Position Statement on Honeybees

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There are more than 270 species of wild British bees, although several of these are now thought to be extinct. This includes 27 bumblebee species (24 extant), and around 250 species of solitary bee. There is just one species of honeybee in Britain and Europe (the Western or European Honeybee Apis mellifera), although this species has numerous subspecies and colour forms which are often given different common names.

The honeybee is important for both pollination and honey production. Honeybees are kept for both purposes in dedicated hives by commercial and hobbyist beekeepers, and virtually all honeybees in agricultural landscapes originate from these hives (Jaffé et al 2010, Breeze et al. 2014, Pirk et al., 2017). The Trust recognises the benefits of honeybees and of beekeeping, but we also acknowledge concerns that, under some circumstances, managed honeybees may have negative effects on wild pollinators, including bumblebees.

As a species, the honeybee is not an endangered species: globally, managed stocks have increased by 45% since the 1960s (Aizen & Harder 2009, Geldman & González-Varo 2018). In the UK, the National Bee Unit (NBU) BeeBase database listed 29,000 beekeepers managing 126,000 hives in 2013, up from 15,000 and 80,000 in 2008 (Defra, 2014). The NBU's newer Hive Count methodology suggested 223,187 hives in 2016-17, 247,461 in 2017-18 (National Bee Unit 2018), and 264,000 in 2019 (National Bee Unit, 2021). Each hive contains around 40,000 individual honeybees, though this fluctuates across the year and varies between individual hives (BBKA 2019).

Although only practised by a minority of beekeepers, the seasonal movement of beehives in order to maximise honey yield and hive survival has become increasingly common, particularly for professional beekeepers (Odoux et al 2014, Odoux, Henry & Bretagnolle 2017). This usually involves the movement of hives into agricultural landscapes for pollination, and into more natural areas, including protected natural areas, when the availability of pollen and nectar in agricultural landscapes declines (Odoux et al 2014, Torné-Noguera et al 2016, Geslin et al 2017, Magrach et al 2017, Odoux, Henry & Bretagnolle 2017).

Worldwide, there is increasing concern that declines in wild pollinators may be exacerbated by unnaturally high densities of honeybees, associated with some forms of beekeeping (Roubik 1978, Goulson 2003, Paini 2004, Fürst et al 2014, Geslin et al 2016, Torné-Noguera et al 2016, Cane & Tepedino 2017, Mallinger et al 2017, Geldman & González-Varo 2018, Wojcik et al 2018, Angelella et al 2021). This is most clear-cut in areas where the honeybee is unequivocally not a native species (Pyke & Balzer 1985, Thorp et al 1994, Kato et al 1999, Dupont et al 2004, Miller et al 2015, Mallinger et al 2017, Olgun et al 2020), but decreased densities of wild pollinators around apiaries has also been found in Europe in both cropped and natural areas (Lindström et al 2016, Torné-Noguera et al 2016, Henry & Rodet 2018, Renner et al 2021). Some countries have already begun attempting to restrict beekeeping because of the potential effects on wild pollinators (Van der Spek 2012, Beard 2015, SNH 2018).

Managed honeybees are known to affect wild pollinators in two main ways: competition for floral resources, and the spread of diseases (Paini 2004, Van der Spek 2012, Mallinger et al 2017, Kleijn et al 2018).

Competition

Honeybees are very efficient super-generalist foragers with a preference for highly-rewarding flowering areas, and will compete strongly with wild pollinator species for pollen and nectar from a wide range of flowers, particularly open flowers (Dupont et al 2003, Goulson 2003, Couvillon et al 2014, Requier et al, 2015, Danner et al 2016, Cane & Tepedino 2017, Magrach et al 2017, Henry & Rodet 2018, Hung et al 2018). In particular, pollen availability is thought to be the main limiting factor for wild bee populations (Roulston & Goodell 2010): several studies have found that available pollen can be almost completely removed each day by wild pollinators (Minckley et al. 1994, Schlindwein et al 2005, Larsson 2006, Müller et al 2006, Larsson & Franzen 2007, Carvalho & Schlindwein 2011). Honeybee colonies have been found to collect between 15 and 55kg of pollen pellets annually (O'Neal & Waller 1984; Winston 1987, Seeley 1995, Cane & Tepedino 2017), consisting of 70-85% pollen and 15-30% water and nectar sugars (Schmidt and Buchmann 1986, Cane & Tepedino 2017). This means that each honeybee colony will reduce the amount of food available for wild pollinators (Heinrich 1979).

