



Wales Threatened Bee Report

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Armed nomad bee (*Nomada armata*) female © Steven Falk.

Executive Summary

There is widespread concern over the status of pollinators, as many insect groups including bees, butterflies, moths and hoverflies have declined dramatically in the UK and globally both in their abundance and diversity. Alarmingly, 3 of our 25 bumblebee species have already gone extinct, with a further 8 suffering major range contractions. Two-thirds of our moths and over 70% of our butterflies are also in long-term decline.

The conservation of pollinators is essential for the health of our countryside and our future health and prosperity. An estimated 85% of all wildflower and flowering crop species depend upon insect pollination; effective pollination is crucial for human nutrition and food security. Insect pollination of crops is of considerable economic importance, estimated at £440 million per annum in the UK and \$215 billion per annum globally. Pollinators should also be recognised for their intrinsic value and contribution to our well-being through enjoyment of the natural environment.

Wild bees (bumblebees and solitary bees) show among the most severe declines of any UK pollinator. Wales is home to nationally rare and threatened bee species and for some, such as the Large mason bee (*Osmia xanthomelana*), Wales supports the last known populations in the UK. The Wales Threatened Bee Report is the first time the status of threatened bees has been assessed at a county level across Wales. Whilst we know that the species assessed have declined at a UK and in some cases national level, such high level assessments can obscure trends at more local scales as can be seen from the results of our analysis.

The Wales Threatened Bee Report has looked at 26 bee species considered to be at greatest risk in the UK, and which are present in Wales. Of these 26 target species, 9 are listed under Section 7 of the [Environment \(Wales\) Act 2016](#) as Species of Principal Importance in Wales. Our analysis indicates range contractions for the majority of the 26 target species in Wales – for example, the Large garden bumblebee (*Bombus ruderatus*) has been lost from 5 vice-counties and is now restricted to Pembrokeshire. We found that 7 bee species have already become extinct in Wales, with a further 5 species at a high risk of extinction. Worryingly, bee losses are evident across the whole of Wales with some counties having lost as many as 10 species.

This report is a call to action. The declines in our pollinators can be reversed by restoring lost flower-rich habitats and connecting up those that remain, helping bees, butterflies, hoverflies and other wildlife to move through our landscape. Through a combination of targeted species conservation action and a more general approach to improving the condition of our countryside for bees and other pollinating insects, we hope that we can reverse the severe declines highlighted in this report and support the delivery of the [Action Plan for Pollinators in Wales](#).

Wales Threatened Bee Report

Research has shown that many pollinating insects have experienced a decline in recent years, both in the UK and globally^{1, 2}. Wild bees (bumblebees and solitary bees) show among the most severe declines of any UK pollinator and whilst exploration of their status at such broad scales is essential for detecting overarching patterns of change, this approach is limited as it can obscure trends at more local scales.

Using the last published status review for bees, wasps and ants³ and data holdings of the Bees, Wasps and Ants Recording Society (BWARS), Local Environmental Records Centres Wales (LERC Wales), National Biodiversity Network Atlas (NBN Atlas) and consulting individual experts, we identified 64 bee species recorded from Wales that are of conservation concern. This report focuses on 26 of these species. 24 of these have been selected because they fall into one of the following two categories:

- Red Data Book categories, namely Endangered (RDB1), Vulnerable (RDB2) or Rare (RDB3).
- Section 7 species i.e. listed in the Environment (Wales) Act 2016 as Species of Principal Importance in Wales.

A further two species (*Andrena marginata* and *Bombus soroensis*) were also added to our target list due to the substantial declines in their habitat extent and population size and the fact that Wales appears to have important holdings of these species at a UK level.

For each target species, we provide the most recent data on its distribution and conservation status in Wales alongside information on their ecology and habitat requirements. We have highlighted the main reasons for decline and proposed management actions for their future conservation. We have also examined the status of each target species at the Watsonian vice-county level, which suggests alarming declines in some species and seemingly differing extents of species losses between vice-counties. We have also created individual species lists for the 13 Welsh vice-counties, as well as grouped the target species by the habitat types they associate with.

The remaining 38 bee species identified as being of conservation concern in Wales (i.e. those listed as 'Notable' in the last published status review³ or are likely to become of special interest in near future) are also mentioned in the 'Other bees of conservation concern in Wales' section. Information on ecology and conservation statuses of these species at the vice-county and national level is included. Additionally, the report also includes several other species that have been seemingly lost from Wales. These are listed in the 'Species losses in Wales' section.

