Definition of Favourable Conservation Status for moss carder bee

Defining Favourable Conservation Status Project

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Acknowledgements

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- Richard Comont, Bumblebee Conservation Trust.
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Executive summary

This document sets out Natural England's view on favourable conservation status for moss carder bee in England.

Favourable conservation status is the situation when the species can be regarded as thriving in England and expected to continue to thrive sustainably in the future. The definition is based on the available evidence on the ecology of moss carder bee. Favourable conservation status is defined in terms of three parameters: natural range and distribution; population; extent and quality of habitat necessary for long-term maintenance of populations.

A summary definition of favourable conservation status in England follows. Section 1 of this document describes the species and its ecosystem context, Section 2 the units used to define favourable conservation status and Section 3 describes the evidence considered when defining favourable conservation status for each of the three parameters. Section 4 sets out the conclusions on favourable values for each of the three parameters.

This document does not include any action planning, or describe actions, to achieve or maintain favourable conservation status. These will be presented separately, for example within strategy documents.

The guidance document Defining Favourable Conservation Status in England describes the Natural England approach to defining favourable conservation status.

Summary definition of favourable conservation status

Moss carder bee is a generally uncommon grassland specialist bumblebee found locally and exclusively in open, flower-rich grasslands. The species' current English population is contained within an area defined by its persistent presence since the year 2000 in 62 monads (1 km grid squares), though it is currently known to be distributed across a larger area of 216 tetrads. It has a rather disjunct distribution in England with most records around southern coastal areas and a cluster in the North Pennines.

The species has declined in range and population due to habitat loss associated with changing agricultural land use and it has been lost from 158 tetrads. A parallel decline has been documented in many of the European countries in which it occurs. Its supporting habitat is often fragmented, with remaining populations likely to be persisting in small, isolated habitat patches.

Approximately 40% of tetrads with records of moss carder bee in the UK occur in England. Moss carder bee is listed as Vulnerable globally, in the UK and in Europe.

Favourable conservation status would be achieved when the species has expanded its range and distribution to occupy all tetrads for which there are current and historical records – 374 tetrads – and the population has increased such that there is a sustainable

population within each monad with a current or historical record of the species, a total of 478 monads. Expansion of range, distribution and populations would be achieved by an increase in the extent of suitable habitat from the current approximately 13,000 ha to 23,000 ha.

Table 1. Confidence levels for the favourable values

Favourable conservation status parameter	Favourable value	Confidence in the favourable value
Range and distribution	374 tetrads.	Moderate
Population	478 monads.	Low
Supporting habitat	The total habitat area of 23,000 hectares found within the favourable range is considered to be the favourable habitat area.	Low

As of January 2022, based on a comparison of the favourable values with the current values, moss carder bee is not in favourable conservation status. Note, this conclusion is based solely on the information within this document and not on a formal assessment of status nor on focussed and/or comprehensive monitoring of status.

Contents

About the Defining Favourable Conservation Status project

Natural England's Defining Favourable Conservation Status (DFCS) project is defining the minimum threshold at which habitats and species in England can be considered to be thriving. Our Favourable Conservation Status (FCS) definitions are based on ecological evidence and the expertise of specialists.

We are doing this so we can say what good looks like and to set our aspiration for species and habitats in England, which will inform decision making and actions to achieve and sustain thriving wildlife.

We are publishing FCS definitions so that you, our partners and decision-makers can do your bit for nature, better.

As we publish more of our work, the format of our definitions may evolve, however the content will remain largely the same.

This definition has been prepared using current data and evidence. It represents Natural England's view of favourable conservation status based on the best available information at the time of production.

1. Species definition and ecosystem context

1.1 Species definition

Moss carder bee *Bombus muscorum*.

Distinct forms are found in the Scilly Isles, and also in the Scottish offshore islands. These are sometimes given sub-specific status - *scyllonius* (Scilly Isles), and *agricolae* (Scottish islands) but this is not a universal treatment.

1.2 Species status

Red list status

An assessment of the risk of extinction.

Global: Vulnerable. Source: IUCN Red List

European: Vulnerable. Source: Nieto and others 2014

GB: Vulnerable (provisional status). Source: RM Smith, 2022, personal communication.