Rigorous manipulative experiments of competition are almost impossible to design for highly-mobile organisms active at a landscape scale, such as bees, and correspondingly no experiment has found clear, unequivocal evidence that honeybees have caused long-term reductions in populations of wild pollinators. However, it is possible to test for symptoms of competition between honeybees and wild bees, and it has been found that some

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wild bee species were scarcer, smaller, less reproductively successful, and were found on different flower species when co-occurring with greater numbers of honeybees (Schaffer et al 1983, Sugden & Pyke 1991, Evertz 1993, Thomson 2004, Paini & Roberts, 2005, Thomson 2006, Goulson & Sparrow, 2009, Elbgami et al 2014, Hudewenz & Klein, 2015, Lindström et al., 2016, Thomson 2016, Torné-Noguera et al., 2016). Wild bees have been found to switch to less-abundant and less-rewarding flower species when honeybees have been present (Anderson & Anderson 1989, Buchmann 1996, Walther-Hellwig et al 2006, Shavit et al 2009, Hudewenz & Klein 2013, Henry & Rodet 2018), and when honeybee hives have been removed from areas, wild bee abundances have increased (Pyke & Balzer 1985, Thorp et al 1994).

Disease transmission

Several diseases affecting, and first described from, honeybees can be found in bumblebees (Durrer & Schmid-Hempe 1994, Genersch et al 2006, Singh et al 2010, Peng et al 2011, Evison et al 2012, Levitt et al 2013, Fürst et al 2014, Graystock et al 2013, Li et al 2014, Ravoet et al 2014, McMahon et al 2015, Fearon & Tibbetts, 2021). Pathogenicity to bumblebees for most of these diseases is not yet precisely known, but bumblebees infected with Deformed Wing Virus (DWV) are known to develop deformed wings (Genersch et al 2006) and suffer higher mortality (Fürst et al 2014). Bumblebees have also been found carrying the fungal pathogen Nosema ceranae, an emergent disease of honeybees (Paxton 2010, Graystock et al 2013, Fürst et al 2014) and emergent infectious diseases have been implicated in bumblebee declines (Cameron et al 2011, Meeus et al 2011, Fürst et al 2014, Schmid Hempel et al 2014).

Disease transfer takes place through shedding of disease particles and direct bee-bee contact on shared flowers (Durrer & Schmid-Hempel 1994, McArt et al. 2014, Graystock et al 2015, Manley et al 2015). In DWV, the best-studied of these pathogens, the anthropogenic movement of managed honeybee stocks has been found to be a source of DWV outbreaks in bumblebees (Wilfert et al 2016, Manley et al 2019). Managed honeybees are likely to be linked to the dispersal of many diseases observed in wild bees, therefore it is reasonable to assume that the proximity of managed bees of any species may be detrimental to vulnerable populations of native bees (Fürst et al 2014, Manley et al 2015, McMahon et al 2015, Graystock et al 2016, Mallinger et al 2017).

Recommendations

The purpose of this position statement is to set out the Bumblebee Conservation Trust's position on managed honeybees. The core aim of the Trust is to aid the conservation of bumblebees. Many conservation measures deployed to help bumblebees will also aid other pollinator species, but this is not their primary aim.

Managed honeybees provide cultural, economic, and ecosystem services (pollination and honey production). Many beekeepers contribute to the creation and conservation of pollinator habitats, which will also help wild pollinators (e.g. the British Beekeepers' Association: https://www.bbka.org.uk/gardening-for-bees and https://www.bbka.org.uk/help-the-honey-bees), and the Trust recognises these numerous positive benefits of managed honeybees and beekeeping.

However, there are concerns that, under certain circumstances, managed honeybees can have detrimental impacts on wild pollinator species, including bumblebees, through disease transmission and competition for resources. It is important to note that competition between managed honeybees and wild bees is most serious when there is little food to go round. Consequently, the provision of flowering patches from March to October is essential in order to minimise competition between managed and wild pollinators (Hung et al 2018).

Although they are capable of foraging over long distances, most honeybees forage mainly within 1km of their hive (Danner et al 2016, Henry & Rodet 2018). Where areas are of particular importance for wild pollinators, such as nature reserves managed for rare bumblebees, it should be recognised that placing additional honeybee hives within 1km for all or part of the year may be detrimental to the rare species through both competition and potential disease transfer.

Further evidence is required in order to better understand these concerns, in light of the current evidence, the position of the Bumblebee Conservation Trust is to adopt the precautionary principle and recommend:

- **Plantings**: Planting for pollinators, especially in the vicinity of honeybee hives, should consist of a range of flowers of different flower structures. Including both long- and short-corolla species will provide food for a range of pollinator species and minimise the risk of any single species outcompeting others.
- **Hive placement:** A precautionary approach should be taken to positioning hives in areas where rare wild bees are present, and/or where important wild bee assemblages occur or are suspected to occur. Where possible hives should not be placed to take advantage of floral resources created and/or managed specifically for wild pollinators, such as nature reserves.

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- **Pathogens:** Honeybee health care among beekeepers should be well-established to minimise infection by Varroa mite and other parasites and pathogens. 'Healthy bee' guidelines such as those laid down by the National Bee Unit should be followed.
- **Research:** Further research into the impacts of managed honeybees on wild bees and the best ways to identify and mitigate detrimental impacts.
- **Awareness:** Continued efforts to raise awareness that establishing and supporting populations of managed honeybees does not automatically equate to conservation of wild pollinators, and may in some circumstances be detrimental to wild pollinator species such as bumblebees.

Further reading

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