What we aim to do

Measures can be taken to reverse the current trend in pollinator decline. We aim to develop a conservation plan

for Wales in the following ways:

1. Raise awareness of threatened bee species and other pollinator species of interest in Wales.
2. Raise awareness of the importance of Wales in conserving threatened and declining bee species at a UK level.
3. Examine historical distribution data to identify the parts of Wales that have suffered the greatest species losses.
4. Highlight gaps in existing knowledge on the ecology of target species - understanding these requirements is key to being able to put conservation measures into place.
5. Use existing distribution data and knowledge of species-specific ecology to group target species by shared habitat requirements.
6. Co-ordinate and focus future conservation action.
7. Support the [Action Plan for Pollinators in Wales](#)⁴.

In the longer term, we hope to:

8. Address gaps in species-specific population distributions and trends.
9. Address gaps in species-specific autecological knowledge.
10. Restore and create suitable nesting and foraging habitat.
11. Maximise opportunities within [Buglife Cymru's B-Lines Initiative](#) and other conservation initiatives to link isolated populations by creating corridors or stepping stones of suitable habitat. Habitat quality and connectivity are the most important factors impacting both our threatened pollinators and more widespread and common species.

The Wales Threatened Bee Report hopes to achieve these aims by working in partnership with the many organisations and landowners who value the importance of bees in Wales. This report utilises data holdings of BWARS, LERC Wales and NBN Atlas to examine the status of target species in Wales, and draws on previous conservation work largely carried out by Hymettus, and the Bumblebee Conservation Trust (BBCT).

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Brown-banded carder bee (*Bombus humilis*) © Liam Olds.

Introduction

Bees in trouble

There is widespread concern over the status of pollinators, as many insect groups including bees, butterflies, moths and hoverflies have declined dramatically in the UK and globally both in their abundance and diversity^{1,2}. With regards to bees in the UK, whilst some species have undergone a range expansion (such as Tree bumblebee *Bombus hypnorum* which arrived in the UK in 2001 and continues to spread – see [BWARS Bombus hypnorum mapping project](#)), the majority seem to be declining. Alarming, 3 of the UK'S 25 bumblebee species have gone extinct, with a further 8 suffering major range contractions⁵. Biesmeijer et al. (2006) compiled almost 1 million occurrence records of native bee species (including bumblebees and solitary bees) before and after 1980 and reported that the number of bee species declined significantly in 52% of the analysed 10km squares of the National Grid².

To be able to effectively prevent further extinctions, and restore sustainable pollinator populations in our countryside, more detailed and accessible data on population trends is required. The European Red List of Bees⁶ highlights the considerable lack of knowledge and data on bees – 57% of all European bee species lack sufficient information to establish their status and 79% of species have unknown population trends. There is currently no official data for trends in wild bee populations for Wales. However, our analysis indicates range contractions for the majority of the 26 target species. This report aims to help fill the gaps in our knowledge of population trends of wild bees in Wales, to highlight species at risk of extinction in Wales and that require urgent targeted

action, and to focus conservation efforts to stabilise and enhance populations of declining species.

Why are pollinators, and in particular wild bees, important?

The conservation of pollinators is essential for the health of our countryside and our future prosperity. The reproduction of an estimated 85% of all wildflower and flowering crop species depends on, or is enhanced by, pollinating insects⁷, and therefore effective pollination is crucial for human nutrition⁸ and food security⁹.

Insect pollination of crops is of considerable economic importance, estimated at £440 million per annum in the UK¹⁰ and \$215 billion per annum globally¹¹, with insect availability greatly influencing individual crop species. Insect pollinators are important in maintaining and improving the yield and quality of many fruit and vegetable crops grown in Wales, including strawberries, apples, raspberries, cherries, beans and oilseed rape. For instance, a recent European study found that insect pollination of strawberries increased the average commercial value of marketable fruits by 92% compared to self-pollination. Insect pollination is not just important for improving crop yields, but vital for physiological processes that result in better marketable quality (e.g. fruit appearance, flavour-enhancing constituents, prolonged shelf life) and commercial value. For example, a study on Gala apples in the UK showed that the exclusion of pollinators from orchards had negative impacts on both yield and quality of the produce¹². One of the reasons for pollination failure in plants is having too few and too inconstant pollinators.

