

Bumblebees of Devon

An atlas and conservation guide

By Patrick Saunders
Edited by Cathy Horsley



Contents

| | |
|---|----|
| Preface | 3 |
| What are bumblebees? | 4 |
| Bumblebee ecology | 6 |
| Distribution of bumblebees of Devon | 11 |
| The decline of bumblebees | 13 |
| Gardening for bumblebees | 16 |
| Malcolm Spooner | 23 |
| Recording bumblebees | 25 |
| Species accounts | 26 |
| Garden bumblebee (<i>Bombus hortorum</i>) | 26 |
| Brown-banded carder bee (<i>Bombus humilis</i>) | 28 |
| Tree bumblebee (<i>Bombus hypnorum</i>) | 30 |
| Heath bumblebee (<i>Bombus jonellus</i>) | 32 |
| Red-tailed bumblebee (<i>Bombus lapidarius</i>) | 34 |
| White-tailed bumblebee (<i>Bombus lucorum sensu lato</i>) | 36 |
| White-tailed bumblebee complex | 38 |
| Bilberry bumblebee (<i>Bombus monticola</i>) | 40 |
| Moss carder bee (<i>Bombus muscorum</i>) | 42 |
| Common carder bee (<i>Bombus pascuorum</i>) | 44 |
| Early bumblebee (<i>Bombus pratorum</i>) | 46 |
| Buff-tailed bumblebee (<i>Bombus terrestris</i>) | 48 |
| Great Yellow bumblebee (<i>Bombus distinguendus</i>) | 50 |
| Ruderal bumblebee (<i>Bombus ruderatus</i>) | 52 |
| Broken-belted bumblebee (<i>Bombus soroeensis</i>) | 54 |
| Red-shanked carder bee (<i>Bombus ruderarius</i>) | 56 |
| Shrill carder bee (<i>Bombus sylvarum</i>) | 58 |
| Short-haired bumblebee (<i>Bombus subterraneus</i>) | 60 |
| Barbut's cuckoo bumblebee (<i>Bombus barbutellus</i>) | 62 |
| Gypsy cuckoo bumblebee (<i>Bombus bohemicus</i>) | 64 |
| Field cuckoo bumblebee (<i>Bombus campestris</i>) | 66 |
| Red-tailed cuckoo bumblebee (<i>Bombus rupestris</i>) | 68 |
| Forest cuckoo bumblebee (<i>Bombus sylvestris</i>) | 70 |
| Southern cuckoo bumblebee (<i>Bombus vestalis</i>) | 72 |
| References | 74 |

Preface

The *Bumblebees of Devon: An atlas and conservation guide* came about through the Bumblebee Conservation Trust's (BBCT) West Country Buzz project. It was recognised that our knowledge of bumblebee distribution in Devon was poor, with sporadic records or no known records at all. The purpose of the Atlas was to gather this scattered information together to make it more accessible, and to highlight the gaps in our knowledge. We are lucky in Devon to have a county so richly diverse in different habitats and with a favourable climate, yet surprisingly, bumblebees are an under-recorded group of insects here. We hope that readers will be encouraged to get involved in recording bumblebees, and to take part in the Trust's national monitoring scheme BeeWalk. There are so many opportunities to make a valuable contribution.

Bumblebee records are crucial for informing the Trust's conservation work, and targeting it according to where the need is greatest. Records also contribute to agri-environment scheme applications, helping to secure the right habitat management in the farmed landscape, and this forms part of the work of the West Country Buzz project. The Trust is working in partnership with Natural England, who part-fund the project, and collaborating with other organisations across the county such as the RSPB, Devon Wildlife Trust, National Trust, Campaign for the farmed Environment, Devon Biodiversity Records Centre and the National Park authorities, to deliver the project.

Following the success of the *Bumblebees of Cornwall: An atlas and conservation guide*, Patrick Saunders has written this Atlas to Devon bumblebees. The Atlas provides the reader with an introduction to bumblebees, including key areas in the county to spot them, and how to help reverse their decline; and describes the distribution of each species in Devon along with their ecology, conservation, and preferred habitats.

Cathy Horsley, Bumblebee Conservation Trust, West Country Buzz Conservation Officer

Acknowledgements

This Atlas has received funding through the West Country Buzz project from the Bumblebee Conservation Trust, and Natural England as part of DEFRA's National Pollinator Strategy. We would also like to thank the Co-op, Norman Family Trust and Naturesave Trust for their generous funding towards the project. Special thanks to BWARS, DBRC and the Bumblebee Conservation Trust for providing the data. Thanks to Stephen Carroll, Nikki Clear, Richard Comont, Audrey Compton, Sally Corbett, Darryl Cox, Helen Dickinson, Mike Edwards, Ian Egerton, Steve Falk, Tim Griffiths, Stephanie Miles, Stuart Norris, Nick Owens, John Walters, Alex Worsley. Also this publication is indebted to the late Malcolm Spooner who did most of the historical recording in Devon and Cornwall. Thanks to all the recorders out there!

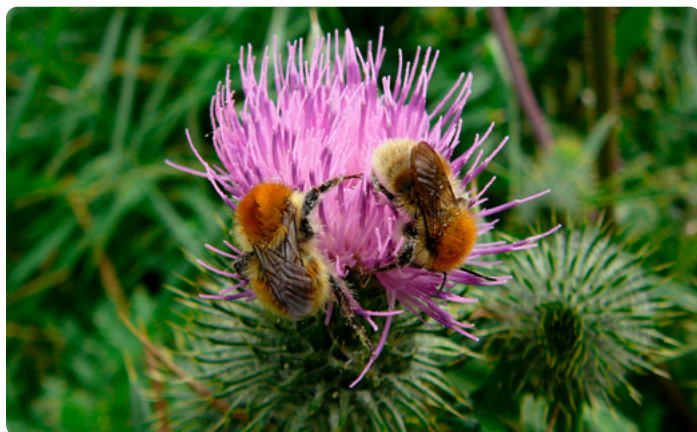
All national and regional distribution maps contains BWARS and BeeWalk data reproduced with permission. The maps also contain OS data © Crown copyright and database right (2019). Please note the national distribution maps indicate post-2000 species data.

What are bumblebees?

What are bumblebees?

There are over 270 species of bee in the United Kingdom, which include 24 resident and 2 extinct species of bumblebee. Bumblebees, the genus *Bombus*, are typically larger and more hairy (and more bumbling) than other British bee species. Bumblebees have a social structure of workers and queens similar to the honeybee and are unlike most of the other native bee species which are solitary or not truly social.

Bumblebees are interesting and rewarding to record; identification can be easy for some species, more challenging for others and in just a few cases, requires genetic analysis. There is limited recording effort for bumblebees in Devon with some species being under-represented in the county mainly due to identification difficulties which are highlighted in the species accounts below. There are a number of identification keys available for bumblebees; Benton (2006), Falk (2015) and Prŷs-Jones and Corbet (2014). The full references can be found at the back of this Atlas.



*Brown-banded
carder bee
(B. humilis).*

Photo-credit BBCT.

Devon has nationally important populations of rare bumblebees, such as the Brown-banded carder bee (*B. humilis*) and the Moss carder bee (*B. muscorum*), and has new records for the Ruderal bumblebee (*B. ruderatus*). Devon also has historical records of three nationally notable species Shrill carder bee (*B. sylvarum*), Great Yellow bumblebee (*B. distinguendus*) and Short-haired bumblebee (*B. subterraneus*), and two rare species, the Broken-belted bumblebee (*B. soroeensis*), and the Red-shanked carder bee (*B. ruderarius*) now possibly extinct in the region. This Atlas indicates a startling decline in bumblebee species in Devon since the middle of the 20th century. This equates to a quarter of the Devon bumblebee fauna lost in one person's lifetime.

Why are bumblebees important?

Bees are extremely important keystone species, as pollinators of 35% of global crop production (Klein et al. 2007). Field beans in Europe are pollinated largely by bumblebees (Goulson et al. 2008b). Evidence suggests that bumblebees may pollinate more effectively than honeybees as bumblebees can operate at lower temperatures, allowing them to operate for longer each day as well as earlier and later in the year than honeybees (Goulson 2003). Most of the native bee species in the UK are economically important for their pollination services, these include smaller solitary species.

Most, if not all, semi-natural habitats rely on insect pollination to form functioning communities (Ashman et al. 2004). Habitats such as dune systems, semi-natural grasslands, wetlands and woodland provide hugely important ecosystem services in the landscape, such as buffering against soil loss, reducing flooding and providing carbon



Heath habitat.

Photo-credit: Alex Worsley.

storage and the health of these habitats relies on pollinators such as bumblebees. Changes in farming practices have reduced the abundance of wildflowers across the UK countryside (Vickers 2001) and this has had a devastating impact on our pollinating species (Ollerton et al. 2014).

The decline in bumblebees may be having dire consequences for the pollination of both agricultural crops and wild plants. The reduction in pollination has potentially resulted in an 'extinction vortex' (Goulson 2003) whereby a reduction in pollinators reduces the ability of plants to reproduce and so reduces the number of flowers, which reduces the pollinators further so that the cycle takes a further downturn, and so creating a negative feedback loop and crash in the populations of both.

Bumblebee ecology

The bumblebee lifecycle

Queen bumblebees generally hibernate over winter, although the Buff-tailed bumblebee (*B. terrestris*) is now known to regularly establish winter-active colonies, and other species such as the Early and Garden bumblebees do so more sporadically. The queen's hibernation site is away from her nest site as she requires a cool sheltered place to survive. In spring she emerges from hibernation and alternates between foraging and nest searching. Species differ in their nest requirements; some nest underground in vole or mouse nests or have long entrance tunnels such as the Red-tailed bumblebee (*B. lapidarius*). Others, such as the carder bees (*B. pascuorum*, *B. muscorum* and *B. humilis*), nest in grass tussocks in a ball of moss and grass, or cracks in walls and sheds may also be used. The author has recorded a Heath bumblebee (*B. jonellus*) nest in a bird box high up in a conifer plantation on Goonhilly Down, Cornwall, and the Tree bumblebee (*B. hypnorum*) is an increasingly-common sight in bird nest boxes in Devon gardens.

The queen initially constructs wax cells to rear her brood, which are more like cups or eggshells than a honeybee comb. Before the workers emerge, the queen will alternate between brood-rearing and foraging for pollen and nectar, which she consumes for energy or uses for feeding her offspring. Pollen is particularly important to the queen while raising a brood; as the colony develops the queen spends more time in the nest, and the workers then take on the role of foraging, caring for the brood and maintaining the nest. The number of workers a colony can produce varies between the species; the Buff-tailed bumblebee (*B. terrestris*) potentially has 300 workers while the Shrill carder bee (*B. sylvarum*) has about 40 workers.

The time taken for a colony to reach its maximum size varies between species and depends on other environmental factors. Colonies may last for two months in short-cycle species such as the Early bumblebee (*B. pratorum*), or about three months in longer-cycle species such as the Shrill carder bee (*B. sylvarum*). At the end of this period the social cohesion of the nest starts to break down, as the queen begins to lay eggs that will produce males or young queens. The workers may lay male eggs as well at this stage. The resulting males will leave the nest to patrol along linear routes, such as hedge lines, where they scent-mark at intervals to attract young queens. Male bumblebees can mate with more than one queen and successfully “father” more than one colony (Gosterit et al. 2016). Queens usually mate with a single male and only mate once, although Tree bumblebee queens (*B. hypnorum*) can mate up to six times (Brown et al. 2002). The mechanisms to prevent queens mating with closely related males are unknown but such events could genetically weaken the colony (Darvill et al. 2007). The young mated queens then either hibernate or, in a few species that are multiple brooded, will found a new colony, such as the Buff-tailed bumblebee (*B. terrestris*) in Devon.

Cuckoo bumblebees

The cuckoo bumblebees, formerly known as a separate genus *Psithyrus*, are social parasites of the ‘true’ bumblebees. The female emerges from hibernation and searches for a bumblebee

nest of a suitable host species. The female cuckoo bee invades the nest and fights with the queen and/or workers, aiming to kill the host queen. Cuckoos use chemical mimicry and repellents to invade their host's nest, or effectively they can wear a chemical camouflage prior to invasion. There are differences in the chemical compounds used by different cuckoos. Gypsy cuckoo bumblebee (*B. bohemicus*), Forest cuckoo bumblebee (*B. sylvestris*) and Southern cuckoo bumblebee (*B. vestalis*) have been found with a chemical which act to repel host workers. Red-tailed cuckoo bumblebee (*B. rupestris*) and Field cuckoo bumblebee (*B. campestris*) were found to only possess mimic chemicals (Martin et al. 2010).

Cuckoo bumblebees have a thicker cuticle and a more powerful sting and mandibles than true bumblebees. This enables the female cuckoo bumblebee to kill the host queen, while the remaining host workers, 'programmed' to feed developing larvae, will help to raise the cuckoo bumblebee's brood. However, different tactics may be used. Lhomme observed Southern cuckoo bumblebee (*B. vestalis*) and Forest cuckoo bumblebee (*B. sylvestris*) avoid conflict and hide themselves into the nest comb (Lhomme et al. 2013). Some cuckoo bees are tolerant of the host queen and allow the host queen to stay alive and reproduce, which has been again been observed for Forest cuckoo bumblebee (*B. sylvestris*) (Lhomme et al. 2013). Nest usurpation is more successful when there are fewer and younger host workers (Sramkova et al. 2009), such as early-stage nests in spring. A vigorous "workforce" can defend the nest more successfully, and compete for reproduction with the cuckoo.

Male cuckoo bumblebees also have to defend themselves from the host workers as they emerge from their pupae. Southern cuckoo bumblebee (*B. vestalis*) males produce scents to repel attacks by Buff-tailed bumblebee (*B. terrestris*) workers in the nest (Lhomme 2015).

Lhomme found a parasitized colony of Buff-tailed bumblebee (*B. terrestris*) on average produced 90 young males and 21 young females of Southern cuckoo bumblebee (*B. vestalis*), whereas a parasitized colony of Early bumblebee (*B. pratorum*) produced 16 males and 5 females of Forest cuckoo bumblebee (*B. sylvestris*). (Lhomme et al. 2013). Cuckoo bees do not have a worker caste of their own, and, as parasites, the cuckoo bumblebees are generally much less abundant than the host bumblebees. Despite this, they can parasitise a high proportion of nests and one study found that 42% of Buff-tailed bumblebee (*B. terrestris*) colonies was parasitised by Southern cuckoo bumblebee (*B. vestalis*) (Erler et al. 2010).

Male cuckoo bumblebee are often seen on late-flowering Asteraceae such as Thistles (*Cirsium spp.*) and Knapweed (*Centaurea spp.*) along field boundaries, where they scent-mark patrol routes to attract young queens.

Cuckoo bumblebee do not collect pollen or nectar for the colony, and their habitat requirements are probably mainly influenced by the habitat requirements of their host species, although differences in distribution of cuckoos and their hosts across the UK suggest other factors may also be at work. Research suggests that Southern cuckoo bumblebee (*B. vestalis*) populations may disperse over a shorter distance than their hosts, possibly because local populations are adapted to local populations of their host (Erler et al. 2010). The ecology of cuckoo bumblebees

requires further research. Cuckoo bumblebees are under recorded in Devon as they can be difficult to identify.

Further information is given by Benton (2006), Goulson (2003), Prŷs-Jones & Corbet (2014) and Sladen (1912). There is however still scope for amateur naturalists to make interesting and useful discoveries on the ecology of cuckoo bumblebees in Devon.

Foraging and population ecology

Bumblebees only store a few days' worth of food at the colony (Prŷs Jones and Corbet 2014) and therefore availability of flower resources is likely to be the predominant factor determining bumblebee abundance and diversity. Pollen is crucial for larval development and finding specific high quality pollen influences bumblebee foraging (Vaudo 2016). It is thought that some of the rarer species have narrower foraging preferences (Goulson et al. 2008a). Studies indicate that bumblebees prefer pollen with higher protein levels (Hanley et al. 2008), many of which are in the Pea family (Fabaceae); Goulson et al. (2005) found that 61 % of foraging visits were to Fabaceae plants. It could be inferred from these studies that pollen resources may be more important limiting factors to bumblebees than nectar resources. One of the most important rare bumblebee forage plants in Cornwall is Kidney vetch (*Anthyllis vulneraria*), which is very strongly associated with the presence of two rare carder bees (*B. humilis* and *B. muscorum*) (Saunders 2008). This could also be the case in Devon. The Bilberry bumblebee (*B. monticola*) is probably the most specialised Devon bumblebee, needing abundant Bilberry to establish populations.

Tongue length is an additional influence on bumblebee populations; longer-tongued species such as the Garden bumblebee (*B. hortorum*) utilise long-tubed flowers and short-tongued bees such as the White-tailed bumblebee (*B. lucorum*) mainly utilise short-tubed flowers. For example, upland moors with short-tubed Bilberry and Heathers are likely to have larger numbers of shorter-tongued species such as the White-tailed bumblebee (*B. lucorum*) and the Heath bumblebee (*B. jonellus*). But this relationship can easily be confounded, as tongue length varies between differently sized individuals in a nest; very small workers of the long-tongued Garden bumblebee (*B. hortorum*) and the medium-tongued Common carder bee (*B. pascuorum*) can probably exploit the same habitats or resources. Additionally, many short-tongued species are adept at 'robbing' long-tubed flowers by biting a hole just above the nectary and bypassing the rest of the flower.

Both landscape quality and quantity are needed to provide forage and nest sites for enough breeding individuals (males and queens) to ensure healthy populations and avoid inbreeding. One study found that the combined pollen resources required to support six common farmland bee species required in any one summer month was somewhere between 350 000 and 18.6 million flower units (or flower heads) per 100 ha (Dicks et al. 2015). It was inferred that a minimum of 2% of the farmed landscape would be needed to have flower rich habitats, to supply the minimum pollen requirements of six common bee species. However, this research suggested a Red clover specialist bumblebee

may need even more than 100 ha of flower rich habitats to supply its minimum pollen requirements. Shrill carder bee (*B. sylvarum*), which can be reliant on Red clover, has very low nest densities. Ellis et al. (2006) estimated 1-2 nests per km², whereas Osborne et al. (2008) estimated 24-70 nests of common species were found per km². The minimum viable population has been estimated as 50 nests for many species (Lehmkuhl 1984). For bumblebees, where workers are essentially sterile, the number of successful nests, as opposed to the number of individuals, is the best representation of population size. So if the Shrill carder bee needs 50 nests this could mean 25–50 km² of suitable habitat is needed for a viable population. Although this is a rough figure it does give a guide of how much landscape is needed for bumblebees.

Another important factor to consider is the foraging range of species, as many bumblebees have been shown to forage over long distances. Hagen et al. (2011) found that bumblebees had maximum flight distances of 2.5 km. Carvell (2012) found mean foraging distances to be 755 m for the Red-tailed bumblebee (*B. lapidarius*) and 775 m for the Common carder bee (*B. pascuorum*). However, there are considerable variations between the species; for example some carder bees (*B. humilis*, *B. sylvarum* and *B. muscorum*) are classed as ‘doorstep foragers’, as they only forage relatively close to the nest. This means that ‘doorstep foragers’ such as the Brown-banded carder bee (*B. humilis*) need lots of flowers within approximately 500 m of the nest throughout the flight season and also may need 50 of these areas to satisfy the minimum viable population requirements previously mentioned. This means these species need large, well-connected areas of high-quality foraging habitat and suggests that in north Devon the Brown-banded carder bee (*B. humilis*) may comprise one population using high-quality flower-rich maritime cliff grassland, heathland and dune sites, connected along the coast. However, the more common species with larger foraging ranges are able to utilise more dispersed flower resources within lower-quality habitats. In Devon common species such as the Buff-tailed bumblebee (*B. terrestris*) are often associated with hedgerows, which are predominantly spring flowering, giving bumblebee species which complete a cycle between April and June an advantage.