Conservation status

There are few data for extant populations in EU member states, or for biogeographic regions, as this species is not listed under the Habitats Directive. It is however, regarded as at least Vulnerable in all the states in which it occurs, and Endangered in Germany.

Moss carder bee is listed as a Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

1.3 Life cycle

Queen bees hibernate overwinter after mating in the autumn. They emerge from hibernation in May, sometimes as late as June in the extreme north of their range (this is a relatively late emerging bumblebee). Newly emerged queens feed up before making a nest on the ground among dense vegetation.

The workers (generally numbering 20-40 in total) are produced from mid to late June and new queens and males are produced in August and September. Workers and males (following mating) die off quite quickly during September and the mated queens feed up before hibernating for the winter to found new colonies the following spring.

1.4 Supporting habitat

Moss carder bee is only found in open, flower-rich grasslands, and it generally prefers damp, neutral or slightly acidic grasslands.

The species can be found in unimproved grasslands, such as lowland meadows and upland hay meadows, and good quality semi-improved grasslands. In East Anglia and southern England it is largely coastal and the habitat here can include coastal and riverine flood defence banks where there is open relatively flower-rich grassland that is not intensively managed.

It is widely distributed and fairly common in the north-west of Scotland, especially on the offshore islands, where the flower-rich grasslands remain relatively less-improved than on the mainland (and where it also occurs in flower-rich areas on moorland).

Queens newly emerged from hibernation feed extensively on legumes, especially clovers, peas and vetches, while males are especially keen on yellow-flowered composites (such as sow-thistles and bristly oxtongue). Workers feed on a variety of flowers including knapweeds, heathers, bramble, birds-foot trefoil and red bartsia as well as those mentioned previously.

The species requires taller grassland areas in which to nest, this being built above ground with a covering of mosses and dried grasses. In some areas ditch banks can be an important nesting habitat.

Little is known about hibernation sites except that they are in sheltered situations on the ground.

It is a reasonable disperser and should be able to find new or restored habitat within 10 miles or so of existing populations.

Sources: Bumblebee Conservation Trust species factsheet 2021; BWARS species factsheet 2012; Falk & Lewington 2015.

1.5 Ecosystem context

The species is native to England and is also found in Wales, Scotland and Ireland. England contains roughly 40% of the UK tetrads holding populations.

Sources: Bumblebee Conservation Trust species factsheet 2021; BWARS species factsheet 2012; Falk & Lewington 2015.

2. Units

2.1 Natural range and distribution

Presence within tetrads (2 x 2 km grid squares).

2.2 Population

Persistent presence in a monad (1 km grid square). Persistent presence has been defined as at least 2 records from 2 different years and where at least one of those years is 2000 onwards.

2.3 Habitat for the species

Hectare

3. Evidence

3.1 Current situation

Natural range and distribution

Moss carder bee is a generally uncommon, locally-distributed species with a rather disjunct distribution. This is mainly a result of recent losses. However, even within apparently suitable habitat, it is generally found rather patchily and the reasons for this are not clear. It may be because it has a shorter foraging distance than many other bumblebees, no further than 500 m and generally within 100 m. The total number of tetrads in England with records of moss carder bee since January 2000 is 216 (Natural England analysis of data provided by Bumblebee Conservation Trust). Annex 1 provides maps showing the current distribution of moss carder bee.

Confidence: Moderate

Population

The population persists in 62 monads (Natural England based on data provided by Bumblebee Conservation Trust).

This bee occurs at relatively low concentrations, partly due to the relative paucity of habitat in many areas where it is still found. This is compared with more common bumblebees which have a more catholic habitat and occur at higher concentrations.

Populations appear to fare much better in areas where there is still a good amount of suitable habitat.

Habitat for the species

There is no accurate data available for the extent of habitat suitable for moss carder bee. Unimproved grasslands such as lowland and upland meadows, where moss carder bee may be found, are scarce, small and highly fragmented and not all of this habitat will be suitable for moss carder bee.