Under-pollination due to unavailability of pollinating insects already reaches 70% for some commercial species¹³. Aside from economically-grown plants, wild plants pollinated by insects contribute to wider biodiversity and ecosystem stability, are key features of many habitats and landscapes, and provide food and shelter to other wildlife¹⁴. Pollinating insects can also provide vast indirect benefits to society as sources of inspiration for education, art and technology, as well as by enabling the maintenance of green spaces within our urbanised areas, which in turn greatly improves people's physical, mental health and well-being^{9, 15}.

Bees are believed to be the most efficient pollinators of all insects¹⁶. Unlike other pollinating insects, which primarily visit flowers to feed solely themselves, bees also collect pollen and nectar to feed their young. This means that they tend to visit more flowers and spend longer time foraging. Bees can also show a high degree of floral constancy, meaning that they methodically visit flowers of the same species thus increasing the likelihood of fertilisation¹⁷.

Even though honeybees are the most economically-valued pollinators of crop monocultures worldwide, the contribution of wild bees to pollination services is of great importance and to date has been much under-estimated. For many crops, wild bees have proved to be the most effective pollinators – these crops include blackberry, raspberry, cherry and tomatoes¹⁸. Due to the differences in their body size, tongue length, period of activity, and preferred flower shape, we often find some bee species preferentially visiting flowers of certain types¹⁹. Some examples of such specialised relationships include: *Andrena hattorfiana*/*A. marginata* and scabiouses; *Colletes hederæ* and ivy; *Macropis europaea* and Yellow Loosestrife; *Melitta dimidiata* and Sainfoin; and *Melitta tricincta* and Red Barstia.

Even for the plants that attract varied types of pollinators, a diversity of wild pollinators is important to ensure their propagation in times of climatic and environmental variation²⁰. Higher bee diversity has been linked with higher seed set and flower visits, and is believed to be critical to overall ecosystem stability¹⁹. Keeping healthy populations of wild pollinators is imperative for maintaining pollination and other ecosystem services, as species declines beyond a critical threshold could trigger plant population decline or extinctions, in turn affecting the structure and composition of natural plant communities and the productivity of many agroecosystems that rely on insect pollination²¹.

Threats to bees

There are many potential threats and drivers of bee declines here in the UK and globally, and rarely do these drivers act in isolation¹. Such threats include:

1. Habitat loss, fragmentation and degradation

Habitat loss is generally thought to be the most important factor driving bee declines²². In the UK, up to 98% of wildflower meadows have been lost through agricultural intensification, land development and coastal stabilisation since the 1940s²³. Decline in many bumblebee species is

largely attributable to the loss of unimproved flower-rich grasslands²⁴. Long-tongued, late-emerging bumblebees such as *Bombus humilis*, *B. sylvarum*, *B. ruderatus* and *B. subterraneus* that specialise heavily in gathering pollen from Fabaceae (plants typical of unimproved flower-rich grasslands) have all declined in the UK²⁴. Similarly, between 1978 and 1998, 76% of bumblebee forage plants experienced declines²⁵.

Bees that have large foraging ranges, such as bumblebees, need large areas with varied habitats to support viable populations and are particularly vulnerable to habitat loss and fragmentation⁵. Habitat fragmentation can isolate species, ultimately reducing gene flow and genetic diversity which can further increase vulnerability to other pressures (e.g. infectious diseases and parasites)²⁶. Common species (e.g. *B. pascuorum* and *B. lapidarius*) may be less affected by habitat fragmentation due to their ability to disperse over greater distances^{27, 28}. Species with specialist requirements, and those that nest above ground or have limited dispersal abilities (such as parasitic bees and bees that rely on a limited number of plant taxa for their pollen) are more vulnerable to habitat loss and degradation^{29, 30} and have suffered bigger losses in the UK when compared to more generalist bees^{1, 2}. This could be due to the fact that specialist pollinators often exist in small and patchy populations and thus fragmentation is more likely to exclude them or their host plants. Additionally, some bees won't fly across extended areas of cleared vegetation when crossing from one vegetated patch to another³¹. Solitary bees have highly specialised life cycles requiring particular nesting sites close to foraging habitats, and this makes them particularly vulnerable to the effects of habitat fragmentation²⁶.