There is some evidence that climate change is affecting bumblebee populations on a national level. It has been suggested that the Brown-banded carder bee (*B. humilis*), a southern species, is expanding its range north and outcompeting the Moss carder bee (*B. muscorum*), found in more northern regions in Southern England (Lee et al. 2008). This could reflect differences in habitat preferences. In Devon the large range of microclimates on the north coast could favour co-existence of these two very closely related species. The Brown-banded carder (*B. humilis*) and Moss carder bee (*B. muscorum*) in Devon probably now only occur together on Braunton Burrows.

| Species adaptations | Site-specific factors |
|-------------------------------------|---|
| Length of tongue | Short-tubed or long-tubed flowers |
| Timing of peak abundance of workers | Timing & availability of key flowers |
| Timing of emergence of queen | Timing & availability of key flowers |
| Forage specificity | Quality of habitat/abundance of key flowers |
| Climatic tolerance | Microclimate of site/region and climate change |
| Colony size | Size of habitat and floral abundance |
| Foraging distance | Size and distance to favourable habitat. Also competition |
| Ability to disperse | Distribution of landscape corridors, quality of surrounding habitats. |

Summary of bumblebee adaptations and the landscape influences/limitations

Competition with honeybees

Honeybees can compete with bumblebees for forage and the effects of this competition can have a negative impact on bumblebee species (Goulson & Sparrow 2008). The practice of moving numbers of hives with thousands of bees to areas of Heather could potentially have serious consequences for populations of threatened species in the region, such as the Bilberry bumblebee (*B. monticola*). There is evidence that some of the diseases of commercial honeybees can be spread to bumblebees (Fürst et al. 2014). Inter-species pathogen transmission originating from honeybees has been implicated in the decline of native pollinators. There is a need for greater precautions before bringing new honeybee hives into landscapes with a high diversity of native bees. Honeybees are largely domesticated and are not a threatened species, and honeybee-keeping is unlikely to have conservation benefits, although it obviously does have cultural and sustainable farming benefits.

Distribution of bumblebees of Devon

Of the 24 species of bumblebee recorded in Devon, four are now thought to be extinct in the county.

| Common Name | Scientific Name | Latest year recorded | S.41 |
|---------------------------------|-------------------------------|----------------------|------|
| Barbut's cuckoo bumblebee | <i>Bombus barbutellus</i> | 2015 | |
| Gypsy cuckoo bumblebee | <i>Bombus bohemicus</i> | 2017 | |
| Field cuckoo bumblebee | <i>Bombus campestris</i> | 2017 | |
| Garden bumblebee | <i>Bombus hortorum</i> | 2019 | |
| Brown-banded carder bee | <i>Bombus humilis</i> | 2019 | Yes |
| Tree bumblebee | <i>Bombus hypnorum</i> | 2019 | |
| Heath bumblebee | <i>Bombus jonellus</i> | 2019 | |
| Red-tailed bumblebee | <i>Bombus lapidarius</i> | 2019 | |
| White-tailed bumblebee | <i>Bombus lucorum</i> | 2019 | |
| Northern white-tailed bumblebee | <i>Bombus magnus</i> | 2013 | |
| Bilberry bumblebee | <i>Bombus monticola</i> | 2017 | |
| Moss carder bee | <i>Bombus muscorum</i> | 2018 | Yes |
| Common carder bee | <i>Bombus pascuorum</i> | 2017 | |
| Early bumblebee | <i>Bombus pratorum</i> | 2017 | |
| Red-tailed cuckoo bumblebee | <i>Bombus rupestris</i> | 2017 | |
| Forest cuckoo bee | <i>Bombus sylvestris</i> | 2017 | |
| Buff-tailed bumblebee | <i>Bombus terrestris</i> | 2017 | |
| Southern cuckoo bumblebee | <i>Bombus vestalis</i> | 2017 | |
| Cryptic bumblebee | <i>Bombus cryptarum</i> | 2011 | |
| Shrill carder bee | <i>Bombus sylvarum</i> * | 1978 | Yes |
| Red-shanked carder bee | <i>Bombus ruderarius</i> | 1983 | Yes |
| Broken-belted bumblebee | <i>Bombus soroeensis</i> * | 1979 | |
| Ruderal bumblebee | <i>Bombus ruderatus</i> | 2019 | Yes |
| Great Yellow bumblebee | <i>Bombus distinguendus</i> * | 1982** | Yes |
| Short-haired bumblebee | <i>Bombus subterraneus</i> * | 1928 | Yes |

* Presumed extinct on basis of most recent verified record.

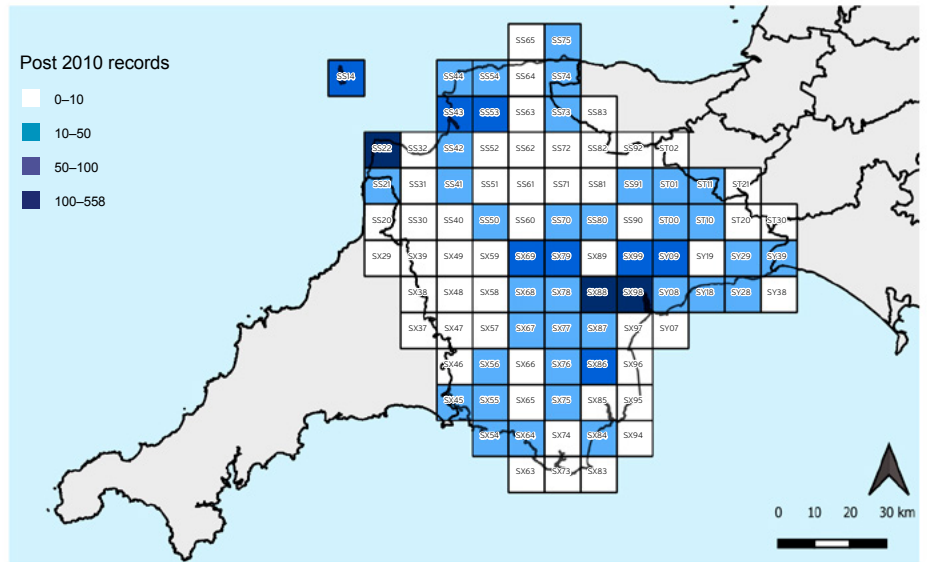
** Unconfirmed record appears in Spooner's notebook, 1985. Prior to this not recorded in Devon since 1936

Key sites for bumblebees in Devon, and the species recorded.

| Site | All records for 10 km square | | |
|--------------------------------------|--|---|--|
| Birch Tor Dartmoor (SX6881) | <i>B. bohemicus</i> <i>B. campestris</i> <i>B. hortorum</i> <i>B. humilis</i> <i>B. jonellus</i> | <i>B. lapidarius</i> <i>B. lucorum</i> <i>B. magnus</i> <i>B. cryptarum</i> <i>B. monticola</i> | <i>B. pascuorum</i> <i>B. pratorum</i> <i>B. sylvestris</i> <i>B. terrestris</i> |
| Braunton Burrows NNR (SS4635) | <i>B. bohemicus</i> <i>B. campestris</i> <i>B. hortorum</i> <i>B. humilis</i> <i>B. lapidarius</i> <i>B. muscorum</i> | <i>B. pascuorum</i> <i>B. pratorum</i> <i>B. sylvestris</i> <i>B. vestalis</i> <i>B. rupestris</i> <i>B. ruderatus</i> | <i>B. distinguendus</i> (1935) <i>B. ruderarius</i> (1934) <i>B. soroeensis</i> (1978) <i>B. sylvarum</i> (1978) |
| Exmoor, Withypool (SS2834) | <i>B. jonellus</i> <i>B. lapidarius</i> <i>B. lucorum</i> | <i>B. sylvestris</i> <i>B. terrestris</i> <i>B. vestalis</i> | <i>B. magnus</i> <i>B. monticola</i> <i>B. cryptarum?</i> |
| Prawle (SX73) | <i>B. barbutellus</i> <i>B. campestris</i> <i>B. hortorum</i> <i>B. lapidarius</i> <i>B. pascuorum</i> | <i>B. pratorum</i> <i>B. sylvestris</i> <i>B. terrestris</i> <i>B. vestalis</i> <i>B. rupestris</i> (1969) | <i>B. muscorum</i> (1944) <i>B. humilis</i> (1978) <i>B. ruderarius</i> (1983) <i>B. soroeensis</i> (1944) <i>B. sylvarum</i> (1969) |

*Includes historical records probably extant. Note some common species are unrecorded but likely to be present.

Map of all records showing recording effort.



The decline of bumblebees

The most important factor driving the decline of bees is the loss of flower-rich habitats caused by post-war intensification of agriculture. Within this, there are several proximate factors driving bumblebee declines. These include:

- Loss of semi-natural habitats: grassland, heath, dunes and moors
- Loss of flowers across the landscape through intensive grazing, silage cutting and nitrogen fertilisers enabling grass domination of meadows
- Lack of grazing on some marginal or uneconomic land such as coastal slopes
- Over-grazing of moorland
- Lack of managed open space in woodland
- Climate change, an increasing factor

There has been unprecedented loss of farmland biodiversity in the post-war era (Boatman et al. 2007). The period between the 1920s and 1960s can be linked to a peak in bee and wasp extinctions (Ollerton et al. 2014). Areas of flower-rich grassland in England and Wales have declined by over 90% between 1934 and 1984 (Fuller 1987). Major factors contributing to this decline include an increase in the use of inorganic nitrogen fertiliser, which benefits agricultural grasses to the detriment of wildflowers. Nitrogen fertiliser consumption in the UK increased by nearly 300% between 1961 and the late 1980s (Rounsevell et al. 2009), and there has been a switch from hay production to silage (Vickery et al. 2001). Heathland and moorland has also been negatively affected by increased stocking rates. Between 1976 and 1997, the total number of sheep in the UK increased by over 50% (Vickery et al. 2001). Figures show that the sheep numbers on Dartmoor farms increased from around 56,000 in 1972 to 239,000 in 2002. During this period there was a reduction in cattle numbers (Turner et al. 2002). Cattle are less selective than sheep, and they will eat coarser vegetation. Cattle are generally considered better for conservation grazing of upland landscapes.



Traditional hay meadow.

Photo-credit: Alex Worsley.

The decline of bumblebees

The countryside has become a 'green desert for bees' dominated by agricultural grasses. One of the last refuges within farmland are the species-rich hedges, commonly seen across the Devon landscape, which form important linear habitats for bumblebees and other wildlife. Unfortunately, over recent decades these hedges have been subject to nutrient enrichment from intensive agriculture, thus reducing the abundance and diversity of flowering plants (Staley et al. 2013). The widespread use of fertilisers is also having a major impact in Europe promoting the growth of ruderal plants such as Nettle (*Urtica dioica*) which may dominate flower-rich habitats (Rasmont 2006). Cutting regimes are also likely to be an important factor. It is rare to see flower rich buffer strips on Devon hedge networks.

Since the mid-1990s, there has been an increase in the use of neonicotinoid pesticides, which are most commonly applied as seed dressings on arable crops such as oilseed rape and maize. These chemicals spread throughout all plant tissues to protect against pests; however the active substances also end up in the pollen and nectar, and can cause harm to bumblebees and other pollinators (Woodcock et al. 2017, Wood & Goulson, 2017). Neonicotinoids also persist in the soil and have been found in the pollen and nectar of flowering plants in field margins (Tsvetkov et al. 2017). In 2018, following a scientific review by the European Food Safety Authority, the European Commission placed a ban on the outdoor use of three neonicotinoid pesticides, Imidacloprid, Thiamethoxam and Clothianidin. These chemicals had been the subject of a moratorium for their use on crops which are attractive to pollinators since 2013, while the scientific review was completed

The effect of post-war changes in forestry has been well documented with respect to butterflies and moths; woodland butterflies have declined dramatically in recent decades and this can be associated with both plantation forestry and lack of woodland open space (Merckx et al. 2012). Changes in woodland management are likely to have also had similar significant negative effects on Devon bumblebees, which also utilise open woodland habitats.

As bumblebees are adapted to colder conditions, climate change is likely to negatively affect bumblebee populations (Rasmont et al. 2015). More frequent extreme weather events may be putting large additional pressures on bumblebee populations across the UK, and local weather effects on biodiversity have not been fully assessed.

Conservation of bumblebees

Much conservation management for bees in Devon is by proxy; generally flower-rich sites are managed for their botanical interest or for priority bird species under agri-environment schemes. However, there is also a need for conservation management specifically for bumblebees, and more targeting of individual site management plans for pollinators is needed. Conservation of protected sites such as Sites of Special Scientific Interest (SSSIs), and the management of large areas of the coast by organisations such as the National Trust, create and protect extremely important habitat for bees. There are a number of conservation grazing schemes throughout Devon which have yielded good results, but grazing is difficult on the very important flower-rich coastal edge and so these areas are increasingly scrubbing over, therefore reducing the flowering plant richness. High prices of oil-based fertilisers could be a cause for hope, and this appears

to be resulting in increased planting of nitrogen-fixing legumes such as clovers in the Devon countryside, which have the beneficial side-effect of being excellent forage for bumblebees.

| Key Areas | |
|------------------------------------|---|
| North coast of Devon | Flower-rich grassland, maritime heath and dunes. |
| South coast of Devon | Some good sites still, although more fragmented and less species rich than north Devon coast. |
| Braunton Burrows | Flower-rich grassland and dunes. |
| Exmoor | Heathland, hay meadows and moorland |
| Dartmoor | Heathland, moorland, rush pastures and hay meadows |
| Culm measures Devon | Now very fragmented; small areas of flower-rich grassland remain. Probably was important for rare bumblebees particularly Broken-belted bumblebee (<i>B. soroensis</i>) |
| East Devon pebblebed heaths | Lowland heathland |

Key areas currently or formerly of importance for bumblebees in Devon



Countryside Stewardship Scheme

Natural England is helping to conserve bumblebees through its delivery of the Countryside Stewardship Scheme and its network of protected sites.

Countryside Stewardship is a voluntary scheme that pays farmers to protect and enhance the environment. Providing a package of measures to conserve wild pollinators is a cornerstone of the scheme. The package includes the provision of:

- Nectar and pollen sources, for example by planting patches of nectar-rich plants such as red clover, common vetch, common knapweed and ox-eye daisy; and
- Hibernation and sheltering habitat, for example by not grazing grassland so tightly so that it becomes a bit tussocky.

Natural England has been working with partners such as Buglife to develop a 'B-lines' map for South Devon; besides working with Bumblebee Conservation Trust's West Country

Buzz Project. Natural England have published a map of Farm Wildlife Package 'Hotspots' to help target the Countryside Stewardship Scheme. The Countryside Stewardship also provides a 'Facilitation Fund' which enables our partners to work with groups of farmers to deliver the Farm Wildlife Package in a joined-up way on a landscape scale.

Many of Devon's Sites of Special Scientific Interest (SSSI) include invertebrates as notified features. Such as the Prawle and Start Point SSSI, which covers 337 hectares and where over 100 species of bees and wasps have been recorded, including rarities such as the Long-horned bee.

Philip Stocks

Natural England Land Management and Conservation Adviser

Gardening for bumblebees

It is easy to have a good garden for bumblebees. Create semi-natural 'meadow-like' habitats using native plants in combination with 'garden' plants to create the best habitats for social and solitary bees. Recent research has found greater abundance of general invertebrates will be supported in gardens with plantings biased towards native and near-native species (Salisbury et.al. 2017).

It is important to have flower resources spread throughout the year, and to provide a peak of flowers within the busiest periods; April-June for queens and June/July for workers, and August/September for pre-hibernation queens. Devon gardens typically have an oversupply of very early or very late colour, as traditional gardening boosts the unusual, and leaves an undersupply of summer meadow flowers. Research has found perennial meadows produced up to twenty times more nectar and up to six times more pollen than annual meadows (Hicks et al. 2016). This study of typical annual and perennial seed mixes also found native weed species (Dandelions, Ragwort and Thistle) to be extremely important contributing the top five nectar producers and two of the top ten pollen producers on the study sites (Hicks et. al. 2016). Winter-flowering shrubs such as Mahonia will take space which is better used by more wildlife-friendly plants.

The Pea family Fabaceae (Vetches, Clovers, Broom, Trefoils, Broad beans, Runner beans etc) should be used as top priority 'super foods' and also because they are likely to be less abundant in typical Devon gardens. Also try to include some within other families Lamiaceae (Oregano, Lavender, Catmints, Deadnettle, etc), Boraginaceae (Lungwort, Comfrey), Scrophulariaceae (Foxglove, Snap dragons), Dipsacaceae (Teasels, Scabiouses), Asteraceae (Asters, Thistles), Ericaceae (Heathers, Blueberries), and Rosaceae (Rockrose, Cinquefoil). The top-pollen producing species in a study of typical perennial wildflower seed mixes per flower were Musk mallow (*Malva moschata*), Black knapweed (*Centaurea nigra*) (which ranked highly for both nectar and pollen rewards) and Ox-eye daisy (*Leucanthemum vulgare*) (Hicks et. al. 2016). Too much variety may mean less efficient foraging, akin to shopping in a supermarket with 50 brands of baked beans. Plant decent stands such as at least ten of each flower species. Planting in 'drifts' looks better as well.

Fruit and vegetable gardens can be useful for bumblebees. Hedges and orchards are very valuable with Rosaceae (Apples, Damsons and Hawthorn) but should be balanced with the importance of retaining un-shaded sunny meadows and borders. Many gardeners underestimate how big that shrub someone plants will get!

A traditional cottage garden is often the best garden for bees. In general, it is better to go for older and less hybridised varieties of garden flowers, as some hybrid forms lack the nectar and pollen that bees need. Avoid double-flowered varieties, as these produce vast quantities of petals which usually block access to any pollen or nectar that may be produced. Annual bedding plants are often an industry with unsustainable peat-use and large quantities of single use plastic, and typical bedding plants are poor for bees. But annual seeding schemes can be good for bees such as the pictorial meadows of the Olympic park.

There are many guides with very large plant lists for bee friendly gardens, but if you use these basic guidelines mentioned above you should have a bee friendly garden. Listed below are a small range of excellent bee plants suitable for Devon gardens.

Garden for bumblebees

Early forage plants; Heathers (*Erica* spp.), Willow (*Salix* spp.), Grape hyacinth (*Muscari*), Lungwort (*Pulmonaria*), Bugle (*Ajuga reptans*), Ceanothus (*Ceanothus* spp.), Pieris (*Pieris* spp.), English bluebells (*Hyacinthoides non-scripta*), Creeping comfrey (*Symphytum grandiflorum*).

Mid-season forage plants; Columbine (*Aquilegia* spp.), Clovers (*Trifolium* spp.), Foxglove (*Digitalis purpurea*), Lavender (*Lavandula* spp.), Sages (*Salvia* spp.), Honeysuckle (*Lonicera* spp.), Viper's bugloss (*Echium* spp.), Cranesbills (*Geranium*), Bell flowers (*Campanula* spp.), Lupin (*Lupinus* spp.), Sweet peas and Everlasting peas (*Lathyrus* spp.), Deadnettles (*Lamium* spp.), Russian comfrey (*Symphytum* × *uplandicum*).

Late-season forage plants; Caryopteris (*Caryopteris* spp.), Devil's-bit scabious (*Succisa pratensis*), Bergamot (*Monarda* spp.), Verbena (*Verbena bonariensis*), Michaelmas daisy (*Aster* spp.), Fuchsia (*Fuchsia* spp.), Globe thistles (*Echinops* spp.), Goldenrod (*Solidago*).

Suitable nesting habitat is important to attract bees to your garden, although many gardens will have some suitable areas without trying to create it. Areas of tussocky grass, unkempt scrub and Brambles around the garden edges are useful as well as other features such as walls or garden sheds, and Devon banks are also attractive. Bumblebee nest boxes can allow interesting and valuable opportunities for observing bee behaviour. Consult 'The Humble-bee' by Sladen (1912) for further information. Putting out bumblebee nest boxes is probably not a good idea as they are rarely occupied, apart from by the Tree bumblebee (*B. hypnorum*) which can use bird boxes. The surrounding wider landscape is of importance, such as surrounding gardens, agricultural land or meadows.



Garden bumblebee
(*B. hortorum*) on an
Aquilegia.