Natural England estimates the habitat available for the species to be 13,156 ha, consisting of the following habitats in the Priority Habitat Inventory (PHI) that are within tetrads with moss carder bee records from 2000 onwards:

- Coastal and floodplain grazing marsh.
- Coastal sand dunes.
- Good quality semi-improved grassland.
- Lowland meadows.
- Upland hay meadow.

However, this calculation is likely to be an overestimate as it is unlikely that the full extent of each area of habitat is suitable for and used by moss carder bee.

Confidence: Moderate

3.2 Historical variation in the above parameters

Moss carder bee has declined markedly in range and numbers as its habitat has declined through agricultural improvement and direct loss of flower-rich grasslands. This species is reported as declining in many of the European countries in which it occurs.

Natural range and distribution

There is relatively little data prior to 2000. However, over 40% of all records are from tetrads where the species has not been found since 2000, despite an increase in recording effort since then. This is evidence of a significant decline over recent decades, and the loss of species-rich grasslands prior to this indicates that the species may have been in decline for decades prior to 2000. The total number of tetrads in England with records of moss carder bee prior to 2000 is 205. See Annex 2 for maps showing the historical (pre-2000) distribution of moss carder bee.

Population

The approximate historic population can be estimated from the historic range shown in the map at Annex 2.

Habitat for the species

There are no data on the historical extent of habitat suitable for moss carder bee. However, there was an estimated 97% loss of all lowland (including enclosed upland meadow) semi-natural grassland between 1930 and 1980 (Fuller 1987). Therefore, it can be assumed that there has been a similar, substantial decline in the supporting habitat for this species. A reasonable assumption would be that the amount of available habitat in most or all tetrads has been reduced and probably fragmented so that remaining populations are likely to persist in smaller habitat patches within most or all tetrads.

Confidence: Low

3.3 Future maintenance of biological diversity and variation of the species

Natural range and distribution

The range required to sustain viable populations and genetic diversity is at least the range shown on the maps (pre- and post-2000 records) and must include the Scilly Isles which

has a distinct form. The total number of tetrads in England where the species has been recorded is 374.

Population

Data from Bumblebee Conservation Trust indicates that the species has been recorded in a total of 478 monads. Favourable conservation status requires that there should be self-sustaining populations of moss carder bee within each of these monads for favourable status.

Habitat for the species

Moss carder bee has declined in range and population, largely due to loss and degradation of its supporting habitat. The species requires larger and connected areas of habitat to expand its range, distribution and populations. The PHI indicates that there are 22,444 ha of the habitats listed in Section 3.1 within all tetrads with records of moss carder bee. In the absence of further information on the extent of habitat required for favourable status, the whole of this area, in a condition suitable for moss carder bee, is considered as the minimum area required for favourable conservation status.

Confidence: Low-Moderate

3.4 Constraints to expansion or restoration

The potential for restoration of populations and distribution is quite good in theory and is directly related to the improvement and creation of suitable grasslands. Restoration of the required grassland habitat should be undertaken throughout the favourable range to restore range and populations. Some insight into the effectiveness of restoration of populations may be gained in the future by the BBCT BeeWalk monitoring scheme, where these transects coincide with restored areas.

Restoration in areas where the species occurred historically but is no longer present will be more difficult as, even if suitable habitat is restored, establishing populations may be difficult and may require significant intervention. Where suitable habitat occurs fairly close to existing populations, then the creation of ‘habitat corridors’ may help establish populations in such areas.

Confidence: Moderate

4. Conclusions

4.1 Favourable range and distribution

This should be the entire range for which there are records (pre- and post-2000) and with expansion into adjacent areas where suitable habitat can be restored or created. The total number of tetrads with records is 374.

4.2 Favourable population

It is not possible to give a figure for the favourable population. However, the number of monads within the species' historic range suggest occupation of 478 monads at favourable conservation status. Once suitable habitat had been created or restored in these areas and the bees shown to be persistently present then a favourable population could be assumed to have been achieved.

4.3 Favourable supporting habitat

There should be sufficient suitable habitat throughout the natural range to support favourable numbers or colonies. The stated favourable range equates to a total habitat area of 23,000 hectares which is considered to be the minimum for favourable status.

