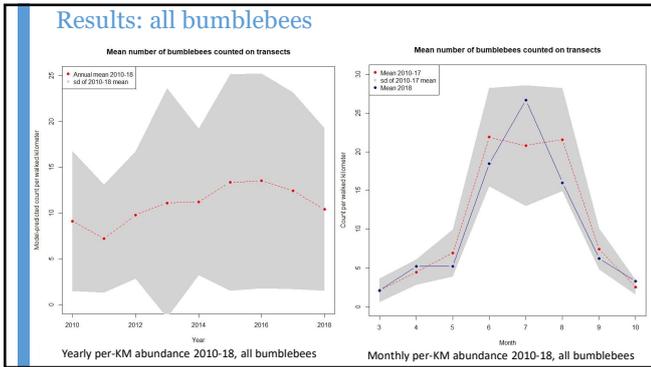
Add habitat data

www.beewalk.org.uk

Guidelines – monthly transect survey

- Walk the same transect every time!
- Walk transect **once per month** during main flight period, **March to October** inclusive.
- Only survey when weather conditions are suitable for bumblebee activity: **Warm, not too windy, no rain**, between 11am-5pm
- At the start of each survey, fill in the environmental details first on the **Field Recording Form (F2)**





Results

2010-2018 population trends for the 20 bumblebee species and 3 species aggregates with sufficient records in the BeeWalk dataset. Species showing population increases are on the left of the table, those showing decreases are on the right. Species are ordered from most positive change to most negative change and ranked accordingly, with last year's rank in brackets for each species. Conservation priority species have been highlighted in blue and cuckoo species in red.

Species	Records	Trend	Species	Records	Trend
1 (1) <i>B. ruderatus</i>	73	0.256	11 (4) <i>B. monticola</i>	113	-0.00111
2 (7) <i>B. sylvarum</i>	144	0.236	12 (12) <i>B. terrestris</i>	17,596	-0.00234
3 (17) <i>B. ruderatus</i>	165	0.147	13 (14) <i>B. hortorum</i>	5,077	-0.0171
4 (3) <i>B. humilis</i>	910	0.134	14 (8) <i>B. jonellus</i>	336	-0.0215
5 (2) <i>B. lucorum/terrestris</i> workers	9,569	0.109	15 (23) <i>B. muscorum</i>	395	-0.0315
6 (5) <i>B. hypnorum</i>	4,837	0.079	16 (13) <i>B. pratorum</i>	6853	-0.0315
7 (6) <i>B. vestalis</i>	1,219	0.071	17 (15) <i>B. lucorum</i> agg.	11,183	-0.0510
8 (11) <i>B. pascuorum</i>	26,870	0.026	18 (20) <i>B. barbutellus</i>	85	-0.0694
9 (9) TOTAL bumblebees	11,1445	0.025	19 (18) <i>B. ruystris</i>	342	-0.0788
10 (10) <i>B. lapidarius</i>	15,428	0.018	20 (19) <i>B. sylvestris</i>	576	-0.101
			21 (16) <i>B. bohemicus</i>	517	-0.117
			22 (12) <i>B. campestris</i>	336	-0.162
			23 (21) <i>B. soroeensis</i>	25	-0.224

UK Pollinator Monitoring Scheme (PoMS)

- Combine improved analyses of existing long-term records with new systematic surveys to establish how pollinator populations are changing.
- Focus on bees (including honeybees) and hoverflies, in recognition of their functional importance as pollinators
- Methods used will sample or survey a wide range of other flower-visiting insects
- Data integration and modelling to create metrics or indicators of change at GB and country level.

New systematic surveys (2017 on)

- Flower-Insect Timed Count (FIT Count)**
 - Count ALL insects that land on target flowers within 50x50cm patch during 10-minute period
 - Identify to group level using guides provided
 - Anyone can do them anywhere!
- Intensive survey of pollinators & floral resources**
 - Network of 75 1km random survey squares
 - Stratified by country area and relative cover of agric (AG) vs semi-natural (SN) land
 - Designed to detect broad GB-level changes in abundance of pollinator groups and some species
 - Pan trapping (+species ID) & FIT Counts
 - 4 x 6 hr surveys per year

How to get involved?

- Visit the webpages for FIT Count guidelines and how-to videos
- Submit counts and records on iRecord
- Email us to join in with 1km square surveys poms@ceh.ac.uk

www.ceh.ac.uk/pollinator-monitoring

Bumblebee Conservation Trust www.beewalk.org.uk

bumblebeeconservation.org

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