Photo-credit: Patrick Saunders

Wildflower lawns

It is possible to create great short grass areas for bees which you can enjoy as well. The plant species to encourage would depend on your site and soil type. Species in the Pea family (Fabaceae) are very important bumblebee forage plants and both Bird's foot trefoil (*Lotus corniculatus*) and Red clover (*Trifolium pratense*) can create very attractive low maintenance lawn areas in a garden. The best management for such an area is mowing and removing the clippings throughout September to March, keeping it as a short lawn. Between April and September cut a bit higher and leave areas within the lawn for a few weeks to flower and set seed. You can time these cuts depending on the species you wish to flower and which plants you wish to set seed. The lawn should be kept slightly taller than a normal lawn in summer months, which both allows the plants to flower, and allows you to lie/sit on top of the flowers without damaging them. A spring meadow/lawn works well in Devon; leave the lawn uncut between late March and June and then cut it as a lawn outside these times.

| Species | | Note |
|----------------------------|-------------------------------|---|
| Red clover | <i>Trifolium pratense</i> | Best plant |
| Bird's foot trefoil | <i>Lotus corniculatus</i> | Best plant |
| Self-heal | <i>Prunella vulgaris</i> | Mower proof and good forage |
| Bugle | <i>Ajuga reptans</i> | Mower proof and good forage |
| Ground ivy | <i>Glechoma hederacea</i> | Mower proof and good forage |
| Slender speedwell | <i>Veronica serpyllifolia</i> | Mower proof – better for solitary bees |
| Germander speedwell | <i>Veronica chamaedrys</i> | Mower proof – better for solitary bees |
| Lesser celandine | <i>Ranunculus ficaria</i> | Mower proof |
| Autumn hawkbit | <i>Leontodon autumnalis</i> | Mower proof and good forage |
| Mouse-ear hawkweed | <i>Pilosella officinarum</i> | Tough – better for solitary bees |
| Kidney vetch | <i>Anthyllis vulneraria</i> | Good bee plant but better in lime rich soils |
| Wild thyme | <i>Thymus polytrichus</i> | For poor soils |
| White clover | <i>Trifolium repens</i> | Tough |
| Dog violet | <i>Viola rivianna</i> | |

Some species suitable for a pollen and nectar lawn

Wildflower meadows

Small native meadows can be very attractive features in a garden and excellent for wildlife. The management of a meadow is similar to the management of a wildflower lawn, but you would not need to keep it so short in summer. Even in a small garden, Yellow rattle (*Rhinanthus minor*) should be an essential part of a wildlife meadow. Yellow rattle parasitizes vigorous plants, which would otherwise compete with the wildflowers, and so it encourages species-rich grassland as

well as being excellent bee forage. Yellow rattle is easy to establish by scattering seed in your desired grassland in autumn. A traditional hay meadow is grazed hard in the winter and cut once in June or July, and this management can be mimicked very successfully in a garden by cutting very low throughout winter, and then once-cut in July or August.

Providing a wide range of habitats within your meadow is the best way to encourage invertebrate species, and can be better achieved by not cutting the entire meadow in one go. Over a number of years it may be possible to reduce the cutting intensity, depending on local soil fertility.

| Season | Management cycle | Tools to use |
|---------------|---|---|
| Winter | Cut meadow twice, as low as possible, between October and February Remove clippings | Rotate cutting to leave a quarter of the whole area uncut each time It may be possible to use a lawn mower, particularly in the second cut |
| Spring/Summer | Cut any areas of high fertility in May or June but not areas with Yellow rattle Remove clippings | Ideally after a number of years there will be fewer areas of high fertility Scythe or strimmer |
| Autumn | Cut $\frac{3}{4}$ of meadow, not too low, in mid-September Remove clippings | Leave some late-flowering plants Scythe or strimmer |

Management recommendations for wildflower meadows.



Photo-credit: Alex Worsley.



Photo-credit: Stuart Norris.

*(left) A tall herb fen, with Stachys palustris.
(right) A bumblebee on Vicia cracca.*

Sourcing wildflowers

Using locally sourced Devon seed is always better for meadow creation. This is very important if your meadow area has existing Devon flora or is close to other high quality habitats. Consult Flora locale website for advice on sourcing local seed. Below is a guide to the propagation of the best and easiest plants to grow in a Devon meadow.

| Species | Autumn/Winter | Spring |
|---|--|---|
| Oxeye daisy (<i>Leucanthemum vulgare</i>) Knapweeds (<i>Centaurea</i> spp.) | Store dry in domestic fridge | Sow in seed trays spring |
| Field scabious (<i>Knautia arvensis</i>) Devil's-bit scabious (<i>Succisa pratensis</i>) | Sow dry in plant pot 50/50 compost and sand. Outside all autumn / winter, with a slate on top | Sow in mix in seed trays spring |
| Birds foot trefoils (<i>Lotus</i> spp.) Everlasting pea or Vetchling (<i>Lathyrus</i> spp.) Vetches (<i>Vicia</i> spp.) | Store dry in domestic fridge | Before sowing soak in warm water for 24 hrs. Sow in seed trays spring |
| Yellow rattle (<i>Rhinanthus minor</i>) | Scarify grass area in late summer / early autumn | Sow in situ late summer / early autumn |

Propagation of meadow plant species



*White-tailed
bumblebee (B.
lucorum) on Field
scabious.*

Photo-credit: Fiona Freshney.

Bumblebees and a Devon farmer

By Audrey Compton

When I started farming in 1969, Dagger Meadow was our biggest field. ‘Daggers’ is the Devon name for wild, yellow iris, and local people told me that, back in the 50s, they thrived there along with many other plants, birds and insects. But in 1969 it was our most useful field – 10ha of ryegrass and clover. Early mornings, when I was moving the electric fence, I’d often stop to watch our Barn Owls ‘quartering’ the field for voles. A couple of years later they had gone, but it didn’t occur to us that there was a connection with the fertiliser that increased grass yields and produced more milk; the rough, tussocky ‘habitat’ (not a familiar word then) had gradually become productive pastures – and the voles had gone.

I was born in 1950 and I loved the countryside and wildlife. I wasn’t from a farming family, but I realised how important food production was, because everyone I knew had experienced years of food rationing. I thought that being a farmer would be the ideal way to produce food and enjoy wildlife. But even though I read Rachel Carson’s *‘Silent Spring’* in 1963, I didn’t understand how massively food production and wildlife would conflict. I didn’t realise that the natural world had already changed for ever.

Throughout the 70s and 80s, my first husband and I were tenant farmers on an 80ha dairy farm in South Devon. Most of our fields had been growing barley, oats, swedes and grass crops since the 19th century, with plenty of arable weeds and meadow flowers providing nectar for millions of insects. Right up to the late 1950s, it had been farmed traditionally, providing jobs for a dozen men and women who hand-milked a few cows, tended the sheep, weeded the swedes by hand – but made hay and ploughed the fields using an amazing, new tractor, provided by the local War Agricultural Executive Committee. Change was in the air ...

Our first big change was in 1971, when we started to make silage instead of hay – it was a good way of beating the wet weather that so often ruined hay. But because grass for silage was cut young, the clover never flowered and there was no nectar for pollinators. Even then, I don’t remember there being many bees around, it already felt as if farms weren’t the place for them – the place for bees was your

flower garden. And there was no good place for flies – they were a menace to grazing animals and dairy hygiene!

Although I was aware that our farm was losing some wildlife, we were careful farmers; we didn’t use many weedkillers and we never sprayed insecticides. There was tremendous governmental pressure on farmers to modernise, with generous grants offered. Adjoining farms ripped out lots of hedges, but on our dairy farm the hedges provided shelter for cattle and made grazing easier to control. The hedges were where our wildlife survived, where the birds nested and the primroses flowered. Though the primroses were gradually replaced with nettles and hogweed (which loved the nitrogen fertiliser) we hardly noticed it in a very busy life, which revolved around milking and caring for over a hundred cows, raising our children and trying desperately to keep our bank manager happy. Modern farming demanded heavy investment in buildings and equipment, but now the farm only provided work for four of us, even though we were producing ten times as much food as in the 50s.

Fast forward to 2000, when my partner, John Whetman, and I managed to buy Deer Park Farm – 40 hectares of Teign Valley land, split into 24 little fields. Most of them are much too steep to plough, fertilise or spray (even with modern machinery), so they are full of wild flowers and buzzing with insects, including several different species of bumblebees! But we can only keep all of these species if we farm really carefully – we need just the right

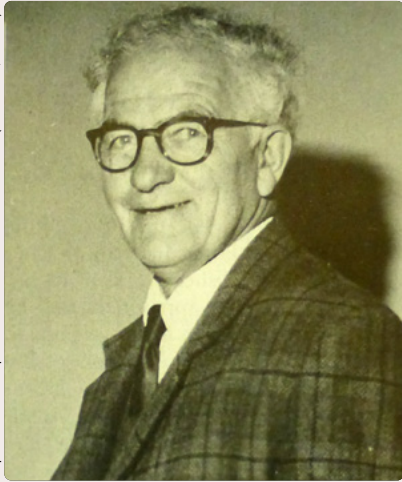
number of cattle and sheep to graze these flowery fields, and we need to make enough hay to feed the stock through the winter. If we have too many animals, all of the wild flowers are eaten before they can bloom, produce nectar and seed. If we don't keep enough then brambles and bracken invade! A cycle of hedge-laying provides different ages of hedge growth, with flowers, fruits and shelter for a vast range of wildlife. Our farm's wildlife is currently supported by a wonderful government scheme (Higher Level Stewardship), but our contract ends in 2022, and new contracts stopped being offered years ago. What then?

The contrast between our little, unspoilt farm and more intensive farms is enormous, but even so, it isn't an island. However hard we try, we can't stop climate change, atmospheric pollution and surrounding wildlife losses from damaging our wildlife here. And farming beef and sheep in an environmentally friendly way without support simply doesn't make a profit. Everyone wants cheap food, and if the UK can't compete with world prices, then food will be imported from places where animal welfare and environmental protection are

much worse! Sadly, UK farmers can only make a profit if they damage our countryside and wildlife.

How can we change this gloomy state of affairs? We believe the only way is to help everyone to love wildlife and understand the difficulties of farming. Our contribution is to welcome hundreds of people to Deer Park Farm every year, including lots of school groups, so that people can get really involved with wildlife – including our wonderful bumblebees!





Malcolm Spooner

Guy Malcolm Spooner should be considered the most important bee and wasp recorder in Devon and Cornwall before 1990 and contributed most of the historical bumblebee records for this Atlas. Malcolm Spooner was born in Yelverton, in 1907. After graduating from Cambridge he worked for 43 years at the Plymouth Laboratory of the Marine Biological Association (MBA). His work for the MBA included research on the genetics of gammarids, and investigations of the uptake of radioactive fission products by seaweeds. He was an expert on Wembury crevice fauna and the mudflat fauna of Salcombe.

His research was interrupted by the War to do codebreaking at Bletchley Park. In 1941 he was sent to Beaumanor Hall as the senior Liaison Officer. Working on his own he solved the system in which the German army ordered columns of information into call signs. An important breakthrough at Beaumanor contributed to the German defeat in North Africa and this was made by staff working on an 'ancient wide seat' in a bathroom and a board over the bath (Pearson 2011). Spooner later returned to Bletchley. Some accounts say the codebreakers shortened the war by two to four years and may have avoided the deaths of a further 14 to 21 million people. It is not clear how Malcolm fitted into the Bletchley work, but he was awarded an MBE for this work, and did attend at least one social evening with Alan Turing.

Problem solving continued when he attended Devonshire Association meetings:

"Sitting next to him at a meeting always enlivened the proceedings as his pencil was never still; he was either drawing

caricature-like cartoons of the people around him or else he was constructing the most complicated word puzzles." Boalch 1990

As young as 12 he had published his first entomological paper about Pine hawk-moths. He was an expert on solitary bees and wasps, contributing numerous papers for Entomological periodicals and to works such O.W. Richards' RES guide to solitary wasps and to the collections at the Natural History Museum. He has a solitary wasp named after him *Psen spooneri*. Malcolm's diaries are still in NHM. His notes on Devon's and Cornwall's bees and wasps are still an excellent source of information.

In his natural garden at Yelverton, he enjoyed showing visitors flies and solitary wasps visiting Angelica. He was also a botanist and alongside his wife Molly made an important contribution to recording for the Atlas of the Devon Flora. He was a founder member of the Devon Wildlife Trust, a member of the Dartmoor National Park Commission and was active in the Devonshire Association.

From re-visiting sites in Devon and Cornwall that Malcolm visited 80 years ago and reading his notes, there are relevant observations to be had about changes in bee fauna and in Devon's landscape. Also personal reflections about the cultural changes in naturalists, such as the massive decline in tweed. Malcolm must have seen and may have been involved in pioneering computing at Bletchley Park, but his Devon bee records were in an era of hand-written cards, hand coloured maps and postal communications. I wonder what any future generation will conclude looking at our digital foot-prints over Dartmoor.

"Those of us who knew Malcolm have a lot to be thankful for, he taught us much and showed us how to appreciate the full range of nature." Boalch 1990

There are fundamentals in the flowers, bees, rain or sun we can always share, in any era, and hopefully Devon naturalists will always be there carrying on protecting the place they love.

Recording bumblebees

Understanding bumblebee distribution will help direct future conservation efforts. There are large gaps in our knowledge, and it is hoped that the Atlas will encourage more bumblebee recording. Bumblebees can be difficult to identify in the field. Records of difficult species have been verified by the author and Atlas partners. Unverified records may not be included at the discretion of the author.

For best practice on collecting species, follow invertebrate link guidelines:

[http://www.royensoc.co.uk/InvLink/documents/Collecting%20Code%20\(2002\).pdf](http://www.royensoc.co.uk/InvLink/documents/Collecting%20Code%20(2002).pdf)

We are calling for bumblebee records, of both rare and common species. To submit records send to DBRC <http://www.dbrc.org.uk/tell-us-about-your-sighting/>. Ideally in standard recording format such as http://www.dbrc.org.uk/i/Species_recording_Excel_spreadsheet.xls. Alternatively, submit your records to iRecord <https://www.brc.ac.uk/irecord/>

For enquires contact Cathy Horsley cathy.horsley@bumblebeeconservation.org

Species accounts

Field guides and keys to bumblebees

The species accounts are intended to be used along-side existing identification works. Recommended works include *Bumblebees* (Benton, 2006), *Handbook of the Bees of the British Isles* (Else & Edwards, 2018.), *Field Guide to the Bees of Great Britain and Ireland*, (Falk, 2015), *Bumblebees* (Prŷs-Jones & Corbet, 2014), *Bumblebees: An introduction* (Gammans et al. 2018)

S41: Section 41 Species

Some bumblebees in the species accounts are indicated as '**S41**'. This relates to the Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.

National and regional distribution map data

All national and regional distribution maps contains BWARS and BeeWalk data reproduced with permission. The maps also contain OS data © Crown copyright and database right (2019). Please note the national distribution maps indicate post-2000 species data.

Garden bumblebee (*Bombus hortorum*)



Photo-credit: Rose Lander.

Devon Phenology & Lifecycle

Garden bumblebees (*B. hortorum*) have a short colony cycle, although queens appear to be active over a longer period than other bumblebee species. Garden bumblebees (*B. hortorum*) can be found in large numbers in gardens during the spring on Columbine (*Aquilegia*) blooms and then later during June/July as they forage on Foxglove (*Digitalis purpurea*).

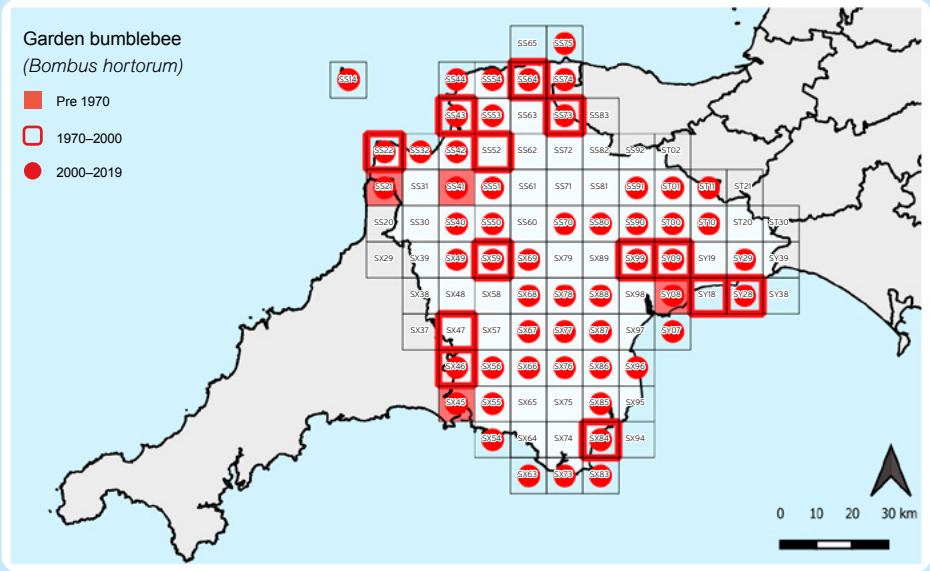
Habitat & Ecology

The Garden bumblebee (*B. hortorum*) is a long-tongued species, foraging on long-tubed flowers such as Lamiaceae and Fabaceae, with queens using flowers such as Foxgloves (*Digitalis purpurea*), Hedge woundwort (*Stachys sylvatica*), White deadnettle (*Lamium album*), Ground ivy (*Glechoma hederacea*), Kidney vetch (*Anthyllis vulneraria*) and Red campion (*Silene dioica*). Workers can be quite small in the peak period and are probably able to access much smaller flowers; Red clover (*Trifolium pratense*) is probably important for workers of this species. Garden bumblebees are commonly found in garden or woodland edge habitats, open coastal

habitats and, to a lesser extent, moorland/heathland. The author suspects populations do better in gardens than the wider countryside. Nests are usually underground but can be on the surface. Medium sized nests can contain about 100 workers. The Garden bumblebee has been recorded nesting in a wooden nest box on the ground. In Devon coastal grassland and areas of abundant Kidney vetch (*Anthyllis vulneraria*) can support high numbers of this species. This species may also be important as a pollinator of deep flowers which other bee species cannot pollinate.

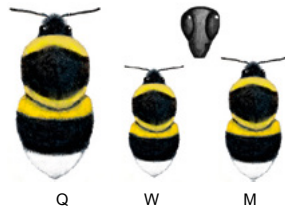
Conservation

Conservation of flower-rich field boundaries, woodland edges, and hedgerows is important for the Garden bumblebee (*B. hortorum*). Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate.



Regional Distribution:

Common.

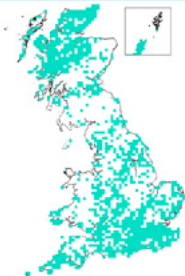


Identification

This species can easily be confused with the very similar but rare Ruderal bumblebee (*B. ruderatus*) and Heath bumblebee (*B. jonellus*), care and experience is needed to avoid misidentification.

National Range and Status:

Common throughout UK.



Alternative Names Garden bumblebee
Bombus (Megabombus) hortorum

Brown-banded carder bee (*Bombus humilis*)

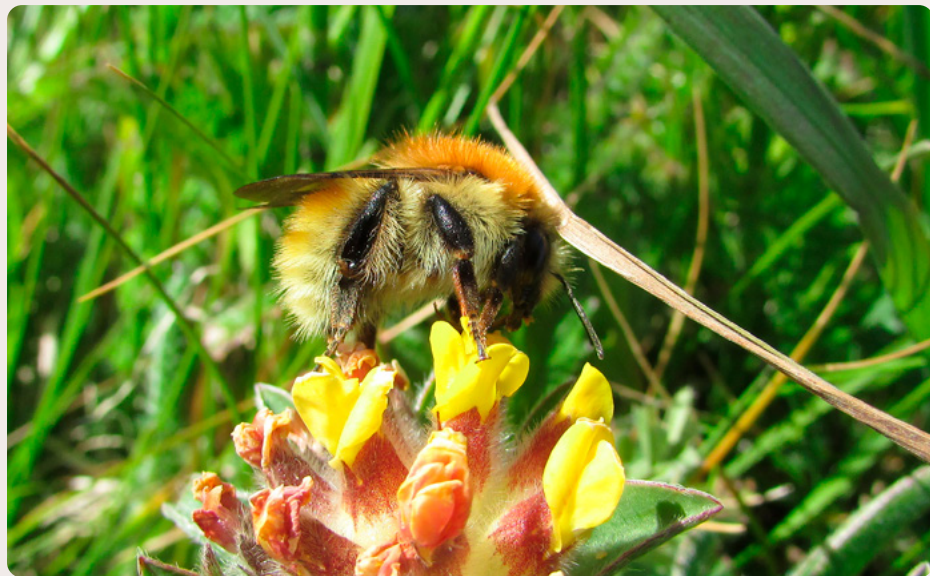


Photo-credit: Patrick Saunders

Devon Phenology & Lifecycle

A late species generally, although in Cornwall it can occur reasonably early with queens in mid-April, with numbers peaking between late June and late August.