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Annex 1 Maps showing current distribution

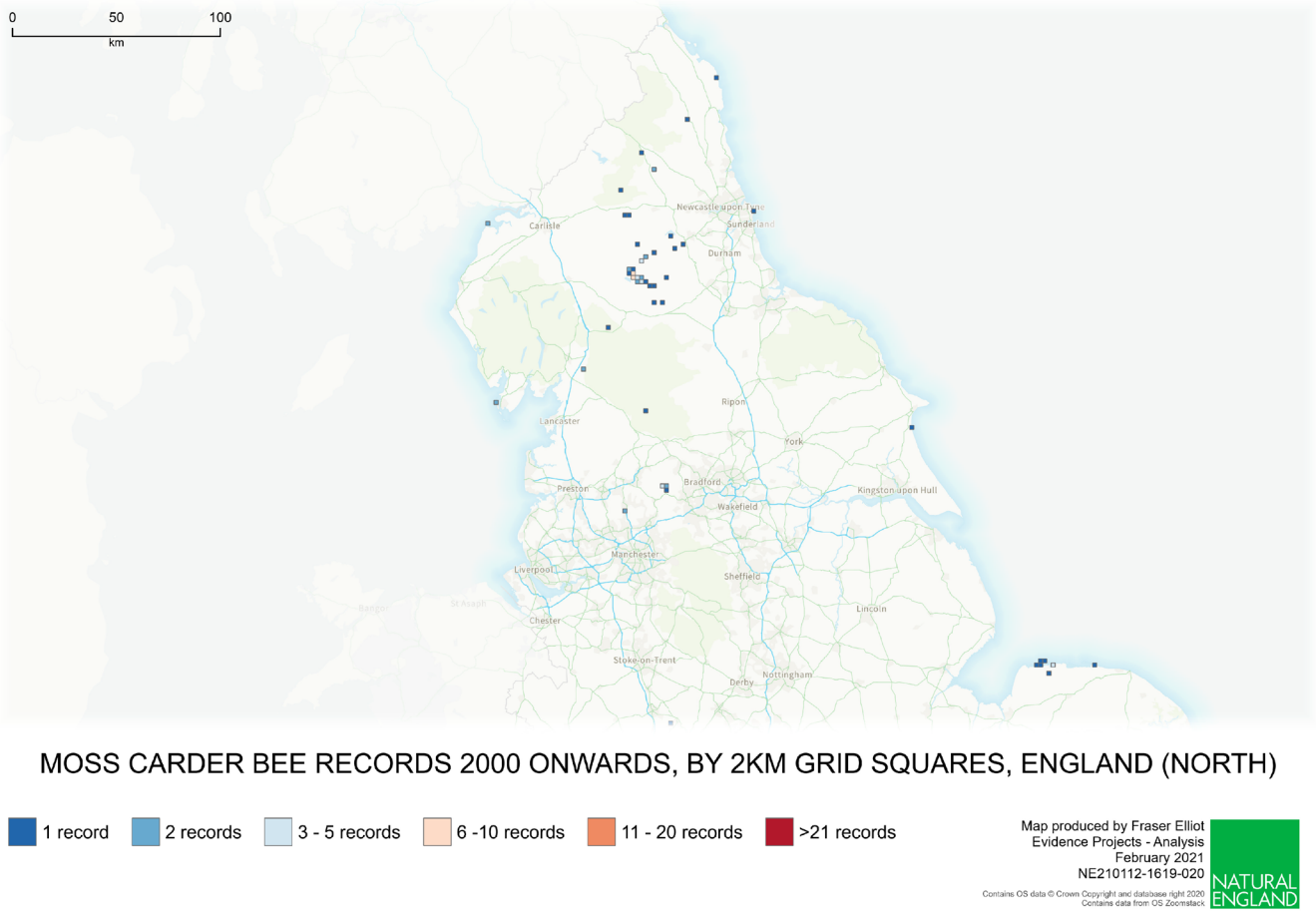

Figure 1(a). Moss carder bee records by 2 km grid square in Northern England 2000 onwards. Contains OS data © Crown Copyright and database right 2020. Contains data from OS Zoomstack and © The Bumblebee Conservation Trust.