To date, there have been few studies on the impact of habitat degradation on the richness and abundance of wild bees¹. Habitat degradation might affect bees, however, by the loss of floral and nesting resources, and the introduction of insecticides, and possibly fungicides, with lethal or sub-lethal effects¹. Following the global and UK trend, habitat loss, fragmentation and degradation is believed to be the key reason for the decline of pollinators in Wales.

2. Pesticides and pollution

The increased use of pesticides and environmental pollution are important factors influencing bee populations. In recent years there has been considerable debate regarding the effects of one class of pesticide, neonicotinoid insecticides, on pollinating insects (particularly bees). Used widely in the developed world, these systemic pesticides spread throughout plant tissues and can occur in plant nectar and pollen^{32, 33}. While most studies have focused on the effects of neonicotinoid exposure on honeybees, those that have examined wild bees have noted reduced reproductive success of bumblebees^{34, 35, 36} and solitary bees^{35, 37} following neonicotinoid exposure. Similarly, a recent large scale experiment spanning three European countries (including the UK) found that exposure of wild bees (and honeybees) to neonicotinoid pesticides reduces

their ability to establish new populations in the year following exposure³⁸. As well as reducing the amount of floral resources for pollinators, pesticide use can also have lethal and sub-lethal effects on pollinators and, possibly via interaction with other stressors, contribute to reduced population performance²⁶.

3. Climate change

Insect distributions have already been altered by recent anthropogenic climate change²⁶. Some pollinators currently limited by their climatic niche (i.e. southern-biased species) may, as the climate warms and where suitable habitat is available, spread north and west colonising new regions. Climate change may facilitate the natural colonisation of new species into Britain from mainland Europe. The Tree bumblebee (*Bombus hypnorum*) is one such species that is seemingly benefiting from climate change. A natural coloniser from mainland Europe, the Tree bumblebee was first recorded in Britain in 2001 in Landford, Wiltshire. Since then, it has spread rapidly, and is now plentiful in many parts of England, Wales and Scotland. While climate change has the potential to benefit some species, it also has the potential to decrease abundance, shift ranges and ultimately increase extinction risk, with these effects exacerbated for specialist species²⁶. European bee richness is generally predicted to decline under climate change³⁹. Climate change is likely to prove stressing for species that cope badly with weather extremes and their impacts such as drought summers, prolonged flooding, cold springs and coastal storm damage.

Phenological mismatch is believed to be a key biodiversity change under climate change and there is evidence that pollinator phenological responses may become decoupled from their forage plants⁴⁰. Such phenological shifts would reduce the floral resources available to pollinators, the effects of which would be exacerbated in species with narrow diet breadth⁴⁰. The curtailment of foraging season is also a major threat under climate change, and is likely to be a significant problem for bumblebees whose queens forage on early and late season plants⁴¹. Climate change is widely expected to drive species extinct by reducing the amount and accessibility of suitable habitat, eliminating other organisms in the ecosystem that are essential to the survival of the species in question, or by hampering individual survival and reproduction⁴⁰. Climate change also has the potential to affect the spread and virulence of pests and pathogens⁴². It is important to note that much of the current evidence is largely based on insights from simulation modelling of effects on wild bees and not empirical observations²⁶.

4. Disease

Most of the evidence on threats to wild pollinators from pathogens and other parasitic organisms (e.g. microsporidian fungi, parasitoids) indicates that the source is managed honeybees²⁶. There is much concern regarding the use and particularly the importation of managed bees (including honeybees, and bumblebees used in polytunnels) as this may introduce exotic parasites (or parasite strains) which subsequently spillover to wild populations^{5, 43}. Pathogens

and parasitoids are known to be important mortality factors for wild bees^{44, 45} and have been implicated in losses in species diversity^{46, 47}. By allowing managed and/or imported bees to mix with wild pollinators, there is the potential for disease emergence⁴⁸.

There is growing evidence from around the world that pathogens (and other parasitic organisms) can be shared between managed bees and the wider pollinator community^{46, 49, 50}. In a recent review of available data, Greystock et al. (2016) reported that managed bees can have negative effects on wild bees through parasite spillover, spillback and facilitation⁴⁸. The study noted a striking association between the use of managed bees and local declines and extinctions of wild bees, suggesting that multiple instances of disease transmission have already occurred between managed and wild bees, including within the UK⁴⁸.

What is the role of Wales?