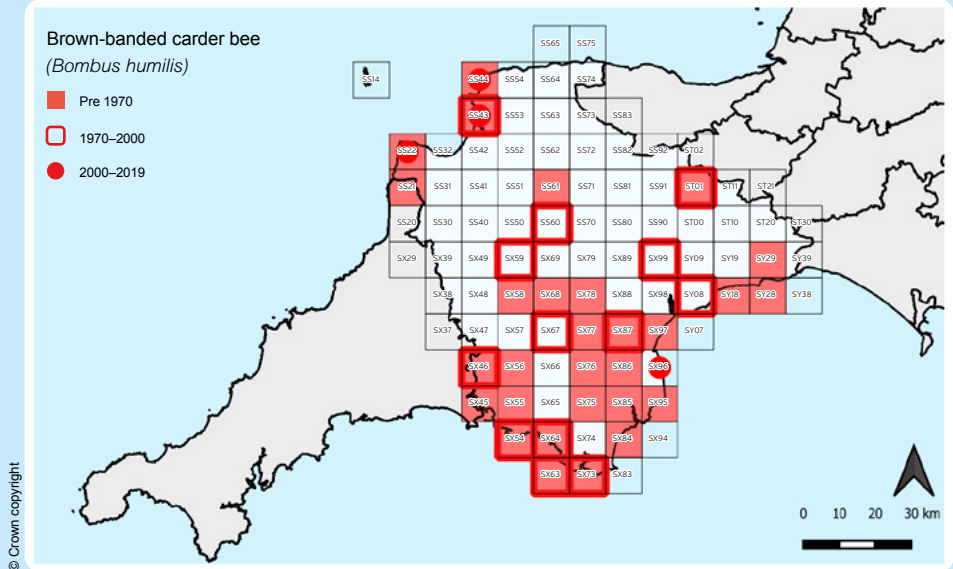
Habitat & Ecology

This is a long-tongued species and can be associated with Kidney vetch (*Anthyllis vulneraria*), which appears to be the most important forage for queens in Cornwall (Saunders 2003). A variety of other forage is used by workers including Red clover (*Trifolium pratense*), Betony (*Stachys officinalis*), Bird's foot trefoil (*Lotus corniculatus*), Knapweed (*Centaurea nigra*) and Wild thyme (*Thymus polytrichus*). The north coast of Devon is similar to Cornwall, although less extensive and less surveyed for bumblebees. Brown-banded carder bees can be found on long narrow linear habitats on the north coast of Cornwall, where the flower-rich grasslands have been reduced to coastal cliffs. Generally it nests on the surface of the ground and has a small colony size. It has a short foraging range and relies on very

high quality habitats close to the nest. In 2008, a nest was found by the author on the slopes of a Cornish hedge slightly underground in Thrift (*Armeria maritima*) tussocks, surrounded by a rich patch of Red clover (*Trifolium pratense*).

Conservation

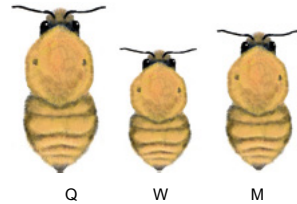
The Devon population of Brown-banded carder bee (*B. humilis*) is nationally important. Protection and suitable management of coastal flower-rich grassland is hugely important for this species and introduction of pollen and nectar margins or clover leys in the agricultural landscape as well as preservation or management of any flower-rich habitat within 1 km of suitable sites (i.e. most areas of the north Devon coast) would be of benefit.



Regional Distribution

The Brown-banded carder bee has greatly declined. The only strong site for the Brown-banded carder bee (and Moss carder bee) in Devon is the Branton Burrows (SS4533) with a few additional recent records elsewhere of Brown-banded carder bee on the North Devon coast. The species was formerly recorded on a great number of sites inland and on the south coast where it is no longer present. M. Spooner (1985) quotes R. Perkins '*Common generally distributed in Devon. On East Dartmoor about 8-900ft abundant on wood sage R.C.L.P. 1913*'.

Malcolm Spooner (Spooner 1985) says about the Brown-banded carder bee '*quite general in south west Devon, but mainly in the drier parts and most common in finer years.*'



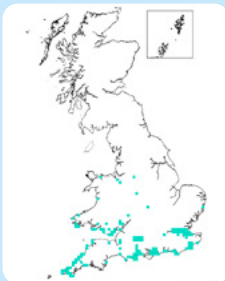
Identification

This species is difficult and can easily be misidentified: care and experience is needed to separate from the Moss carder bee (*B. muscorum*) and faded examples of Common carder bee (*B. pascuorum*).

National Range and Status

Has declined greatly in the UK. Strongest populations are found in South and Southwest.

S41



Alternative Names

Brown-banded carder bee, *Bombus* (*Thoracobombus*) *humilis*

Tree bumblebee (*Bombus hypnorum*)



Photo-credit: Andrea Finch.

Devon Phenology & Lifecycle

The Tree bumblebee (*B. hypnorum*) is an early species, Queens have been recorded in March. It can be multiple brooded, with individuals recorded as late as November.

Habitat & Ecology

This species can be found in woodland edges as well as gardens and other grassland habitats. Tree bumblebees have been known to utilise bird boxes and other artificial nesting/roosting boxes in gardens and woodlands.

Conservation

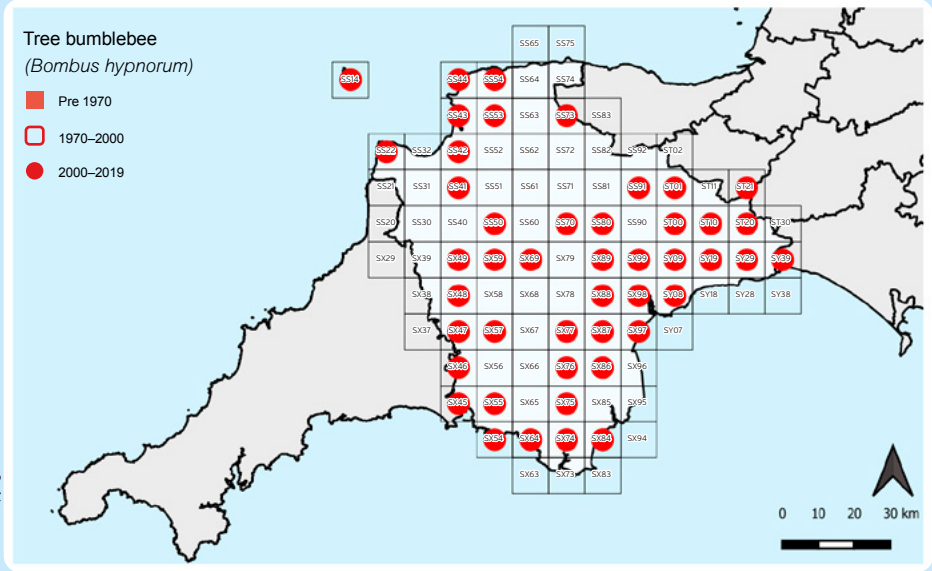
Conservation of flower-rich woodland edge and garden habitats is important for this species, though more research on the requirements of this bumblebee is needed. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate.



Photo-credit: BBCT.

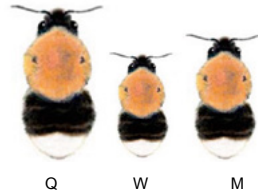


Photo-credit: BBCT.



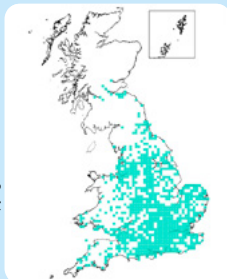
Regional Distribution

A continental species, first recorded in Devon in 2010. It is becoming common in Devon, although it has spread more slowly through Devon and Cornwall than it has in the north eastern English counties. (Roberts 2009).



Identification

The Tree bumblebee is very distinctive and easy to separate from all the other bumblebees. Occasionally darker forms can occur which are more difficult.



National Range and Status

Expanding through England, Wales and southern Scotland.

Alternative Names *Bombus*
(*Pyrobombus*) *hypnorum*

Heath bumblebee (*Bombus jonellus*)



Photo-credit: Nick Owens.

Devon Phenology & Lifecycle

The Heath bumblebee (*B. jonellus*) can occur in two broods; the first brood may be found very early, even in February, and can be found in diverse habitats away from heathland. It is more common for workers to peak in abundance during August when Bell heather (*Erica cinerea*) is in flower.

Habitat & Ecology

This is a short-tongued species and can be found most commonly on heathland where there is an abundance of Bell heather (*Erica cinerea*). It can occur in good numbers in heathland both on the coast and inland, however away from heaths this species occurs on a more dispersed basis. Heath bumblebees (*B. jonellus*) forage on Heathers (*Erica cinerea*), Ling (*Calluna vulgaris* and *Erica cineria*), Bilberry (*Vaccinium myrtillus*), Willow (*Salix* spp.), Wild thyme (*Thymus polytrichus*), Eyebright (*Euphrasia* spp.), Purple loosestrife (*Lythrum salicaria*), Tormentil (*Potentilla erecta*) and Western gorse (*Ulex gallii*). Nests are medium to small, reported as containing 50–120 workers, and in a variety of situations. The author reports

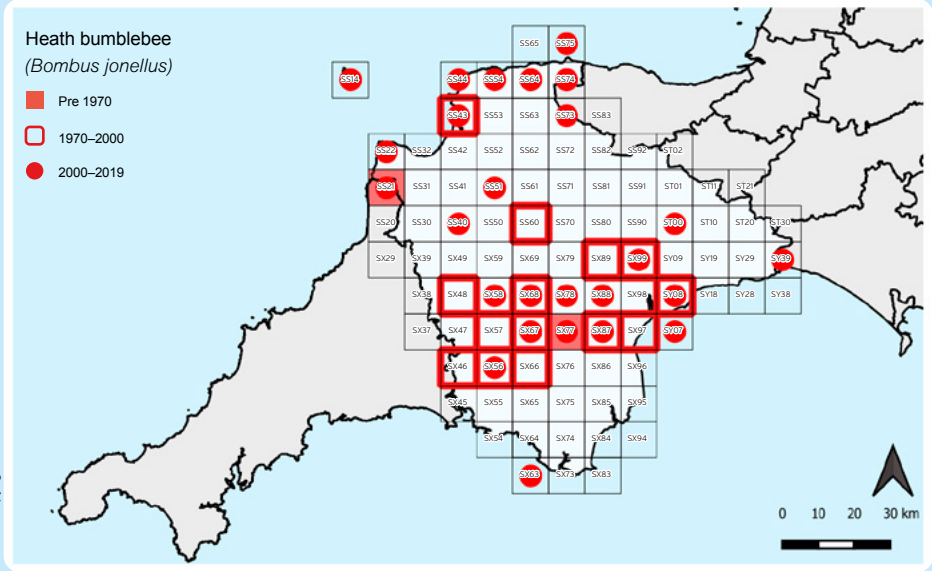
finding a Heath bumblebee (*B. jonellus*) nest in a bird box within a dense conifer plantation on Goonhilly Downs, however more natural locations for nests are likely to be on the ground in scrubby heathland.

Conservation

Maintain traditional grazing, to encourage heathland rich in Heathers (*Erica cinerea* and *Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*). Threats include over-grazing on moorland and heathland habitats, (often too many sheep) and development on brownfield ex-mining sites particularly in Bovey Basin.

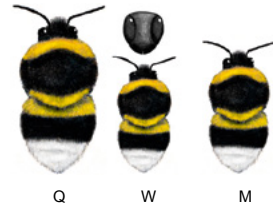


Photo-credit: BBC T.



Regional Distribution

Local. Particularly found on Dartmoor, Exmoor and other heathland and coastal areas: Bovey Basin heaths, Dawlish Warren, East Devon pebblebed heaths.

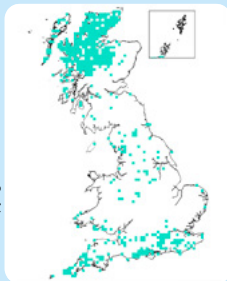


Identification

This species can easily be confused with the very similar Garden bumblebee (*B. hortorum*) and possibly Ruderal bumblebee (*B. ruderatus*); care and experience is needed to avoid misidentification. Male White-tailed bumblebee (*B. lucorum*) also look similar to the Heath bumblebee (*B. jonellus*). Some of the queens encountered on the north coast of Cornwall are of a dark form with little or no yellow banding. These may be also present in Devon.

Alternative Names

Bombus (*Pyrobombus*) *jonellus*



National Range and Status

Widespread but local in UK.

Red-tailed bumblebee (*Bombus lapidarius*)



Photo-credit: Tessa Bramall.

Devon Phenology & Lifecycle

This species is recorded throughout the summer. The colony cycle is described as short (Macdonald & Nisbet 2006) or medium (Benton 2006). It is possible the species could occur in two broods in Devon.

Habitat & Ecology

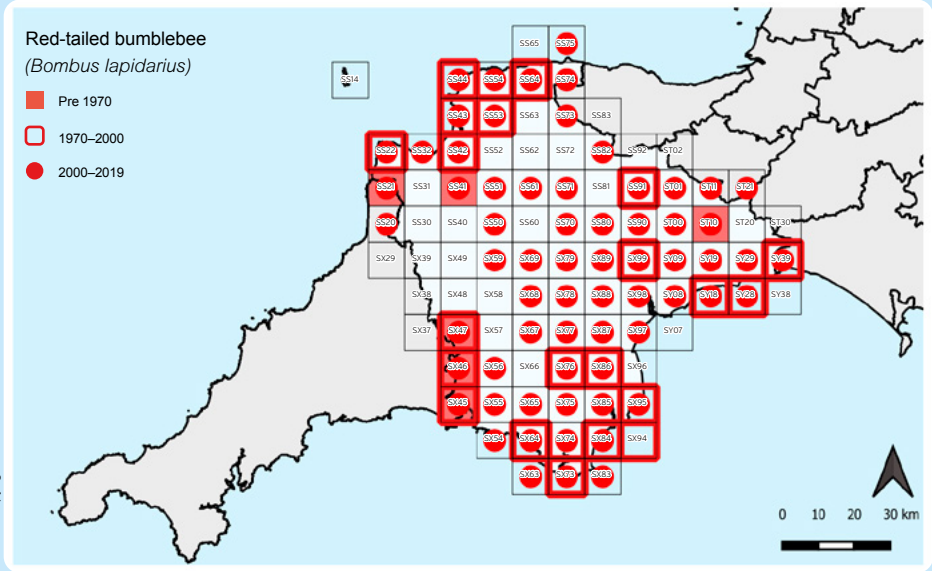
The Red-tailed bumblebee (*B. lapidarius*) is medium-tongued and is found commonly in gardens and grassland habitats but can also occur in woodland edge habitats, hedgerows and field boundaries. This species forages on a wide variety of flowers, particularly Bird's foot trefoil (*Lotus corniculatus*). Other forage flowers include Bluebells (*Hyacinthoides non-scripta*), Willows (*Salix* spp.), Knapweed (*Centaurea nigra*), Bramble (*Rubus fruticosus* agg.), Purple loosestrife (*Lythrum salicaria*), Spear thistle (*Cirsium vulgare*), Mallow (*Malva sylvestris*) and White clover (*Trifolium repens*). Frequently nests near masonry and stone, in underground colonies with over 150 individuals. Red-tailed bumblebee nests are known to have very long entrance tunnels; Sladen (1912) reported a nest with a 7ft tunnel.

Conservation

Conservation of any flower-rich habitat, particularly field margins, hedgerows, grassland, gardens and woodland edges/rides are of benefit to the Red-tailed bumblebee (*B. lapidarius*). Possibly more threatened than the other common species inland, as more associated with declining later flowering grasslands.

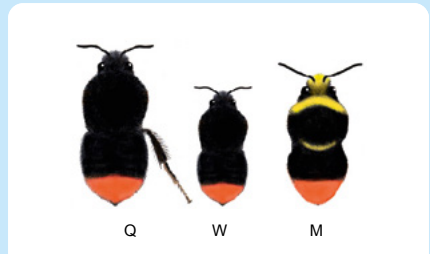


Photo-credit: BBC T.



Regional Distribution

Common

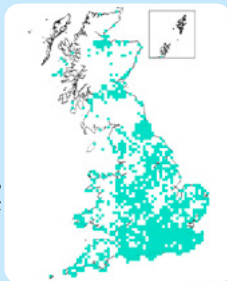


Identification

The Red-tailed bumblebee can be confused with Red-shanked carder bee (*B. ruderarius*) and possibly Red-tailed cuckoo bumblebee (*B. rupestris*). Male Red-tailed bumblebees are very different from females and could be confused with Early bumblebee (*B. pratorum*).

National Range and Status

Common in the south, expanding its range in the north.



Alternative Names

Bombus (Melanobombus) lapidarius

White-tailed bumblebee (*Bombus lucorum sensu lato*)



Photo-credit: Andrea Finch.

Devon Phenology & Lifecycle

White-tailed bumblebees (*B. lucorum sensu lato*) are early to emerge and most colonies end mid to late summer. This species is known to have multiple broods, with smaller numbers of nests occurring throughout the winter.

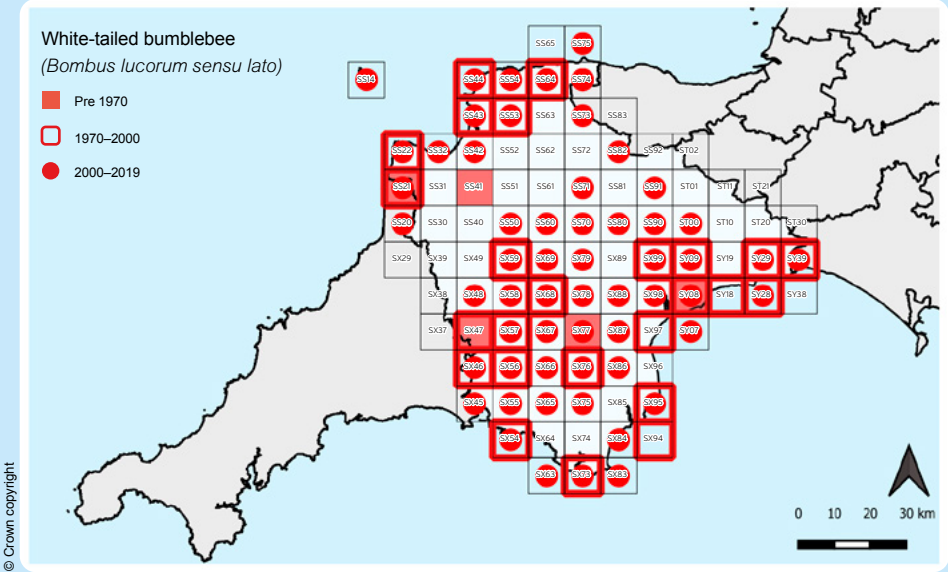
Habitat & Ecology

White-tailed bumblebees forage on a wide range of short-tubed flowers, and have been observed to feed on honeydew. True White-tailed bumblebees (*B. lucorum sensu stricto*) appear to be the most generalised forager of White-tailed bumblebee complex, occupying the broadest climatic range, feeding on a wide range of flowers (Scriven et al. 2015). Cryptic bumblebee (*B. cryptarum*) and Northern white-tailed bumblebee (*B. magnus*) are more likely to be found at sites with lower summer temperatures such as Dartmoor where they may be more abundant than true White-tailed bumblebees (*B. lucorum sensu stricto*) (Scriven et al. 2015). This species creates large underground nests with up to 400 individuals.