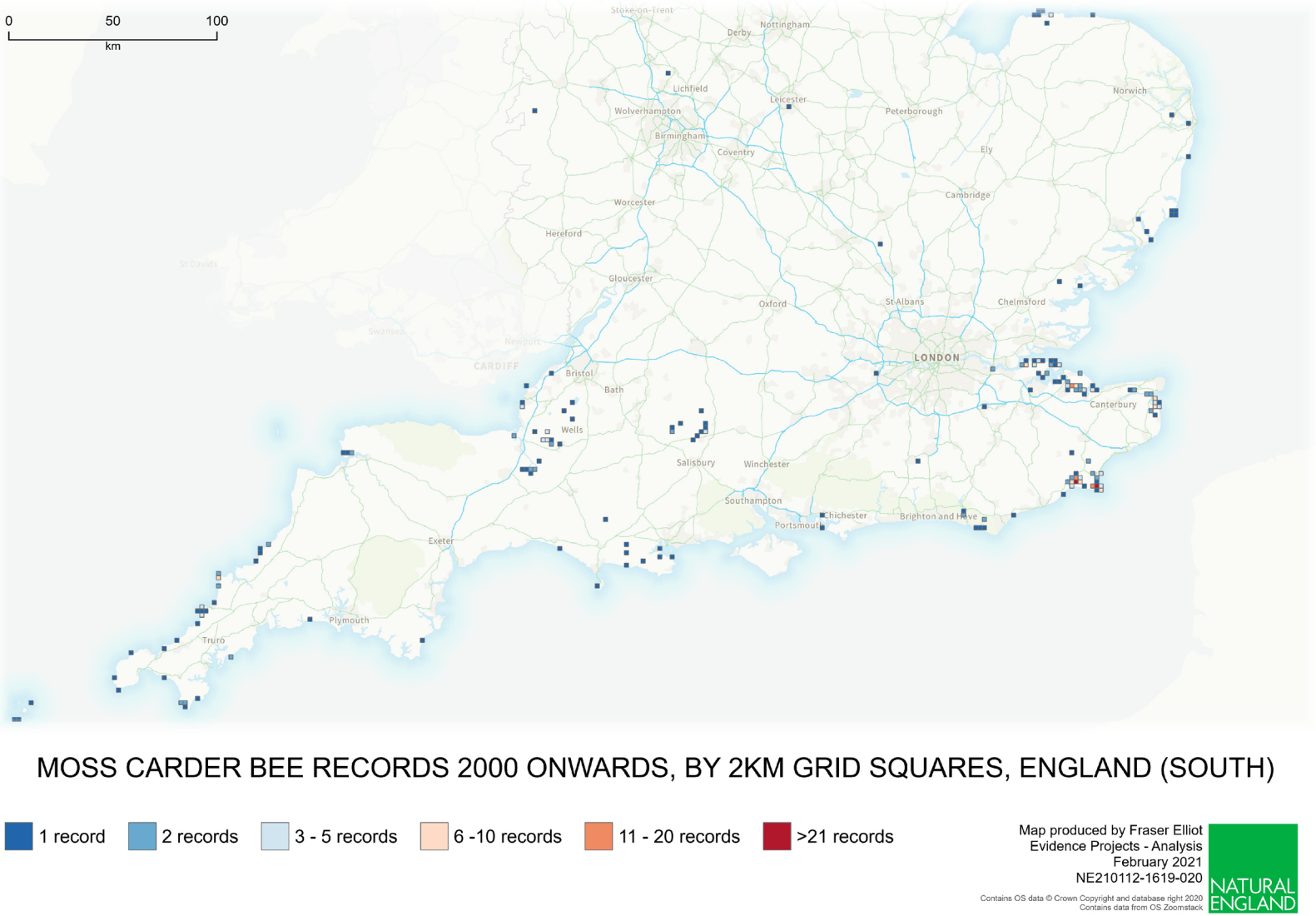

Figure 1(b). Moss carder bee records by 2 km grid square in Southern England 2000 onwards. Contains OS data © Crown Copyright and database right 2020. Contains data from OS Zoomstack and © The Bumblebee Conservation Trust.