Wales is home to nationally rare and threatened bee species and for some, such as *Osmia xanthomelana*, Wales supports the last known populations in the UK. Wales also supports important UK populations of species such as *Andrena falsifica*, *A. tarsata*, *B. muscuorum*, *Bombus sylvarum*, *Coelioxys mandibularis* and possibly *A. rosae*. The dune-loving western UK form of *Colletes cunicularius* (which may be genetically distinct from other forms) also has a high proportion of its population within Wales.

Surrounded by sea on three sides, Wales has extensive and varied coastlines which are an extremely important habitat for some bee species, as well as for many other insects. Wales also has extensive grasslands, heaths and moorland, which at a landscape scale result in unique habitat mosaics. Some of the largest coastal dunes in the UK occur in Wales (e.g. Merthyr Mawr, Kenfig, Newborough Warren, Morfa Harlech, Morfa Dyffryn, and those of the Gower Peninsula) and these are known to support exceptionally important bee assemblages.

The climate is essentially maritime, characterised by weather that is often cloudy, wet and windy but mild. However, the shape of the coastline and the central spine of high ground from Snowdonia southwards to the Brecon Beacons introduce localised differences. Whilst some upland areas can experience harsh weather, the coasts enjoy more favourable conditions and areas in east Wales are more sheltered and hence similar to neighbouring English counties ([Met Office](#)). As such, it represents conditions that differ from elsewhere in the UK, which results in a distinctive assemblage of bees.

Current data indicates that some of the most significant areas for bees in Wales include:

1. The South Wales Valleys (made up of a mosaic of semi-natural habitats).
2. The Gwent Levels.
3. The Glamorgan coast (including the Gower Peninsula).
4. Pembrokeshire Coast National Park.
5. Snowdonia National Park.

6. The dunes of Cardigan Bay.
7. Anglesey.
8. The Llŷn Peninsula.
9. Brownfield sites and quarries of Denbighshire and Flintshire vice-counties.

Protecting and enhancing bee abundance and diversity in these areas will make a substantial contribution to bee conservation at a Wales and UK level.

Legislative and Policy context in Wales

The Action Plan for Pollinators in Wales

The Welsh Government, with conservation NGOs, industry and other stakeholders, developed an [Action Plan for Pollinators in Wales](#). It looks in detail at the evidence and issues around pollinators and their conservation. The Plan sets the strategic vision, outcomes and areas for action to improve conditions for pollinators and work to halt and reverse their decline in Wales.

The plan was launched in 2013 (the first of its kind in the UK) and describes the current situation in Wales and identifies areas where action is needed. It details the Vision for Pollinators in Wales, and puts that into the context of the Welsh Government's priorities and policies. It also lays out an Agenda for Action – the outcomes and areas for action that have been identified and how we will work towards them.

The four main outcomes are:

- **Outcome 1:** Wales has joined up policy, governance and a sound evidence base for action for pollinators.
- **Outcome 2:** Wales provides diverse and connected flower-rich habitats to support our pollinators.
- **Outcome 3:** Wales' pollinator populations are healthy.
- **Outcome 4:** Wales' citizens are better informed and aware of the importance and management of pollinators.

Implementation of the Plan is overseen by the Pollinators Taskforce. This group brings together key stakeholders from the public, private and voluntary sectors to deliver the objectives of the Action Plan for Pollinators in Wales. Actions to deliver the APP were reviewed and refreshed, and a revised set of actions to continue to deliver the outcomes was launched in July 2018.

Environment (Wales) Act 2016

The biodiversity and resilience of ecosystems duty under section 6 of the [Environment \(Wales\) Act 2016](#) requires public authorities in Wales to maintain and enhance biodiversity and promote the resilience of ecosystems. This Duty should mean that Local Authorities make biodiversity an integral part of policy and decision making. Section 7 of the Act also makes provision for a list of habitats and species of principal importance to maintaining and enhancing biodiversity in relation to Wales (formerly Section 42 under the NERC Biodiversity Duty) and outlines a duty on Welsh Ministers to take steps to maintain and enhance the habitats and species on the list.

Well-being of Future Generations (Wales) Act 2015

The [Well-being of Future Generations \(Wales\) Act 2015](#) places a duty on public bodies to deliver against 7 well-being goals including 'A resilient Wales' - which is defined as 'a nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change)'.