Conservation

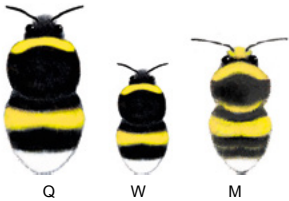
Conservation of flower-rich features and maintenance of a succession of forage from April to September is of great benefit to this species. Hedgerows and boundaries are also important in the wider countryside. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate.





Regional Distribution

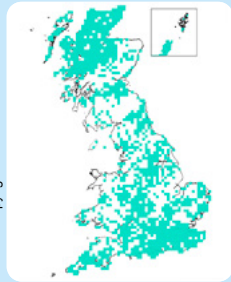
Common. This account refers to three species under the term *B. lucorum sensu lato*.



Identification

Unfortunately White-tailed bumblebees are difficult. White-tailed bumblebees are now known to be three species and are best recorded under an umbrella term covering all of the species within this group: *B. lucorum sensu lato*. White-tailed bumblebees could be confused with Broken-belted bumblebee (*B. soroeensis*) and Buff-tailed bumblebee (*B. terrestris*) workers. Male White-tailed bumblebees are more distinctive and easier to separate from other bumblebees.

Alternative Names *Bombus* (*Bombus*)
lucorum



National Range and Status

Common. Replaces the Buff-tailed bumblebee (*B. terrestris*) to a certain extent in upland areas and the north.

White-tailed bumblebee complex

Historically two White-tailed bumblebee species were recorded in Britain; the Northern white-tailed bumblebee (*B. magnus*) and the White-tailed bumblebee (*B. lucorum sensu stricto*). However, in recent years the White-tailed bumblebee (*B. lucorum*) has been separated into three species, which are currently thought impossible to separate in the field. Some authors have described identifying characteristics for the Northern white-tailed bumblebee (*B. magnus*) and the Cryptic bumblebee (*B. cryptarum*) which could help with field identification but whether these are reliable enough to replace DNA analysis is yet to be confirmed. The *Bombus lucorum* complex is the umbrella name of the species within this group (Carolan et al. 2012).



Photo-credit: Patrick Saunders.

Cryptic bumblebee (*Bombus cryptarum*)

There have been confirmed records of the Cryptic bumblebee (*B. cryptarum*) on Dartmoor 2011 (Scriven et al. 2015). The author has recorded individuals on Exmoor in 2008 fitting the description of Macdonald et al. (2006), but genetic testing is required to confirm this. It has only been recently recognised in the UK as a separate species and is therefore under recorded. The Cryptic bumblebee (*B. cryptarum*) is probably more associated with upland heather habitats and found at sites with lower summer temperatures (Scriven et al. 2015), and less common than the White-tailed Bumblebee (*B. lucorum sensu stricto*) outside these habitats. Cryptic bumblebee (*B. cryptarum*) workers and queens are also found on a more restricted variety of plant species than White-tailed bumblebee (*B. lucorum sensu stricto*) workers in recent studies (Scriven et al. 2015).

Recording name

| | |
|--|---|
| White-tailed bumblebee complex <i>B. lucorum sensu lato</i> | Umbrella term for <i>B. magnus</i> , <i>B. cryptarum</i> and <i>B. lucorum</i> which cannot be separately identified with confidence. |
| White-tailed bumblebee <i>B. lucorum sensu stricto</i> | Identified with confidence usually only by DNA analysis. |
| Cryptic bumblebee <i>B. cryptarum</i> | |
| Northern white-tailed bumblebee <i>B. magnus</i> | |

The White-tailed bumblebee complex



Photo-credit: Patrick Saunders.

Northern white-tailed bumblebee (*Bombus magnus*)

The Northern white-tailed bumblebee (*B. magnus*) is thought to be the most distinctive member of the White-tailed bumblebee complex and it may be possible to identify it in the field (Macdonald & Nisbet 2006). In the Scottish Highlands it is thought to be more numerous than the White-tailed bumblebee (*B. lucorum sensu stricto*) (Macdonald & Nisbet 2006). In 2006 the author recorded queens which agree with Macdonald and Nisbet's accounts. Northern white-tailed bumblebee (*B. magnus*) ecology is generally similar to that of the White-tailed bumblebee (*B. lucorum sensu stricto*) although it is more associated with heathland and moorland habitats; in Scotland it is found in *Erica*-rich moorland. This species has been recorded on Bell heather (*Erica cinerea*) on Dartmoor. In one extensive study the majority of Northern white-tailed bumblebee (*B. magnus*) workers and queens were found foraging on Ling (*Calluna vulgaris*) and Heathers (*Erica cinerea* and *Erica tetralix*) and were found to have the lowest diet breadth of the three White-tailed bumblebee complex species (Scriven et al. 2015).

Bilberry bumblebee (*Bombus monticola*)



Photo-credit: Nick Owens.

Devon Phenology & Lifecycle

The Bilberry bumblebee (*B. monticola*) has a long life cycle; the first queens generally appear in late April or early May and the workers can still be seen in mid-September, peaking in July and August.

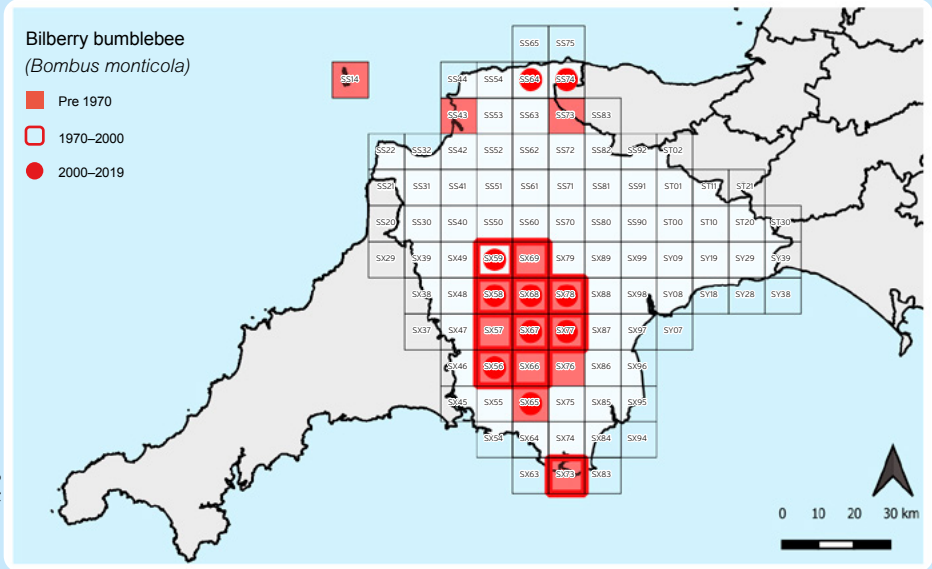
Habitat & Ecology

This is a short-tongued species, associating with one plant species more than any other British *Bombus* species: the Bilberry (*Vaccinium myrtillus*). It is usually observed in heath/ moorland where Bilberry is very abundant, although habitat diversity is also required, with plants such as Willow (*Salix* spp.) important for queens, and Bell heather (*Erica cinerea*) and upland hay meadows with diverse forage plants including Fabaceae for workers. The nests are usually in old mammal nests underground and the colony is medium to small with fewer than 100 individuals. The species is a good disperser; it has been recorded at Prawle Point SX73 and West Looe SX2553 well away from Dartmoor. Interestingly Spooner refers to recording a fresh male Bilberry bumblebee a

few yards from the sea beach at Sidmouth; this is a very strange record as it seems unlikely that males would travel such large distances from Dartmoor.

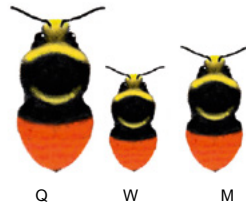
Conservation

Over-grazing of moorland with flowering Bilberry (*Vaccinium myrtillus*) has impacted on this species. Dartmoor has some suitable sites mostly towards the eastern side, although generally flowering Bilberry is rare and negatively impacted by management regimes. Exmoor has a number of good sites and is less intensively grazed than Dartmoor. Bee keepers putting hives on Dartmoor when the Heather is in flower on key sites such as Birch Tor is likely to be having adverse impacts for the species. The species is likely to be vulnerable to climate change.



Regional Distribution

Local or Rare populations only found on Dartmoor and Exmoor. Probably declined although on Eastern Dartmoor in good years can be present in good numbers. Exmoor probably is under-recorded for the species. Spooner recorded the species quite widely on Dartmoor in the 1960s and 70s 'Taken on Dartmoor on various occasions, and found to be rather strictly confined to the granite area, not invading surrounding commons below 800 ft.' (Spooner 1985). In 2009 the author could only find one male Bilberry bumblebee on two visits to the best areas of eastern Dartmoor, whereas in 2013 good numbers were seen and two new sites on the western side of the moor were found.

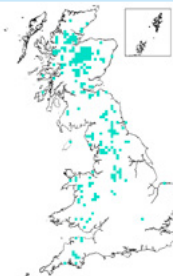


Identification

Very distinctive and attractive bee. Unlikely to be confused with other bumblebees.

National Range and Status

In UK has a western and northern upland distribution and is declining.



Alternative Names

Mountain bumblebee, *Bombus* (*Pyrobombus*) *monticola*, also Blaeberry bumblebee in Scotland.

Moss carder bee (*Bombus muscorum*)



Photo-credit: Nick Owens.

Devon Phenology & Lifecycle

A late species generally, although in Devon it can occur early with queens in mid-April, with numbers peaking between late June and late August, although some can be seen into September.

Habitat & Ecology

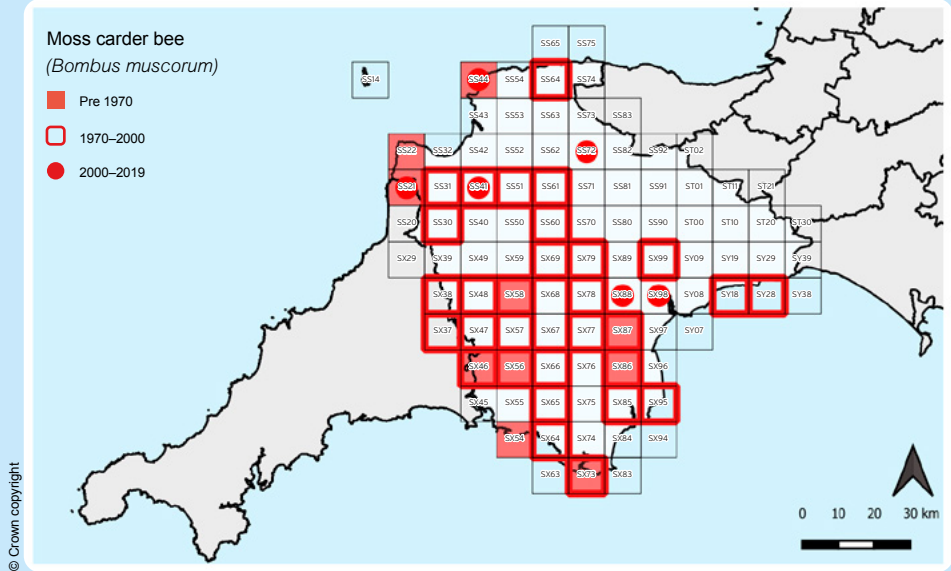
A long/medium-tongue, surface nesting species, the Moss carder bee (*B. muscorum*) is associated with cool damp grasslands, although this association is not obvious in Devon. The Moss carder bee has only been recently recorded on one Devon site, near Braunton Burrows. In Cornwall, the Moss carder bee is typically found on the same sites as the Brown-banded carder bee (*B. humilis*), although it is much rarer. R. Perkins 1923 writes on the Moss carder bee (Spooner 1985) “Appears to be of great rarity in Devon, as I have only taken it singly in the Bovey district (One male picked out from scores of *humilis* males feeding on scabiose flowers)”.

The Moss carder bee is usually found on higher quality sites where flower-rich grassland occurs alongside coastal heaths and/or dunes, whereas the Brown-banded carder bee can

occur on flower-rich grassland alone. The Moss carder bee is found in flower-rich areas with Fabaceae such as Kidney vetch (*Anthyllis vulneraria*), White clover (*Trifolium repens*) and Red clover (*Trifolium pratense*).

There has been some evidence that the Brown-banded carder bee is expanding in areas of Southern England where the Moss carder bee is declining (Lee et. al. 2008). The great range of micro-climates on the north Devon and Cornwall coast could provide reasons for co-existence of these two very closely related species.

The Moss carder bee was historically more numerous on upland moors such as Dartmoor. “Vale Down, nr Lydford, not rare (1943 & 1944) on various parts of the open moorland in some parts in company with *humilis*, no nests found, females did not appear before first week of May, they visited lousewort only – some of these females were still alive in the beginning of September (R. Perkins 1945)” (Spooner 1985). Sladen (1912) “noticed this species to be commonest in damp cold seasons”

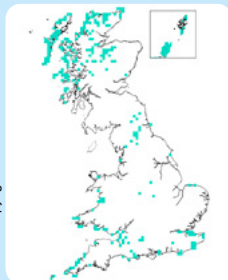


Conservation

Protection of coastal flower-rich grassland, and introduction of pollen and nectar margins or clover leys are important for this species. Threats include destruction of flower-rich and upland habitats. Climate change is a further threat to UK populations of Moss carder bees. This species should be a conservation priority and should be monitored on sites with active management.

Regional Distribution

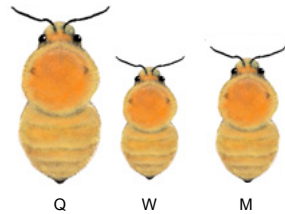
Very Scarce in Devon now only recorded around Branton Burrows. Formerly more common and recorded on Dartmoor and south Devon coast.



National Range and Status

Declining in England and Wales. **S41**

In Scotland found on inland moors as well as coastal areas.



Identification

Very difficult to separate from Brown-banded carder bee (*B. humilis*) which can occur alongside this bumblebee. Common carder bee (*B. pascuorum*) particularly when worn can look similar.

Alternative Names

Moss carder bee, *Bombus*
(*Thoracobombus*) *muscorum*

Common carder bee (*Bombus pascuorum*)



Photo-credit: Patrick Saunders

Devon Phenology & Lifecycle

Benton (2006) classes the Common carder bee (*B. pascuorum*) as early nesting with a medium length colony cycle. In Devon, the Common carder bee may be multiple brooded with males observed into late October.

Habitat & Ecology

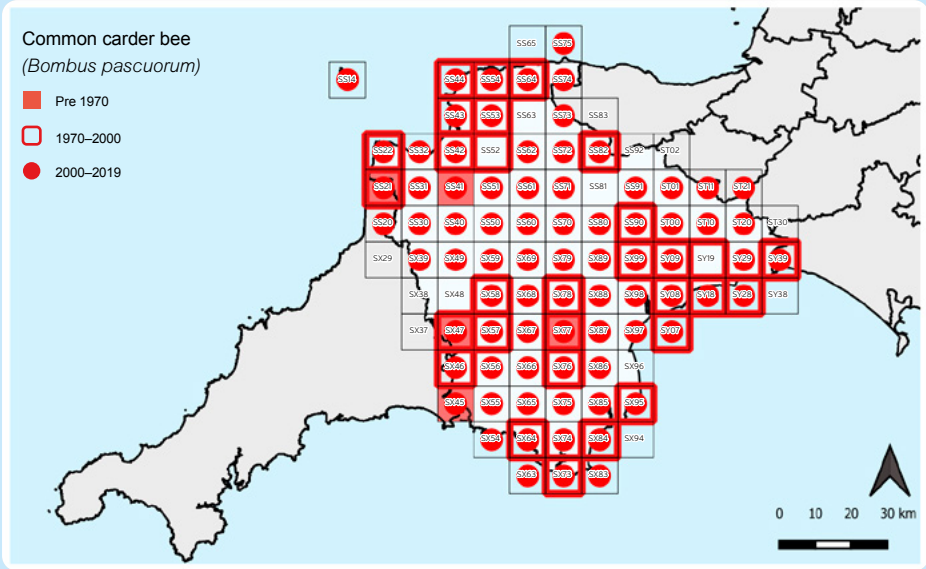
Long to medium-tongued, found on woodland edge, although present in most habitats. On coastal grassland sites can occur alongside other carder bumblebee species, and can be less abundant than the other two species on these sites. Present in upland moorland and heathland open ground sites utilising a wide variety of forage plants particularly Scrophulariaceae, Fabaceae and Lamiaceae. Mainly nesting on the surface, within tussocky grass, Common carder bees have medium-sized colonies with 100 or so individuals.

Conservation

Conservation of any flower-rich habitats, particularly hedges and field boundaries is important to this species. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate. The species is being negatively affected by loss of flower rich habitats, intensive grazing regimes and frequent cutting for silage.

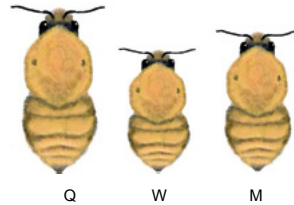


Photo-credit: Patrick Saunders



Regional Distribution

Common.

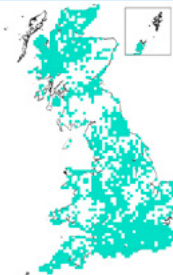


Identification

Reasonably easy species to identify. Can be confused with Brown-banded carder bee (*B. humilis*) and Moss carder bee (*B. muscorum*), particularly if worn Common carder bees are found.

National Range and Status

Common throughout UK.



Alternative Names *Bombus*
(*Thoracobombus*) *pascuorum*

Early bumblebee (*Bombus pratorum*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

As the name suggests, this species emerges early in spring and is commonly seen in garden and hedgerow habitats as one of the first bees of the season. This species is multi-brooded with a peak during May and June.

Habitat & Ecology

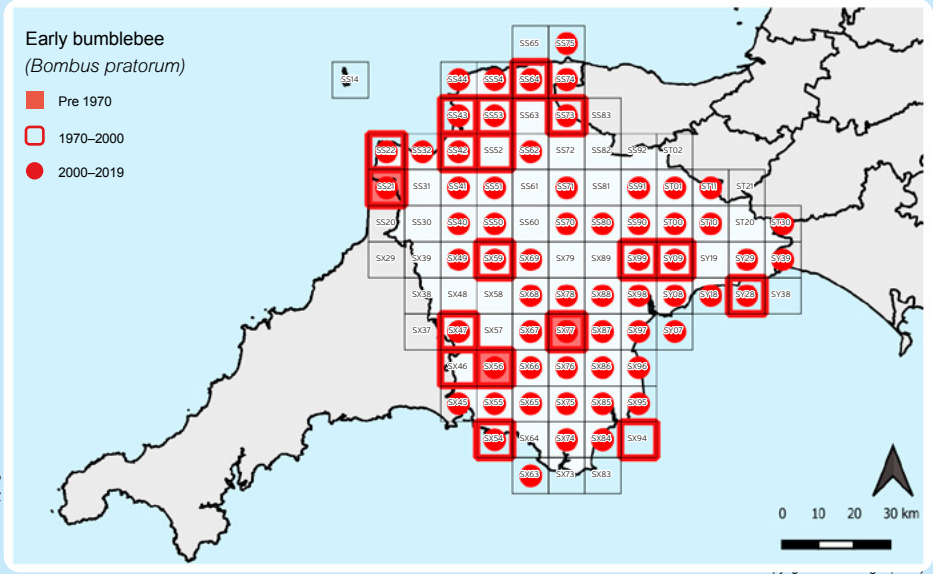
The Early bumblebee (*B. pratorum*) is a short-tongued species, found in a range of spring flowering habitats such as woodland edge hedge and field boundaries. Workers of this species can be very small and utilise a very diverse range of forage including Willow (*Salix* spp.), Ground ivy (*Glechoma hederacea*), Bird's foot trefoil (*Lotus corniculatus*), Common vetch (*Vicia sativa*), Comfrey (*Symphytum officinale*), Green alkanet (*Pentaglottis sempervirens*) and Viper's bugloss (*Echium vulgare*). This species nests in various sites with the colony size usually fewer than 100 individuals.