Annex 2 Maps showing historical distribution

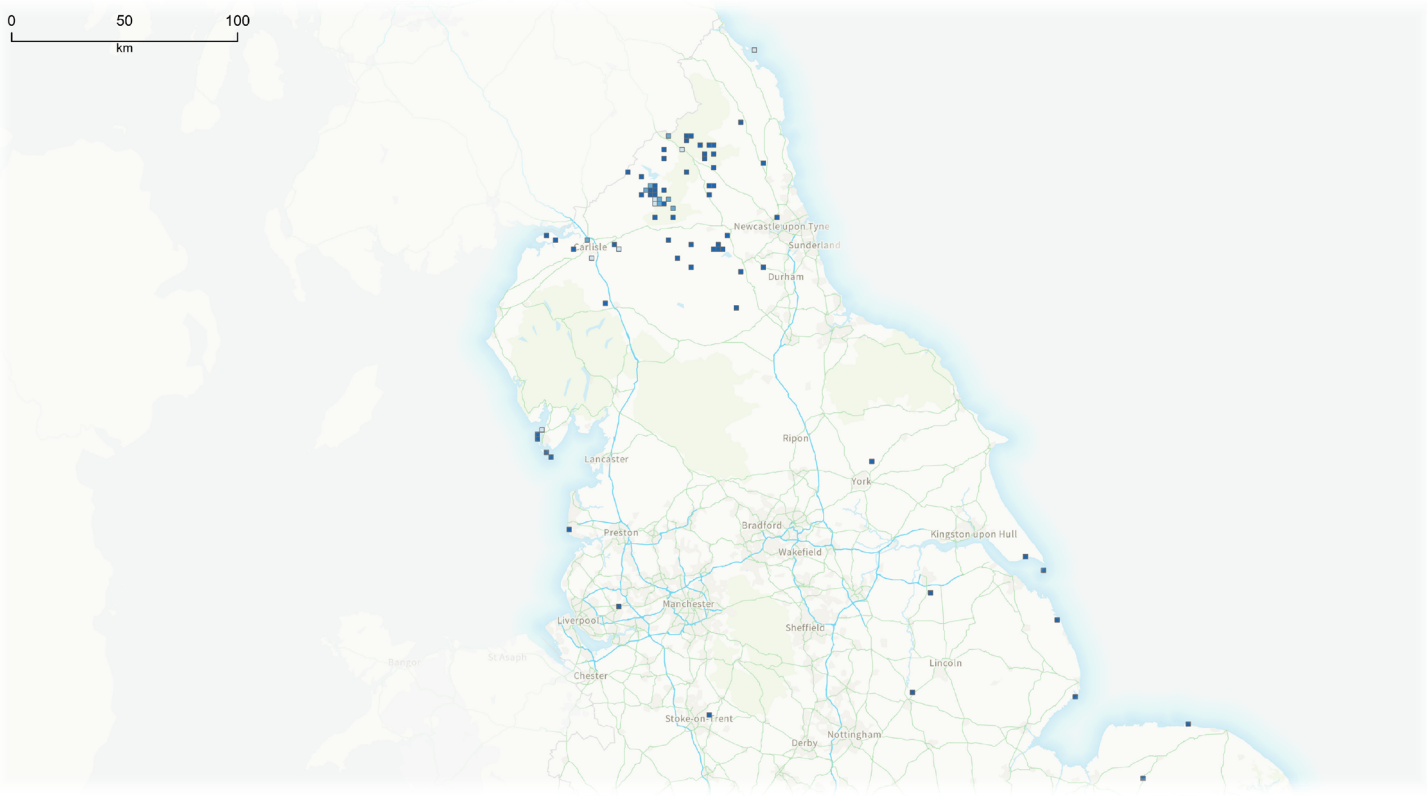

Figure 2(a). Moss carder bee records by 2 km grid square in Northern England pre 2000. Contains OS data © Crown Copyright and database right 2020. Contains data from OS Zoomstack and © The Bumblebee Conservation Trust.

