Mountain bumblebee

Mountain (Bilbury) Bumblebee *Bombus monticola* Smith.

Climate Change Sensitivity:	HIGH	Ability to Manage:	LOW
Non climatic threats:	MEDIUM	Vulnerability:	HIGH

Summary

The mountain bumblebee is a cool-loving species of the uplands. In the past it was widespread in north and western Britain, but its population has declined. The main causes of this decline are thought to be related to habitat loss and degradation, both of which reduce or eliminate the flowering plants it relies on. However, the more rapid recent decline is consistent with that projected under a warming climate, and projections suggest a further contraction of suitable climate space.

Maintaining a mosaic of suitable habitat that includes upland heathland and hay meadows that support bilberry and legumes such as clover and birds-foot trefoil will be a key adaptation response.

Description

The queens, workers and males of the mountain bumblebee all have two yellow bands on the thorax but none on the abdomen. The yellow is bright and often straw-coloured. However, the rear band on the thorax is less pronounced. The orange-red tail colouring extends over more than half of the abdomen. Sexes are similar in colour, but males have yellow facial hair.

Ecology and distribution

The mountain bumblebee is associated with mountain and moorland habitats, including blanket bogs, upland heath and upland hay meadows, and is found in western and upland areas of England, including Dartmoor, Exmoor, the Peak District, and the North York Moors. There is evidence to suggest it needs access to grassland and heathland habitats, and it has a strong affinity with areas rich in bilberry *Vaccinium spp*, its preferred pollen source. It is found closer to sea level in northern England.

Queens emerge from hibernation in April and search for suitable nest sites, which are frequently found at the base of bilberry or heather plants. Once identified, the queen makes a single entrance chamber. Within this she forms a wax pot which she fills with nectar, and next to it a wax covered lump of pollen (usually from bilberry or *Salix* (Goulson pers. com), inside which she lays between 8-16 eggs.

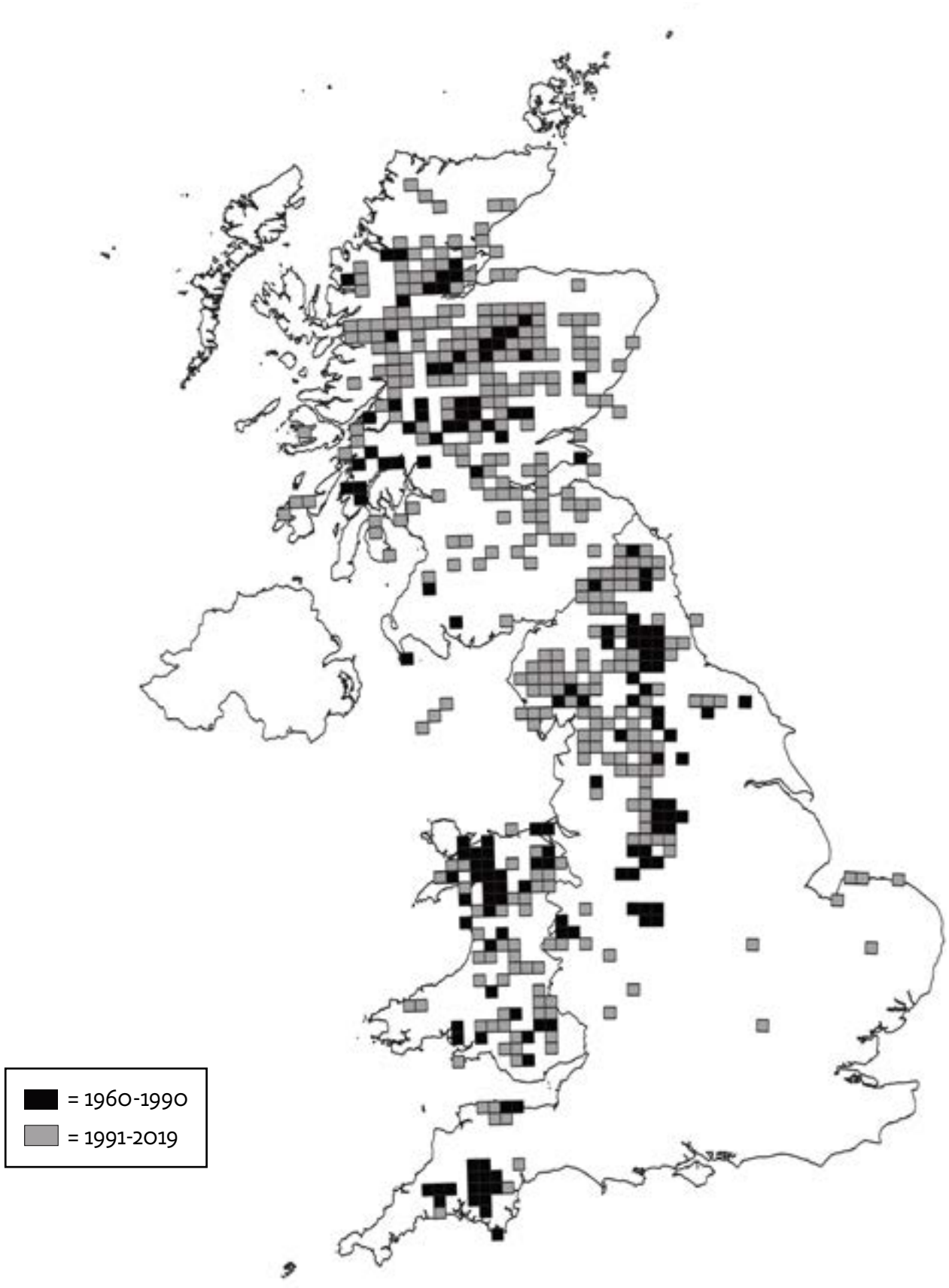
Larvae hatch in a few days and begin feeding on the pollen. After a couple of weeks the larvae spin a cocoon and pupate. The first batches of adults are all female 'worker' bees. Some of these will stay behind to help rear the next batch of workers but most will leave the nest and forage. Workers can be seen from May onwards visiting bilberry flowers, but also sallow *Salix spp*, bramble *Rubus fruticosus* agg, raspberry *Rubus idaeus*, bell heather *Erica cinerea*, and legumes such as clover *Trifolium* spp and birdsfoot trefoil *Lotus corniculatus*.