Conservation

Spring flowers are common in hedges and field boundaries in Devon, and these are important habitats for this species. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate.

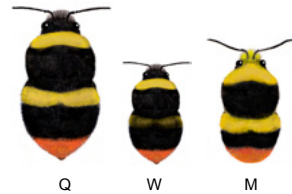


Photo-credit: Patrick Saunders.



Regional Distribution

Common

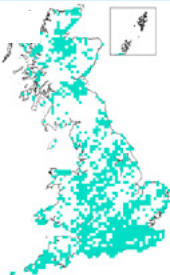


Identification

Females are distinctive. Males can be confused with Broken-belted bumblebee (*B. soroeensis*) males or Red-tailed bumblebee (*B. lapidarius*) males.

National Range and Status

Common.



Alternative Names

Bombus (Pyrobombus) *pratorum*,
Meadow bumblebee

Buff-tailed bumblebee (*Bombus terrestris*)



Photo-credit: Patrick Saunders

Devon Phenology & Lifecycle

This species is early to emerge and very late to finish, with multiple broods, and has been observed being active right through the winter.

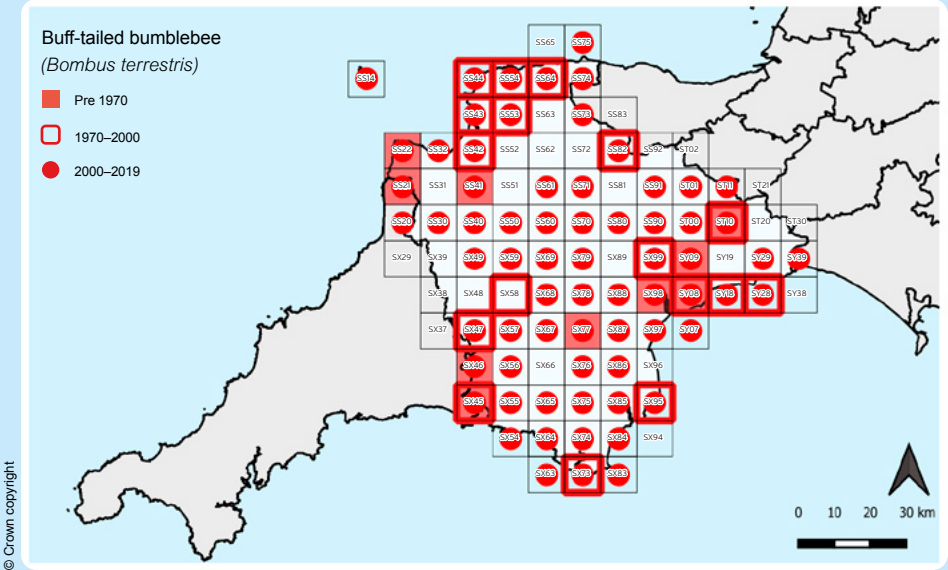
Habitat & Ecology

The Buff-tailed bumblebee (*B. terrestris*) is a short-tongued species and utilises a wide variety of habitats, such as spring flowering woodland edges, hedgerows, upland moors, gardens and heaths. It feeds on a very wide range of short-tubed flowers, but can also feed on deeper flowers by biting into the corolla. This species nests underground with very large colonies of over 300 workers, which forage over large distances. The Buff-tailed bumblebee is the most widely researched species as complete colonies can be purchased. It is considered a socially complex species and uses a range of pheromones to control the colony. The technique of 'buzz pollinating' or encouraging pollen release through vibrating wing muscles makes them very efficient pollinators of certain plants, (other bumblebee species also 'buzz pollinate').

Conservation

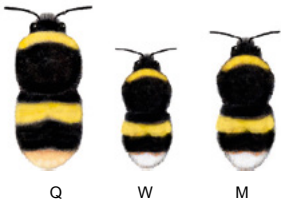
Protection of any flower-rich sites or landscapes is important, as with any pollinating species though the Buff-tailed bumblebee is a generalist with a large foraging range and is likely to benefit from a wide variety of agri-environment options. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate. Commercial Buff-tailed bumblebee colonies can be used for pollinating greenhouse crops such as tomatoes and these colonies can be of continental stock (*B. terrestris dalmatinus* & *B. t. terrestris*). Approximately 60,000 of these colonies are imported each year to the UK, although recent legislation has been put into force to ensure only the British sub-species (*B. terrestris audax*) is imported.

The Bumblebee Conservation Trust is calling for improved legislation to prevent the release of these imported bumblebees into the wild. Methods to prevent their escape from greenhouses and polytunnels should be taken and they should not be able to be deployed outdoors, to prevent them coming into contact with native wild bees and potential transfer of new-to-Britain diseases.



Regional Distribution

One of the most common bumblebees in the region.



Identification

Queens are quite distinctive. Males and workers are very confusing and can easily be confused with White-tailed bumblebees.

National Range and Status

Common.



Alternative Names *Bombus terrestris*

Great Yellow bumblebee (*Bombus distinguendus*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Unknown.

Habitat & Ecology

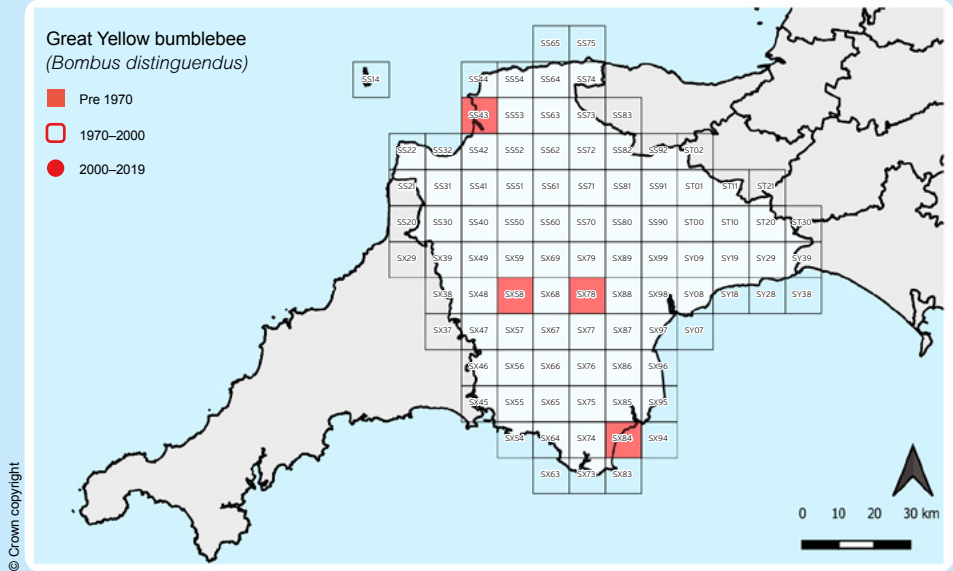
Historically used to be widespread across UK, including Devon, but only found in North Scotland now. The strongest populations of the Great Yellow bumblebee (*B. distinguendus*) are now found on coastal flower rich grasslands, such as the Machair (fertile low-lying plains of the northwest coastline of Scotland).

Conservation

A northern species at the southern edge of range in Devon (Williams et al. 2007). Re-establishment of this species in Devon is now likely to be unfeasible.

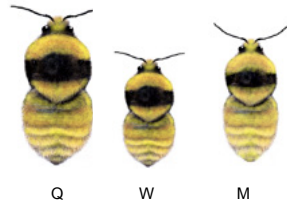


Photo-credit: Christine Hall.



Regional Distribution

Extinct, with no records in Devon since 1936. There are three sites in both North and South Devon where the bee was recorded by Spooner. There is a record in Spooner's notes '1982 large female in a summer house Kennford SX48 seen closely by Maureen Turner', (Spooner 1985). This record should be considered unverified. Queens are easily recognisable bumblebees, but males are more problematic and could be confused with Short-haired bumblebee (*B. subterraneus*). Some of the historical records of males may be suspect (see account of Short-haired bumblebee (*B. subterraneus*)).



Identification

Queens are a very distinctive handsome bee. Not likely to be confused with other species. Males are difficult and can be similar to Short-haired bumblebee (*B. subterraneus*). Worn workers could be confused with any of the carder bees and Short-haired bumblebee (*B. subterraneus*). There are no modern sites anywhere in the UK where both Great Yellow bumblebee (*B. distinguendus*) and Short-haired bumblebee (*B. subterraneus*) occur alongside each other.



BBC and county recorder should be consulted as a voucher is needed to confirm record.

Alternative Names *Bombus*
(*Subterraneobombus*) *distinguendus*

National Range and Status

Scotland only; extinct in England and Wales. **S41**



Ruderal bumblebee (*Bombus ruderatus*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Relatively late species to emerge. Queens occur in May.

Habitat & Ecology

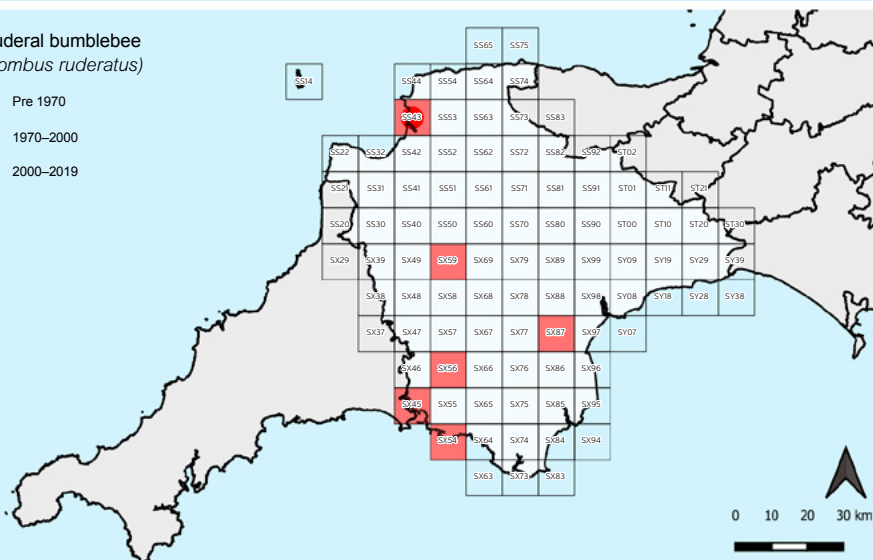
It is long-tongued, foraging on long-tubed flowers. It is strongly associated with grassland or meadows with abundant Red clover (*Trifolium pratense*) and wetland or river corridors with long-tubed flowers such as White deadnettle (*Lamium album*), Marsh woundwort (*Stachys palustris*), Black horehound (*Ballota nigra*) and Comfrey (*Symphytum officinale*). It can also occur in ruderal habitats where I have found it quite abundantly on Teasel (*Dipsacus fullonum*) in Cambridgeshire. It builds large underground nests with up to 150 individuals. Completely black forms often occur alongside banded forms. All black forms of this bee have been recorded historically in Devon, referred to by Spooner as 'harrisellus' (Spooner 1985).

Conservation

Conservation of Clover-rich grassland is important. Conservation management of field boundaries, riverside and wetland habitats rich in long-tubed flowers may also be important for this species.

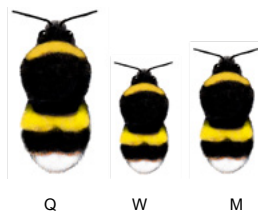


Photo-credit: Patrick Saunders.



Recently recorded at Braunton Burrows (det. G. Allen 2019). This is the only sighting in Devon since 1961. Further recording and research is needed to confirm its status in Devon.

Recorders should take care as it is easily confused with Garden bumblebee (*B. hortorum*) and may be misidentified. There is some suggestion that the species is recovering to recolonise former sites, and it occurs in Somerset. It may never have been common in Devon. Spooner only records it on a few sites in SW Devon and Braunton Burrows between 1930s–1960s. Malcolm Spooner (Spooner 1985), '*much less plentiful than hortorum and missing from exposed habitats, in S.W. Devon thus mainly coastal*'.

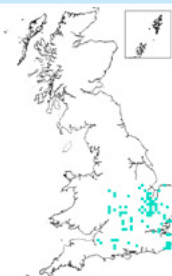


Very difficult bee. Well marked females and males can have a distinctive 'jizz'. But very easy to confuse with Garden bumblebee (*B. hortorum*) and Heath bumblebee (*B. jonellus*).



BBCT and county recorder should be consulted as a voucher is needed to confirm record.

Has declined nationally. Strongest populations in East Anglia and South Midlands. Some possible recovery as a result of new agri-environment schemes (Baldock 2007). **S41**



Alternative Names Large garden bumblebee, *Bombus* (Megabombus) *runderatus*

Broken-belted bumblebee (*Bombus soroeensis*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

One of the latest *Bombus* species, with populations at peak numbers into the middle of September and the queens emerging from late May.

Habitat & Ecology

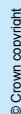
A short/medium-tongued species associated with wet heath/moorland. In Scotland this species is often observed foraging on flowers such as Cross-leaved heath (*Erica tetralix*) and *Rubus* spp.. On Salisbury Plain the main forage is Devil's-bit's scabious (*Succisa pratensis*). Small flowered legumes such as Melilot (*Melilotus officinalis*) and Sainfoin (*Onobrychis viciifolia*) may be very important for queens. Past populations at Ilfracombe were associated with Bramble (*Rubus fruticosus* agg.) (Sladen 1912). In Europe the species can be common and is considered not to be specific in its forage requirements. Usually nesting below ground with about 100 workers in a nest.

Conservation

Protection of large areas of later flowering habitats such as heathland/moorland with Devil's-bit scabious (*Succisa pratensis*) is important. Fragmentation and reduction in quality of later flowering habitats seems most likely to have caused extinction in this species.



Photo-credit: Patrick Saunders.



Extinct in Devon, last recorded in 1979. Greatly declined in the region. Spooner recorded it at a large number of sites on the Devon/Cornwall border, in the Culm grassland areas and on Dartmoor in the late 1970s where it now appears to be absent. Spooner (1985) wrote, '*the species is widely distributed and in some seasons locally abundant occurring both in North and South Devon, on the whole frequent in the neighbourhood of heaths and moorland, but has been seen in numbers on the coast near Dawlish and a mile or so inland from Paignton (R.C.L.P. 1923)*'. It is unlikely the species is present on Exmoor, although further surveys for this species are desirable.

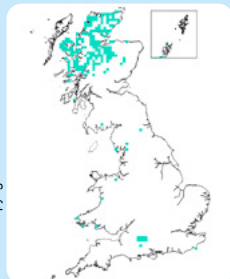


Difficult bee easy to confuse with White-tailed bumblebee (*B. lucorum*) which also have a 'broken band'. Males may be confused with Early bumblebee (*B. pratorum*).



BBCT and county recorder should be consulted as a voucher is needed to confirm record.

Local in Scottish highlands, rare and declining in England and Wales although there are strong populations on Salisbury Plain.



Alternative Names *Bombus*
(*Kallobombus*) *soroensis*

Red-shanked carder bee (*Bombus ruderarius*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Queens emerge relatively early (April) and the species has a short cycle with the colonies known to start to break up in mid-July.

Habitat & Ecology

A medium-tongued species, present in a very wide range of habitats. Research suggests it survives best in the complex habitats formed by later stages of succession from grassland to scrub (Benton 2008). Forages in flower-rich habitats with early flowering Lamiaceae such as White dead-nettle (*Lamium album*) and Ground ivy (*Glechoma hederacea*), and Fabaceae such as Red clover (*Trifolium pratense*) and Kidney vetch (*Anthyllis vulneraria*). Forms quite small colonies of 20-50 individuals nesting in tussocky grassland.

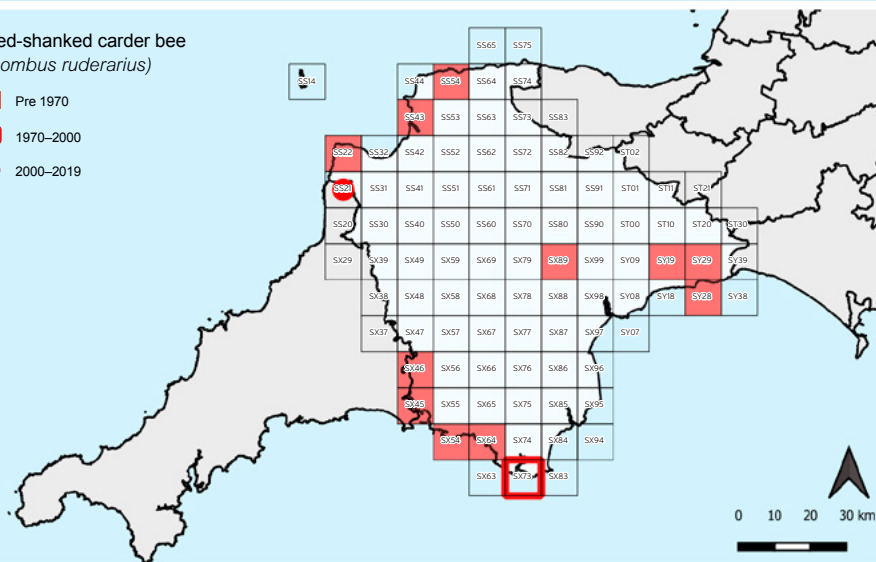
Conservation

Protection of tall flower-rich grassland. Further research and survey work are needed nationally

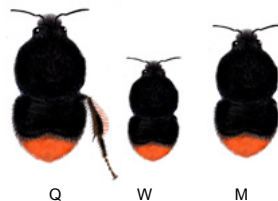
to establish clearer conservation requirements for this bumblebee. This is a priority species.



Photo-credit: Nick Owens.



Presumed extinct in Devon but further recording is needed. Most recently recorded in 1983 at Prawle point (SX73) with widely scattered historical records through the county. Spooner quotes R. Perkins, "*Not nearly as abundant as Somerset and Gloucestershire but widely and perhaps generally distributed. (R.C.L.P. 1923).*" It seems to have disappeared from south Devon", (Spooner 1985). The species occurs on the Dorset coast around Lulworth Cove (SY8180) and has been recently recorded in Somerset around the Mendips. More surveys are needed in East Devon particularly on the Dorset Border.

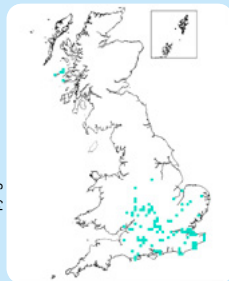


Red-shanked carder bee is very difficult to separate workers from the common Red-tailed bumblebee (*B. lapidarius*). The ginger leg hairs of this species can be useful characteristics but to confirm a modern Devon population other structural features are needed as well. Males could possibly be confused with Early bumblebee (*B. pratorum*) or Red-tailed cuckoo bumblebee (*B. rupestris*).



BBCT and county recorder should be consulted as a voucher is needed to confirm record.

Alternative Names Red-shanked carder bee, Small red-tailed bumblebee, *Bombus* (Thoracobombus) *runderarius*



Scattered distribution in southern England, the Midlands and South West Wales and is generally declining. **S41**

Shrill carder bee (*Bombus sylvarum*)



Photo-credit: Veselay France.

Devon Phenology & Lifecycle

The Shrill carder bee (*B. sylvarum*) is a late species which often only reaches peak numbers in August. Queens can be seen in May or occasionally April, males and workers into September.