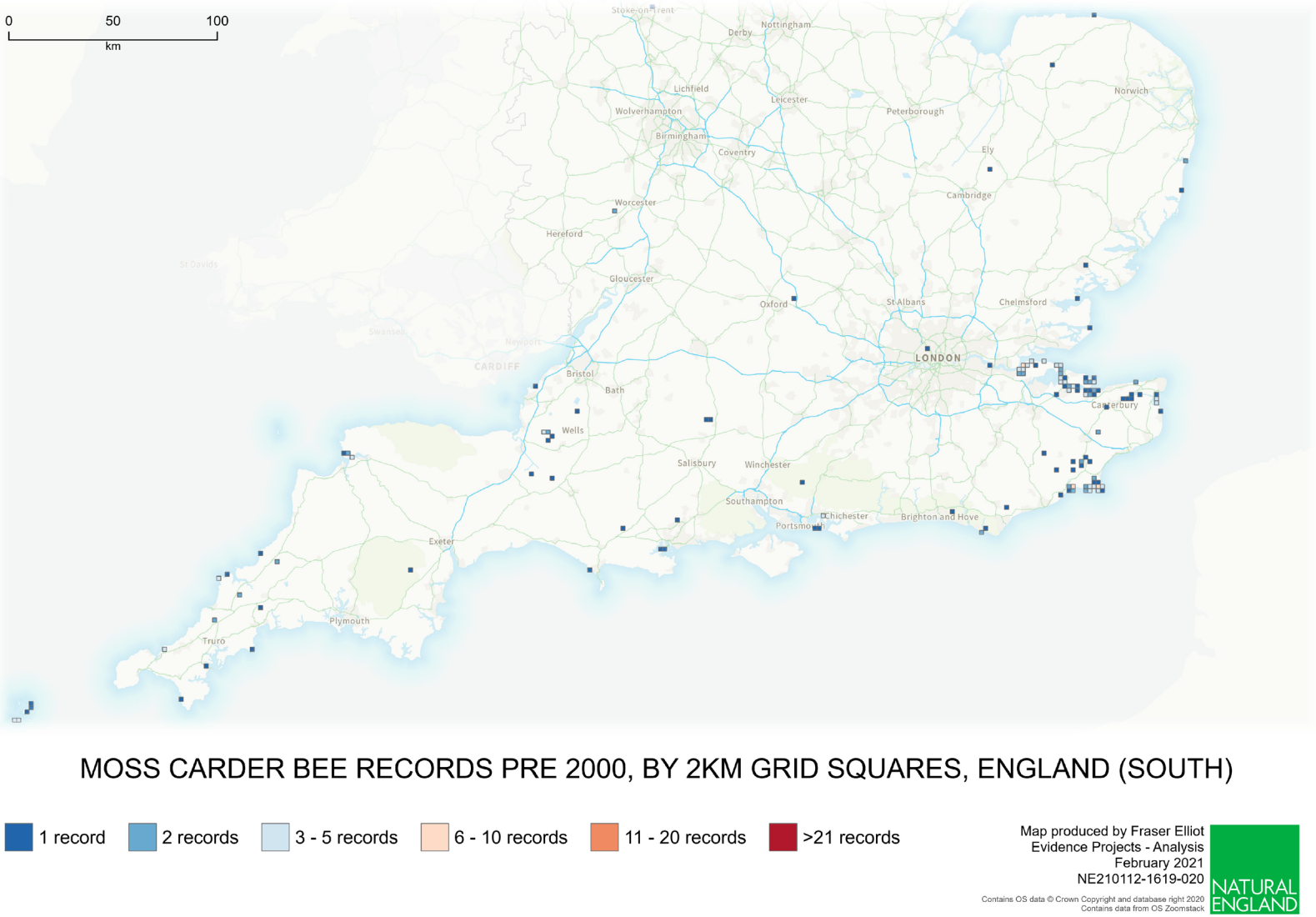

Figure 2(b). Moss carder bee records by 2 km grid square in Southern England pre 2000. Contains OS data © Crown Copyright and database right 2020. Contains data from OS Zoomstack and © The Bumblebee Conservation Trust.

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