The cycle continues until around June, when the queen switches from producing workers to a mix of males and new queens. These generally emerge between July and August. The young queens feed on pollen and nectar to build up their energy reserves. Mating takes place at this time. Once mated the new queens locate a suitable hibernation site, usually loose soil in which they can burrow and form a small chamber in which to overwinter.

In Europe it is absent from isolated suitable habitat suggesting that is has relatively poor dispersal or requires large patches to persist (Rasmont *et al* 2015).

Bees, Wasps and Ants Recording Society (BWARS) and Bumblebee Conservation Trust (BBCT) presence records for mountain bumblebee are shown on the map below (10km grid scale).

Presence of mountain bumblebee records, 10km^2.
Maps contain BWARS and BBCT BeeWalk data reproduced with permission.



Confidence in climate change impacts[30]

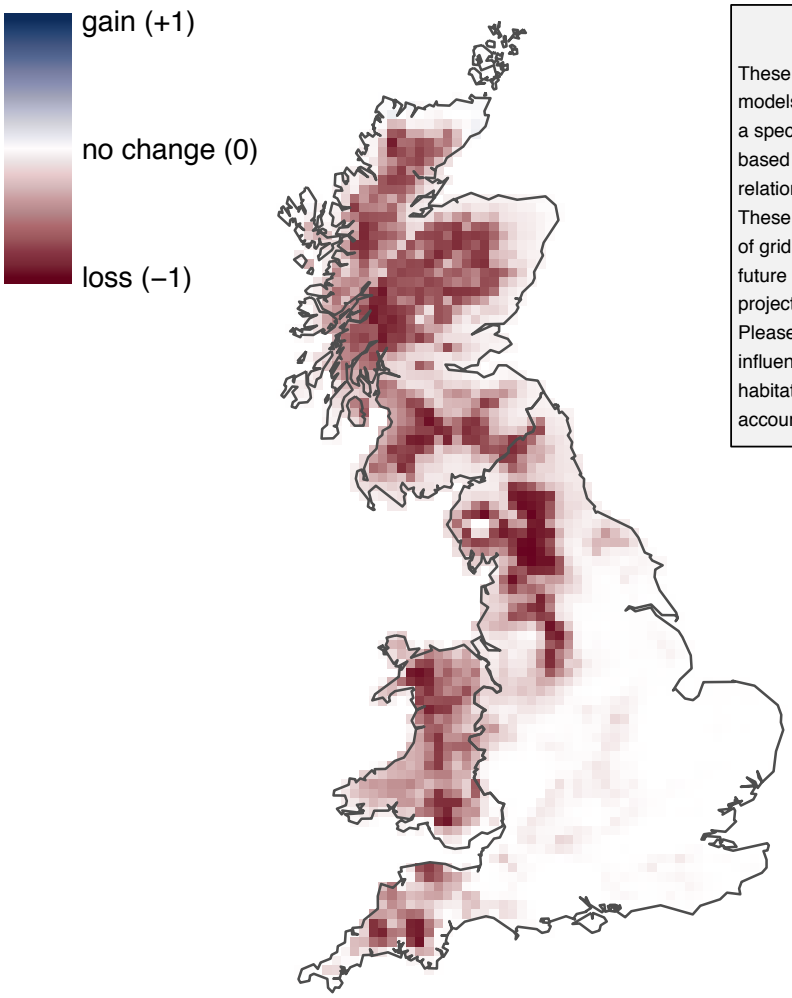
Distribution change: **MEDIUM CONFIDENCE** Mechanism: **LOW CONFIDENCE**

Recent changes in the distribution of the mountain bumblebee in England and across its range are consistent with a warming climate. These changes consist primarily of an up-slope contraction of its presence (Manino *et al* 2007). This suggests that changes in temperature are the main driver of change, although the mechanism is unknown (Iserbyt & Rasmont, 2012). Modelling suggests a further contraction of its range (Rasmont *et al* 2015). Anecdotal evidence suggests that recent warmer springs are leading to early emergence of the queens in March and April, which makes them susceptible to late frosts (Evans & Potts 2013).