Habitat & Ecology

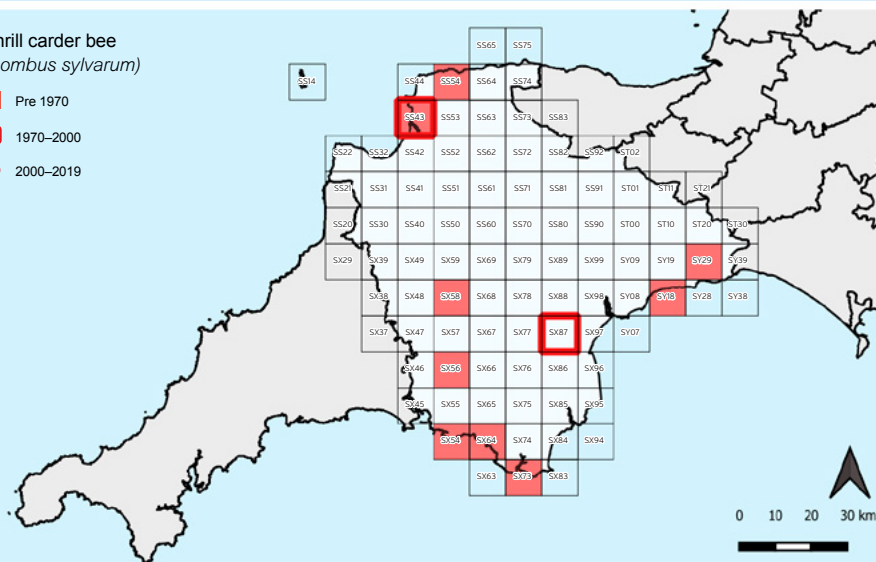
A long-tongued species, associated with flower-rich grassland with Fabaceae particularly Red clover (*Trifolium pratense*). Other forage plants include Red bartsia (*Odontites verna*), Tufted vetch (*Vicia cracca*) and Comfrey (*Symphytum officinale*). However, it is known to associate with taller more dense vegetation where it can weave deep into vegetation, foraging unlike other bumblebees. This species makes a shrill distinctive noise which accounts for its common name, the Shrill carder bee. This species creates small nests on the surface or underground, with less than 50 workers, and is fairly late to nest and to reach peak numbers.

Conservation

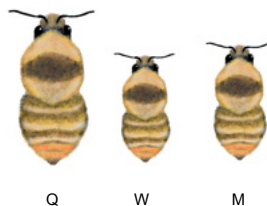
Restoration of large areas of tall flower-rich grassland with abundant Fabaceae in particular Red clover (*Trifolium pratense*), particularly in East Devon. Brown-field or sites of previously developed land can be very important for this bumblebee.



Photo-credit: Veselay France.



Considered extinct. The most recent record is 1978 at Braunton Burrows (SS4534), which has been searched subsequently and seems more likely to represent the last population of the bee in Devon. Also recorded in 1973 Bradley, Little Pool, near Bovey Tracey (SX8377). Before this period the Shrilc carder bee was quite widely recorded in throughout Devon.



Very distinctive bee. Very worn bees could be mistaken for Common carder bee (*B. pascuorum*) or possibly Field cuckoo bumblebee (*B. campestris*).



BBCT and county recorder should be consulted as a voucher is needed to confirm record.

Much declined, only present in a few landscape areas in southern England and south Wales. This bee is doing badly even in most of its last few strongholds. **S41**



Alternative Names Knapweed Carder
Bee *Bombus* (Thoracobombus) *sylvorum*

Short-haired bumblebee (*Bombus subterraneus*)



Photo-credit: Nikki Gamman.

Devon Phenology & Lifecycle

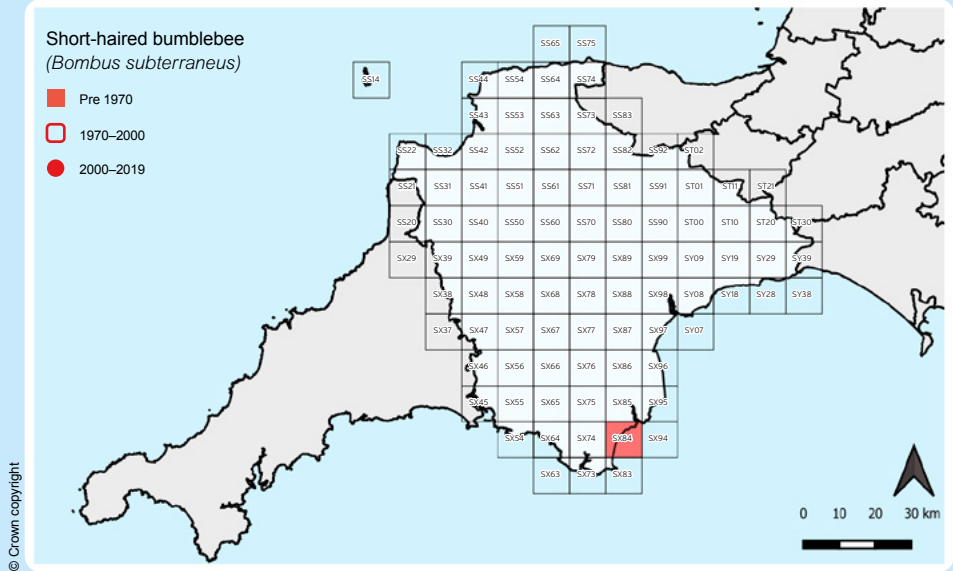
Unknown.

Habitat & Ecology

The Short-haired bumblebee (*B. subterraneus*) is a long-tongued species and is found associated with Red clover (*Trifolium pratense*) in dry grassland habitats. As the name suggests it builds underground nests.

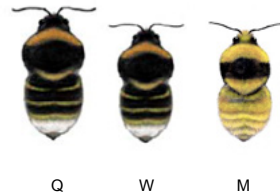
Conservation

The Short-haired bumblebee (*B. subterraneus*) is subject to an ongoing reintroduction programme in England. Devon probably does not have any suitable areas for reintroduction. The Short-haired bumblebee (*B. subterraneus*) is a priority species.



Regional Distribution

Extinct; last recorded in 1928 (M. Spooner 1985). 'Single specimens only from Dawlish and Bovey Heathfield. Very scarce in South Devon (R.C.L.P. 1923)'. M. Spooner (1985) quotes R. Perkins as 'Torcross 1928, a queen in copulation with a *distinguendus* male and I believe the nest they came from was a mixed *subterraneus* and *distinguendus*.' Short-haired bumblebee (*B. subterraneus*) males are very similar to Great Yellow bumblebee (*B. distinguendus*) so confusion seems most likely.



Identification

Moderately distinctive bee. But can be very variable. Could be confused with Great Yellow bumblebee (*B. distinguendus*) and Ruderal bumblebee (*B. ruderatus*), although there are no modern sites anywhere in the UK where both Great Yellow bumblebee (*B. distinguendus*) and Short-haired bumblebee (*B. subterraneus*) occur alongside each other.



BBCT and county recorder should be consulted as a voucher is needed to confirm record.

National Range and Status

Last recorded in the 1980s in Dungeness, but subject to a reintroduction programme with the first suspected workers seen again in 2013. Declining elsewhere in Europe.



Alternative Names *Bombus*
(*Subterraneobombus*) *subterraneus*

Barbut's cuckoo bumblebee (*Bombus barbutellus*)



Photo-credit: Nick Owens.

Devon Phenology & Lifecycle

Barbut's cuckoo bumblebees (*B. barbutellus*) can be found between April and October in Devon.

Habitat & Ecology

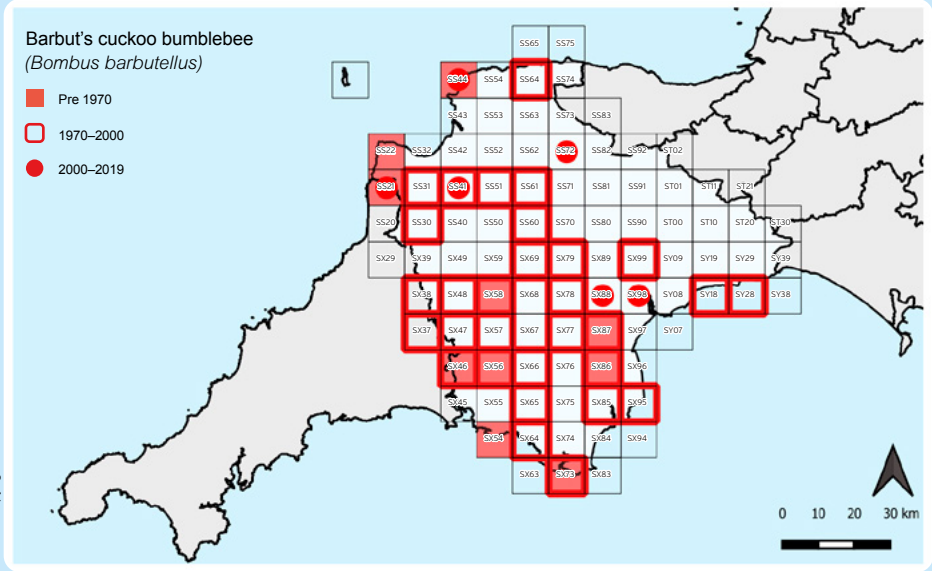
The Barbut's cuckoo bumblebee is a social parasite of the Garden bumblebee (*B. hortorum*) and occasionally the Ruderal bumblebee (*B. ruderatus*). Barbut's cuckoo bee occurs in a wide variety of habitats particularly gardens and woodland edges.

Conservation

As for all cuckoo bumblebees, the population requirements of the host are more important than the quality or type of habitat for the cuckoo itself. Barbut's cuckoo bumblebee is likely to occur where there is better quality Garden bumblebee habitat, and is likely to be impacted by similar conservation concerns.



Photo-credit: Les Hebdon.



Regional Distribution

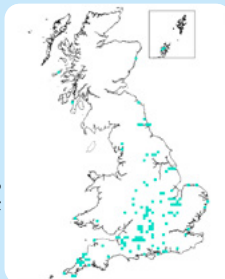
Local but under-recorded. 'Never abundant, moderately common in south west Devon from coast to well up into Dartmoor' (Spooner 1985).



Identification

Cuckoo bumblebees can be very difficult. Large females of Barbut's cuckoo bumblebee (*B. barbutellus*) can be distinctive, but can sometimes be variable and confused with Field cuckoo bumblebee (*B. campestris*) or Gypsy cuckoo bumblebee (*B. bohemicus*). Males are difficult and can be confused with all the other male cuckoos apart from Red-tailed cuckoo bumblebee (*B. rupestris*).

Alternative Names Barbut's cuckoo bumblebee, *Bombus* (Psithyrus) *barbutellus*.



National Range and Status

Widespread through the south although very scattered in UK.

Gypsy cuckoo bumblebee (*Bombus bohemicus*)



Photo-credit: Nick Owens.

Devon Phenology & Lifecycle

Unknown.

Habitat & Ecology

Social parasite of the White-tailed bumblebee complex (*B. lucorum*, *B. magnus* and possibly *B. cryptarum*). The author has observed this bee more often on upland areas, such as Birch Tor, Dartmoor with all three white-tailed species rather than lowland areas with only *lucorum-sensu stricto*. More research is needed about this bee as the ecology is largely unknown. Further recording of the Gypsy cuckoo bumblebee is necessary as there are few recent records.

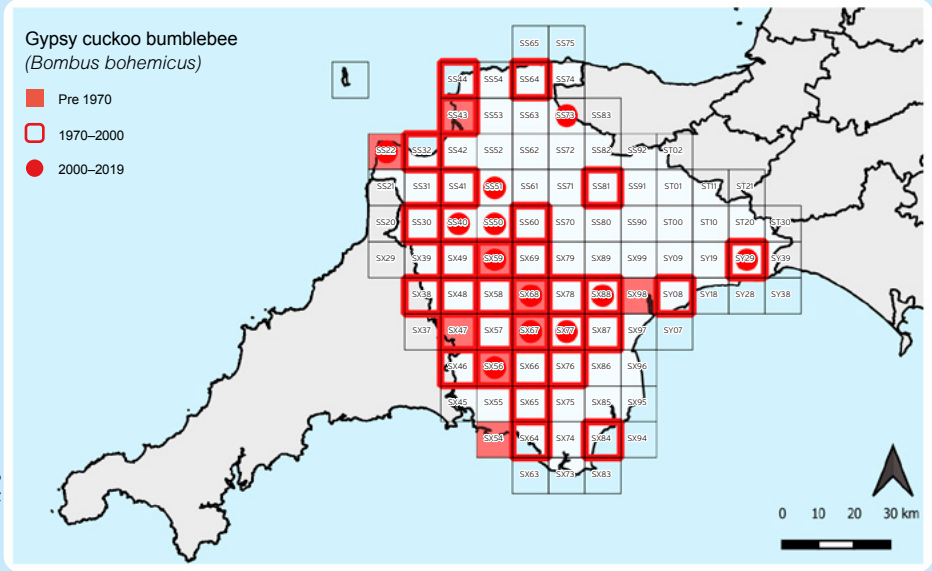
Conservation

The Gypsy cuckoo bumblebee (*B. bohemicus*) is likely to occur where there is better quality open grassland, heathland and woodland edge habitats. General conservation of flower-rich

moorland and heathland is of great benefit to the Gypsy cuckoo bumblebee (*B. bohemicus*). For cuckoo bumblebees the abundance of the host species and quality of habitat for host species is likely to be more important than the quality or type of habitat used by the cuckoo itself. But this is not proven and there are probably other important factors: climate is a strong possibility as, nationwide, the species has been retreating northwards and is almost extinct in south east England.

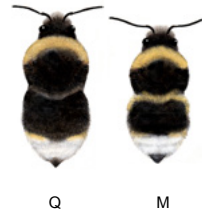


Photo-credit: Nick Owens.



Regional Distribution

Scarce but under-recorded. Probably much rarer than previous national atlases suggest. 'Generally found in SW Devon, especially towards higher ground, from coast to the higher parts of Dartmoor' (Spooner 1985).

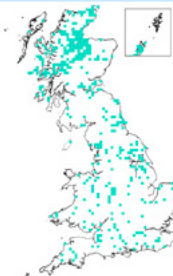


Identification

The Gypsy cuckoo bumblebee can be very difficult. Females easily confused with pale or faded Southern cuckoo bumblebee (*B. vestalis*). Males are difficult and can be confused with all the other male cuckoos apart from Red-tailed cuckoo bumblebee (*B. rupestris*).

National Range and Status

Widespread throughout the UK.



Alternative Names Gypsy cuckoo bumblebee, *Bombus* (Psithyrus) *bohemicus*, Wandering cuckoo bee

Field cuckoo bumblebee (*Bombus campestris*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Found from April to October in Devon.

Habitat & Ecology

Social parasite of the Common carder bee (*B. pascuorum*) but also known to parasitise the Brown-banded carder bee (*B. humilis*), Moss carder bee (*B. muscorum*), Red-shanked carder bee (*B. ruderarius*) and Shrill carder bee (*B. sylvarum*). The Field cuckoo bumblebee (*B. campestris*) may be double-brooded. Found in a wide variety of habitats including gardens, grassland, field boundaries, woodland edge, coastal habitats and, less commonly, on moorland. The all-black form of the Field cuckoo bumblebee (*B. campestris*) is found in Devon.

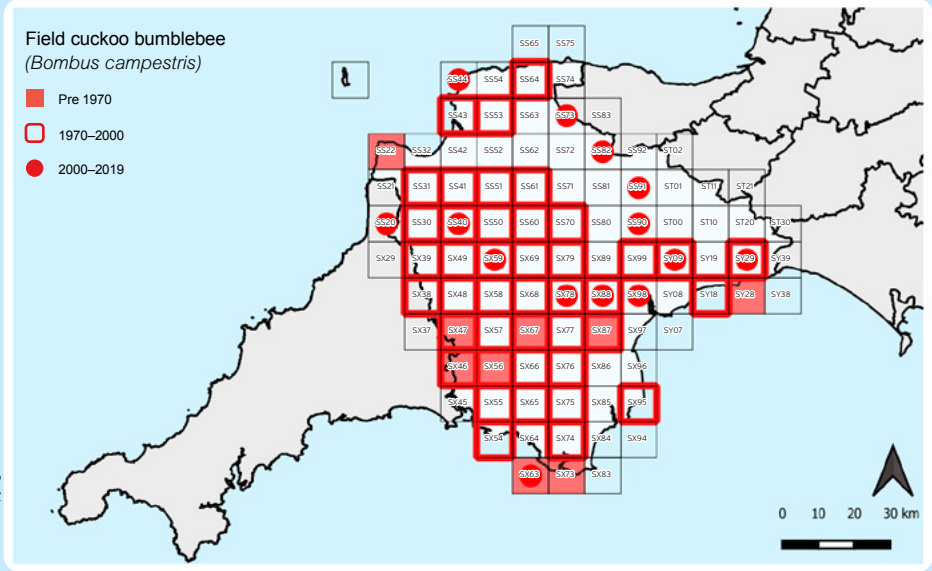
there are larger areas of better quality habitat. Field boundaries and hedgerow are important for congregating males and nest searching females.



Photo-credit: Shona Menzies.

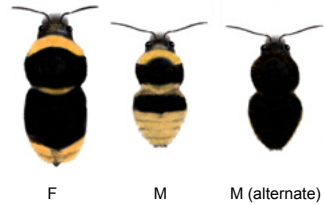
Conservation

Found on flower-rich habitats, particularly hedges and field boundaries, like the Common carder bee (*B. pascuorum*) but is likely to occur where



Regional Distribution

Local but under recorded.

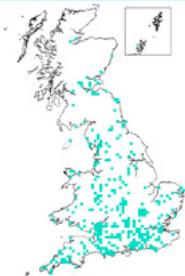


Identification

Brightly coloured female Field cuckoo bumblebee can be very distinctive. But this species can be very variable occurring in both dark and paler forms. Males are difficult and can be confused with all the other male cuckoos apart from Red-tailed cuckoo bumblebee (*B. rupestris*).

National Range and Status

Common throughout central and south England.



Alternative Names Field cuckoo bumblebee, *Bombus* (Psithyrus) *campestris*, Buff-banded cuckoo bee.

Red-tailed cuckoo bumblebee (*Bombus rupestris*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

The Red-tailed cuckoo bumblebee (*B. rupestris*) has a shorter cycle than the other cuckoo bumblebees, and is usually found from April to September.

Habitat & Ecology

The Red-tailed cuckoo bumblebee is a social parasite of the Red-tailed bumblebee (*B. lapidarius*) and so is reliant on abundance of Red-tailed bumblebee (*B. lapidarius*).

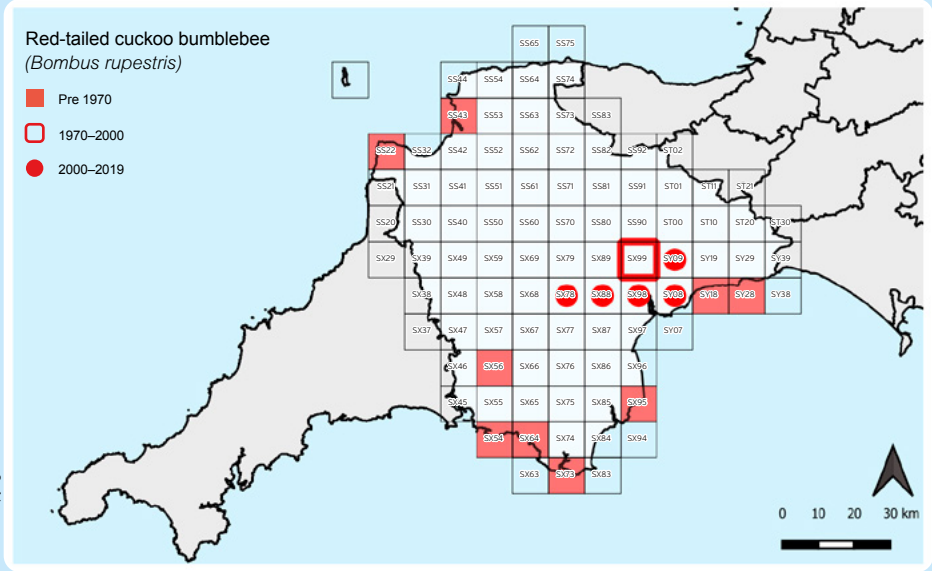
Conservation

In some areas of Southern England this species is showing a recovery from previous declines and it is increasing its range in northern England but is still scarce in Devon. Although its host is a common species, the Red-tailed cuckoo bumblebee occurs much more locally. The Red-tailed cuckoo bee is likely to need flower-rich grassland with abundant Fabaceae particularly

Bird's foot trefoil (*Lotus corniculatus*) similar to its host species, although other factors are likely to be implicated in the distribution of the Red-tailed cuckoo bumblebee as it is absent from areas where the host is quite common.

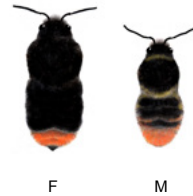


Photo-credit: Vivian Russell.



Regional Distribution

Scarce. Probably under-recorded in Devon. Spooner comments 'In south west Devon not at all common' (Spooner 1985).



Identification

The Red-tailed cuckoo bumblebee is the most easily identified cuckoo, although could be confused with both Red-tailed bumblebee (*B. lapidarius*) and Red-shanked carder bee (*B. ruderarius*). Males in particular can look like Red-shanked carder bee (*B. ruderarius*).

National Range and Status

Predominantly southern with a recovery in some areas.



Alternative Names *Bombus* (Psithyrus) *rupestris*

Forest cuckoo bumblebee (*Bombus sylvestris*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Found from April to October, with young females seen over a longer period than other cuckoo bee species. It is thought to be double brooded and is the social parasite of the Early bumblebee (*B. pratorum*), the Heath bumblebee (*B. jonellus*) and the Bilberry bumblebee (*B. monticola*). One study found 50% of Early bumblebee (*B. pratorum*) nests parasitised by Forest cuckoo bumblebee (*B. sylvestris*) (Goulson 2003). A parasitized colony of Early bumblebee (*B. pratorum*) produced 16 males and five females of Forest cuckoo bumblebee (*B. sylvestris*) (Lhomme et al 2013).

Habitat & Ecology

Occurs in any habitats where the host species is found. Males can be abundant foraging on Asteraceae such as Thistles (*Cirsium spp.*) and Knapweeds (*Centaurea*). The Forest cuckoo bumblebee (*B. sylvestris*) is often associated with

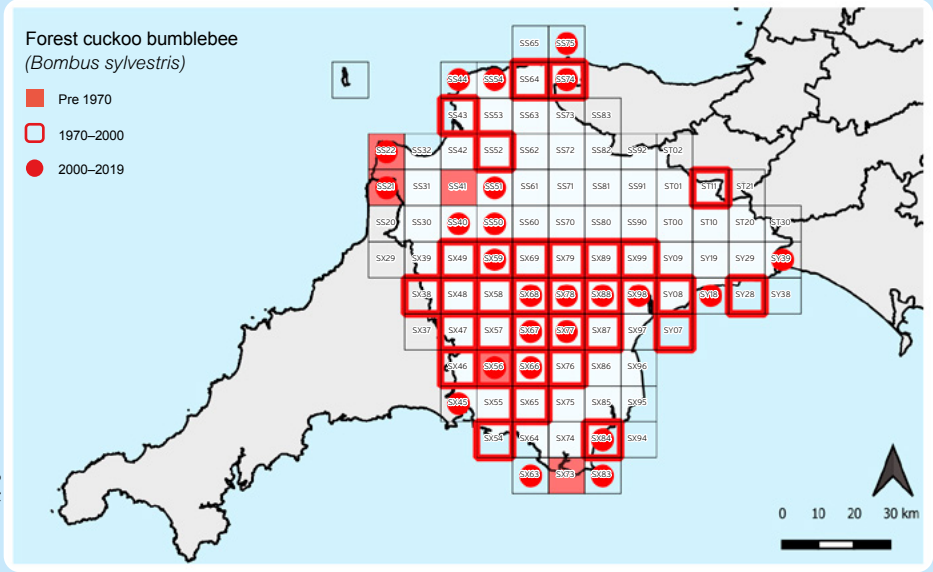
woodland edge habitats in spring and with open ground habitats such as heathland, moorland and coastal grassland later in the season. It is unknown how flexible the species is at choosing between different species to parasitise.

Conservation

Occurs in broad range of habitats. Suitable rotational hedge management and cutting regimes on flower-rich boundaries are important, with late summer/autumn cutting most appropriate.

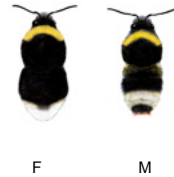


Photo-credit: Nick Owens.



Regional Distribution

Widespread but under recorded. The second most commonly seen cuckoo bee in the region. Spooner comments 'Common in south west Devon, occurring freely on Dartmoor, where it associates evidently with *B. monticola*, frequently *Vaccinium* in spring' (Spooner 1985).

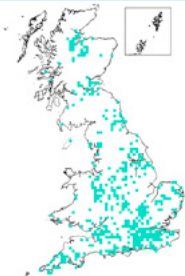


Identification

Females of Forest cuckoo bumblebee can be moderately distinctive, although males are difficult and can be confused with all the other male cuckoo's apart from Red-tailed cuckoo bumblebee (*B. rupestris*).

National Range and Status

Scattered, locally common.



Alternative Names Four-coloured cuckoo bee, *Bombus* (*Psithyrus*) *sylvestris*, Four-banded cuckoo bee

Southern cuckoo bumblebee (*Bombus vestalis*)



Photo-credit: Patrick Saunders.

Devon Phenology & Lifecycle

Recorded between April and October and is a social parasite of the Buff-tailed bumblebee (*B. terrestris*).

Habitat & Ecology

The Southern cuckoo bumblebee (*B. vestalis*) is found in a wide range of habitats, but less commonly on cooler habitats such as moorland in the region. Males can often be seen in numbers on Asteraceae such as Thistles (*Cirsium* spp.) and Brambles (*Rubus fruticosus* agg.). One study found that 42% of Buff-tailed bumblebee (*B. terrestris*) colonies were parasitised by Vestal cuckoo bee (*B. vestalis*) (Erler et al. 2010).

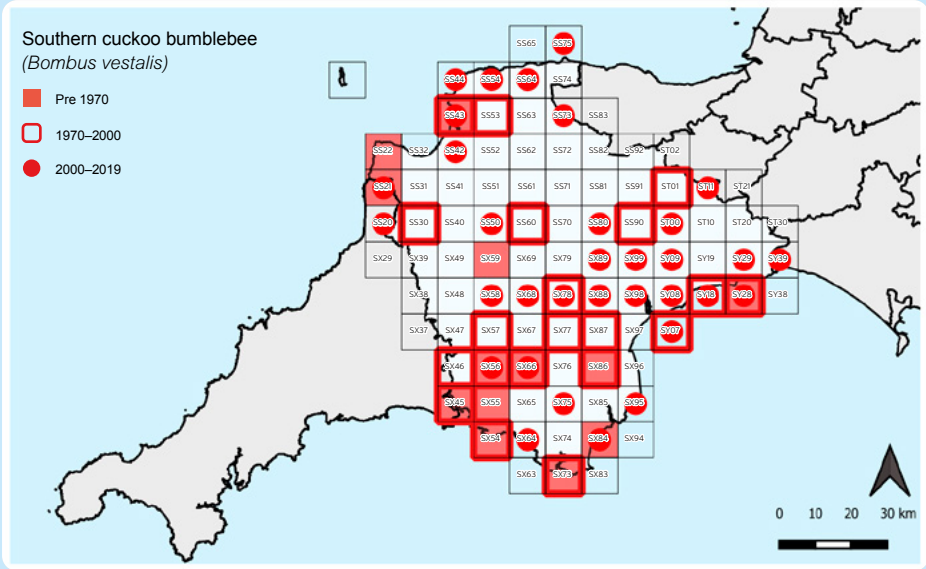
Conservation

As for the Buff-tailed bumblebee (*B. terrestris*), conservation of any flower-rich habitat is important but the Southern cuckoo bumblebee

(*B. vestalis*) is more likely to occur where there is better quality habitat. General conservation of flower-rich boundaries and edge habitats is important. Research suggests that Southern cuckoo bumblebee (*B. vestalis*) populations may disperse over a shorter distance than their hosts, potentially because of the advantages of being adapted to local populations of their host (Erler et al. 2010).

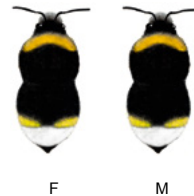


Photo-credit: Patrick Saunders.



Regional Distribution

Widespread or common. The most commonly seen cuckoo bumblebee in the region. Spooner comments '*In south west Devon much less frequent than is bohemicus*' (Spooner 1985). This is very interesting as this no longer seems to be the case.



Identification

Fresh brightly marked females and males are fairly distinctive. But when faded both males and females can easily be confused with most of the cuckoos.

National Range and Status

Common in southern England and Wales.



Alternative Names Southern cuckoo bee, *Bombus* (Psithyrus) *vestalis*

References

- Baldock D (2007) Bees, ants and wasps. Wildlife reports, *British Wildlife* 18 (6)
- Benton T (2006) *Bumblebees*. New Naturalist. Collins, London
- Benton T (2008) Hymettus report: *Bombus ruderarius* (Müller, 1776): Current knowledge of its autecology and reasons for decline. Available at [http://hymettus.org.uk/downloads/B.%20 ruderarius%20report08.pdf](http://hymettus.org.uk/downloads/B.%20ruderarius%20report08.pdf)
- Boatman ND, Parry HR, Bishop JD & Cuthbertson AG (2007) Impacts of agricultural change on farmland biodiversity in the UK. Hester RE, and Harrison RM (eds), *Biodiversity under threat*. RSC Publishing, Cambridge, UK, 1–32
- Boalch GT (1990) Devonshire Assoc reports GM Spooner announcement and obituary, *Transactions of the Devonshire Association* vol 122 (Tiverton)
- Brown MJF, Bear B, Schmid-Hempel R, Schmid-Hempel P (2002) Dynamics of multiple-mating in the bumble bee *Bombus hypnorum*. *Insectes Soc.* 49(4), 315–319
- Carolan JC, Murray TE, Fitzpatrick U, Crossley J, Schmidt H et al. (2012) Colour patterns do not diagnose species: quantitative evaluation of a DNA barcoded cryptic bumblebee complex. *PLoS One* 7(1): e29251
- Carvell C, Jordan WC, Bourke AFG, Pickles R, Redhead, JW & Heard MS (2012) Molecular and spatial analyses reveal links between colony-specific foraging distance and landscape-level resource availability in two bumblebee species. *Oikos*, 121, 734–742
- Darvill B, Ellis JS, Lye GC & Goulson D (2006) Population structure and inbreeding in a rare and declining bumblebee, *Bombus muscorum* (Hymenoptera: Apidae). *Molecular Ecology* 15, 601–611
- Dicks LV, Baude M, Roberts SPM, Phillips J, Green M, Carvell C (2015) 'How Much Flower-Rich Habitat Is Enough for Wild Pollinators? Answering a Key Policy Question with Incomplete Knowledge'. *Ecological Entomology* 40 (S1), 22–35
- Ellis JS, Knight ME, Darvill B & Goulson D (2006) Extremely low effective population sizes, genetic structuring and reduced genetic diversity in a threatened bumblebee species, *Bombus sylvarum* (Hymenoptera: Apidae). *Molecular Ecology* 15, 4375–4386
- Else GR & Edwards M (2018) *Handbook of the Bees of the British Isles*. Ray Society
- Erler S & Lattorff HMG (2010) The degree of parasitism of the bumblebee (*Bombus terrestris*) by cuckoo bumblebees (*Bombus [Psithyrus] vestalis*). *Insectes sociaux*, 57(4), 371–377
- Falk S (2015). *Field Guide to the Bees of Great Britain and Ireland*. Bloomsbury Publishing
- Fuller RM (1987) The changing extent and conservation interest of lowland grasslands in England and Wales: a review of grassland surveys 1930–84. *Biological Conservation* 40, 281–300

- Fürst MA, McMahon DP, Osborne JL, Paxton RJ & Brown MJF (2014) Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 506, 364–366
- Gammans N, Comont R, Morgan SC, Perkins G (2018) *Bumblebees: An introduction*. Bumblebee Conservation Trust
- Gosterit A & Gurel F (2016) Male remating and its influences on queen colony foundation success in the bumblebee, *Bombus terrestris*. *Apidologie*, 47(6), 828–834
- Goulson D (2003) *Bumblebees: Their behaviour and ecology*. Oxford University Press, Oxford
- Goulson D, Hanley ME, Darvill B, Ellis JS & Knight ME (2005) Causes of rarity in bumblebees. *Biological Conservation*, 122, 1–8
- Goulson D, Lye GC & Darvill B (2008a) Diet breadth, coexistence and rarity in bumblebees. *Biodiversity and Conservation*, 17(13), 3269–3288
- Goulson D, Lye GC & Darvill B (2008b) Decline and conservation of bumblebees. *Annual Review of Entomology*, 53, 191–208
- Goulson D & Sparrow KR (2008) Evidence for competition between honeybees and bumblebees; effects on bumblebee worker size. *Journal of Insect Conservation*, 13(2), 177–181
- Hagen M, Wikelsk M & Kissling WD (2011) Space use of bumblebees (*Bombus spp.*) revealed by radio-tracking. *PLoS One* 6(5): e19997
- Hanley ME, Franco M, Pichon S, Darvill B & Goulson D (2008) Breeding system, pollinator choice and variation in pollen quality in British herbaceous plants. *Functional Ecology*, 22, 592–598
- Hicks DM, Ouvrard P, Baldock KCR, Baude M, Goddard MA, Kunin WE et al. (2016) Food for Pollinators: Quantifying the nectar and pollen resources of urban flower meadows. *PLoS ONE* 11(6): e0158117
- Klein AM, Vaissiere BE, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C & Tscharntke T (2007) Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society B: Biological Sciences*, 274(1608), 303–313
- Lee et al. (2008) *Hymettus research report for 2008*. Hymettus. Available at http://www.hymettus.org.uk/downloads/Hymettus_research_report_2008.pdf
- Lhomme P, Ayasse M, Valterova I, Lecocq T, Rasmont P (2015) 'A Scent Shield to Survive: Identification of the Repellent Compounds Secreted by the Male Offspring of the Cuckoo Bumblebee *Bombus Vestalis*'. *Entomologia Experimentalis et Applicata*, 157 (3), 263–70
- Lhomme P, Sramkova A, Kreuter K, Lecocq T, Rasmont P & Ayasse M (2013) A method for year-round rearing of cuckoo bumblebees (Hymenoptera: Apoidea: *Bombus* subgenus *Psithyrus*). In *Annales de la Société Entomologique de France* (Vol. 49, No. 1, pp. 117–125). Taylor & Francis

References

- Lehmkuhl JF (1984) Determining size and dispersion of minimum viable populations for land management planning and species conservation. *Environmental Management* March 1984, Volume 8, Issue 2, pp 167–176
- Macdonald M & Nisbet G (2006) Highland bumblebees: distribution, ecology and conservation. Highland Biological Recording Group, Cromarty
- Merckx T, Feber RE, Hoare DJ, Parsons MS, Kelly CJ, Bourn NA & Macdonald DW (2012) Conserving threatened Lepidoptera: Towards an effective woodland management policy in landscapes under intense human land-use. *Biological Conservation*, 149(1), 32–39
- Martin SJ, Carruthers JM, Williams PH & Drijfhout FP (2010) Host specific social parasites (Psithyrus) indicate chemical recognition system in bumblebees. *Journal of Chemical Ecology*, 36(8), 855–863
- Ollerton J, Erenler H, Edwards M & Crockett R (2014) Extinctions of aculeate pollinators in Britain and the role of large-scale agricultural changes. *Science*, 346, 1360–1362
- Osborne JL, Martin AP, Shortall CR, Todd AD, Goulson D, Knight ME, Hale RJ & Sanderson RA (2008) Quantifying and comparing bumblebee nest densities in gardens and countryside habitats. *Journal of Applied Ecology*, 45(3), 784–792
- Pearson J (2011) *Cribs For Victory – The untold story of Bletchley Park's secret room*. Polperro Heritage Press
- Prŷs-Jones OE & Corbet SA (2014, revised reprint) *Bumblebees*. Naturalists' Handbooks 6. Pelagic Publishing, Exeter
- Rasmont P (2006) La régression massive des espèces d'abeilles sauvages et de bourdons d'Europe: un effet de la perturbation mondiale du cycle de l'azote. In Actes Colloq. *Insectes et Biodiversité*, Vol. 6, pp. 43–60
- Rasmont P, Franzén M, Lecocq T, Harpke A, Roberts S, Biesmeijer JC & Schweiger O (2015) Climatic risk and distribution atlas of European Bumblebees. *BioRisk*, 10, 1
- Rounsevell MDA & Reay DS (2009) Land use and climate change in the UK. *Land Use Policy*, 26, S160–S169
- Salisbury A, Al-Beidh S, Armitage J, Bird S, Bostock H, Platoni A & Perry J (2017) Enhancing gardens as habitats for plant-associated invertebrates: should we plant native or exotic species? *Biodiversity and Conservation*, 26(11), 2657–2673
- Saunders P (2003) *BAP and SRP bumblebees, a one-year survey of Devon distribution and status*. Report to English Nature Bombus Working Group
- Saunders P (2008) *Bombus muscorum and Bombus humilis in the South West in 2008*. Hymettus Ltd. Available at <http://hymettus.org.uk/downloads/Cornwall%20Bombus%20survey08.pdf>

- Scriven JJ, Woodall LC, Tinsley MC, Knight ME, Williams PH, Carolan JC, Goulson D (2015) Revealing the hidden niches of cryptic bumblebees in Great Britain: Implications for conservation. *Biological Conservation*, 182, 126–133
- Sladen FWL (1912, reprint 1989) *The Humble-bee*. Logaston Press
- Spooner M (1985) Unpublished notes. *Bumblebees in Devon*. Copy held in the Biological Records Centre, Wallingford
- Sramkova A & Ayasse M (2009) Chemical ecology involved in invasion success of the cuckoo bumblebee *Psithyrus vestalis* and in survival of workers of its host *Bombus terrestris*. *Chemoecology*, 19(1), 55–62
- Staley JT, Bullock JM, Baldock KC, Redhead JW, Hooftman DA, Button N & Pywell RF (2013) Changes in hedgerow floral diversity over 70 years in an English rural landscape, and the impacts of management. *Biological conservation*, 167, 97–105
- Roberts S (2009) *Bombus hypnorum* report. Available at: <http://www.bwars.com/content/bombus-hypnorum-report-2009>. [Accessed 6 February 2018]
- Turner M, Barr D, Fogerty M, Hart K & Winter M (2002) *The state of farming on Dartmoor 2002: final report on research to inform the 'Moor Futures' initiative*. Centre for Rural Policy Research, University of Exeter
- Tsvetkov N, Samson-Robert O, Sood K, Patel HS, Malena DA, Gajiwala PH, Maciukiewicz P, Fournier V, Zayed A. (2017) Chronic exposure to neonicotinoids reduces honey bee health near corn crops. *Science*, 356, 1395–1397
- Williams PH, Araujo M & Rasmont P (2007) Can vulnerability among British bumblebee (*Bombus*) species be explained by niche position and breadth? *Biological Conservation*, 138, 493–505
- Wood, TJ & Goulson, D (2017) The environmental risks of neonicotinoid pesticides: a review of the evidence post 2013. *Environmental Science and Pollution Research*, 24, 17285–17325
- Woodcock BA, Bullock JM, Shore RF, Heard MS, Pereira MG, Redhead J & Peyton J (2017) Country-specific effects of neonicotinoid pesticides on honey bees and wild bees. *Science*, 356 (6345), 1393–1395
- Vaudo AD, Patch HM, Mortensen DA, Tooker JF & Grozinger CM (2016) Macronutrient ratios in pollen shape bumble bee (*Bombus impatiens*) foraging strategies and floral preferences. *Proceedings of the National Academy of Sciences*, 113(28), E4035–E4042
- Vickery JA, Tallwin JR, Feber RE, Asteraki EJ, Atkinson PW, Fuller RJ and Brown VK (2001) The management of lowland neutral grasslands in Britain: effects of agricultural practices on birds and their food resources. *Journal of Applied Ecology*, 38, 647–664

Front cover illustration by John Walters



**Devon Biodiversity
Records Centre**



www.bumblebeeconservation.org

August 2023. BBCT135. Copyright 2023 ©. All rights reserved.

The Bumblebee Conservation Trust is a registered charity (England & Wales 1115634 / Scotland SC042830).
Company registration number 05618710 (England & Wales).

Correspondence address: Bumblebee Conservation Trust, Beta Centre, Stirling University Innovation Park, Stirling FK9 4NF.
Registered office: International House, 109–111 Fulham Palace Road, London W6 8JA

Follow us on