The species has also been shown to have lower heat tolerance than species that inhabit lower altitudes (Martinet *et al* 2015) making it more susceptible to climate change driven warming. Warming may also lead to colonisation by more competitive species (Pradervand *et al* 2014; Goulson *et al* 2005).

30 An assessment of the strength of evidence that distributions are changing and the mechanisms causing change are understood. Refer to Part B, section 5 of the species section introduction for more information.

Projected change in potential distribution of mountain bumblebee in the UK with a temperature rise of 2°C (Pearce-Higgins *et al* 2015).



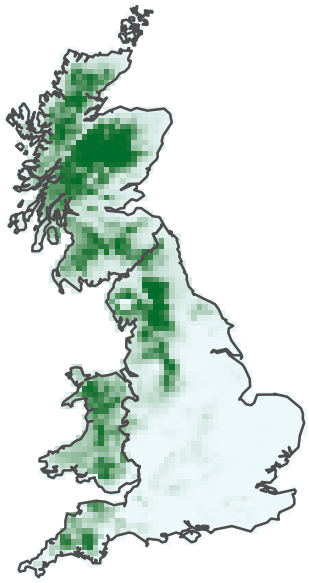
Climate suitability

These maps are created using statistical models which describe the probability that a species will be found in a 10 km grid square, based on its current distribution and its relationship to a number of climatic variables. These can be used to model the suitability of grid squares for a species under possible future climates when climate change projections are taken into account. Please note that other variables that influence species distributions, such as habitat and land–use change, are not accounted for in the modelling process.

Confidence of change

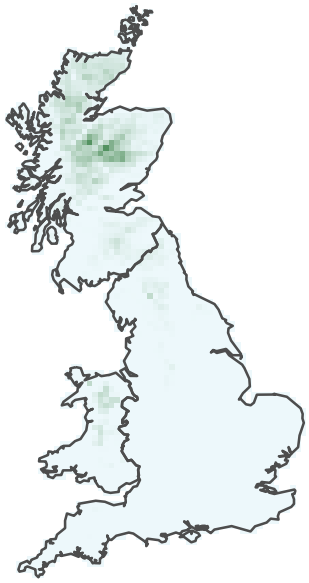
An assessment of the available data and other factors, as part of Natural England's Research Report NECR175, suggests that our confidence in this projection is high. N.B. many confidence assessments are rated as low because there is a lack of published information on the likely influence of climate on the species concerned.

Current climate scenario



Climate suitability

Low (2°C change) climate scenario



Created by:	University of York	Created for:	Natural England	Created on:	August 18 2016

Further information on these projections can be found in the introduction to the species section (Part A, Section 3 and Part B Section 5). Note that this is a guide to where a species may be able to survive, it does not capture other issues such as habitat availability and fragmentation – see text above for further details. Contains public sector information licensed under the Open Government Licence v3.0. Please also see acknowledgement and copyright at the beginning of this manual.

Please read this case study alongside the relevant habitat sheets.

Adaptation options

- Manage grazing to ensure sites support healthy populations of bilberry and a wide range of nectar sources, including clover and birdsfoot trefoil (Welch 1998).

- Ensure grazing regimes support the flowering of favoured plants throughout the season; bilberry and sallow in spring; birdsfoot trefoil, clovers, raspberry and bramble in early to mid-summer, and bell heather in mid to late summer.

- Within existing sites, identify and protect areas that have the potential to act as climate change refugia, such as sites with topographic variation and north facing slopes.

- Restore, maintain or create a mosaic of suitable habitat around existing sites, especially upslope from these where possible, including upland heathland that supports bilberry, *Salix* and *Erica*, and hay meadows that support legumes such as clover and birds-foot trefoil.

- Monitor known populations to determine the extent of any change, and where possible to identify the mechanisms driving this change. This is especially important at sites at the southern margins of its range where the impacts of climate change are likely to be most apparent.

- Identify potential reintroduction sites in areas where the climate will remain suitable and that are outside the species' limited natural dispersal range.

- Undertake further research to identify the mechanisms driving climate change losses; and to understand colonisation processes, in order to improve the targeting of habitat restoration and creation.

Relevant Countryside Stewardship options

UP1 Enclosed rough grazing

UP3 Management of moorland

UP6 Upland livestock exclusion supplement

References and further reading

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