Green Infrastructure Plan for Pollinators in South-east Wales

The [Green Infrastructure Action Plan for Pollinators in SE Wales](#) is part of a wider Pollinators for Life project, funded through the Welsh Government's Nature Fund. The study area comprises Caerphilly, Blaenau Gwent, Monmouthshire and Torfaen Local Authority areas. However, the Action Plan has a much wider remit and is applicable to other Local Authority areas in Wales, and is applicable to a wider audience.

Pollinator Initiatives and Schemes

B-Lines

Buglife's B-Lines initiative, which uses a UK-wide collaborative approach to tackle insect conservation at a landscape scale, is an integral component of a strategy to conserve both common and rarer species. B-Lines aims to link and buffer existing wildlife areas primarily via the restoration of permanent wildflower-rich habitat, either as 'stepping stones' or continuous strips of habitat. This will improve connectivity between existing habitat, facilitating species movement and dispersal, a process that is essential for maintaining metapopulations and genetic diversity⁵. However for some species, more detailed, targeted actions are also required. In Wales the initiative has been funded by Welsh Government, North and Mid Wales Trunk Road agents (NMWTRA) and the Postcode Lottery. B-Lines have now been mapped across all of [Wales](#) and are a resource to be used by everyone to prioritise and target action on the ground.

Bumblebee Conservation Trust (BBCT)

Bee Wild West Wales

Bee Wild West Wales works with communities in west Wales (Carmarthenshire, Ceredigion and Pembrokeshire) to help them discover how important bumblebees are and what they can do to protect them. This support is achieved through two work strands: Skills for Bees and Buzzing Communities. The 'Skills for Bees' workstream delivers learning opportunities such as bumblebee identification training, bumblebee hunts and surveys, and bilingual resources. We encourage people to engage with bumblebees through citizen science and conservation work parties, as well as a variety of events, and our work with Farms for City Children. Nearly 150 'trained' bumblebee recorders are now engaged in the project, and BeeWalk (bumblebee monitoring) hubs are now developing at several locations, with many individual BeeWalkers establishing transects as well. The 'Buzzing Communities' workstream has delivered bumblebee friendly features

at 5 greenspaces in Carmarthenshire and Ceredigion, and delivers guidance for community groups on how to make their greenspaces more bee friendly. The project has also incorporated habitat restoration in key Shrill carder bee (*Bombus sylvarum*) areas in Pembrokeshire.

BeeWalk

BeeWalk is a standardised bumblebee-monitoring scheme active across Great Britain since 2008. The scheme protocol involves volunteer BeeWalkers walking the same fixed route (a transect) at least once a month between March and October (inclusive). This covers the full flight period of the bumblebees, including emergence from overwintering and workers tailing off. Volunteers record the abundance of each bumblebee species seen in a 4m x 4m x 2m 'recording box' in order to standardise between habitats and observers.

Since the scheme began, it has received significant financial contributions from the Redwing Trust, Esmée Fairbairn Foundation, and the Garfield Weston Foundation. The scheme is managed by the Bumblebee Conservation Trust (BBCT), and scheme organisers can be contacted here: beewalk@bumblebeeconservation.org.

Notes on the text

Species accounts have drawn from expert knowledge, and from a number of published sources including BWARS species accounts, Buglife species management advice sheets, and the Field Guide to the Bees of Great Britain and Ireland⁵¹.

Species distribution maps display data accessed via the NBN Atlas and LERC Wales, and sources are referenced below each map (NBN Atlas occurrence download at <http://nbnatlas.org>. Accessed 01 March 2018). Historical data was included with reference to Pavett and Fowles (2004)⁵² and additional records sought from known recorders where appropriate. Species distributions within each Watsonian vice-county are then explored using this data. Species are considered seemingly lost from a vice-county if they have not been recorded since 1990. It should be noted that data extracted from the NBN Atlas and LERC Wales can contain unverified and erroneous data.

Abbreviations

BBCT – Bumblebee Conservation Trust

BWARS – UK Bees Wasps and Ants Recording Society

CCW – Countryside Council for Wales

LERC Wales – Local Environmental Records Centres Wales

NBN Atlas – National Biodiversity Network Atlas

NRW – Natural Resources Wales

Red data book (RDB) National Status definitions:

RDB 1 – ENDANGERED

Definition: Taxa in danger of extinction and whose survival is

unlikely if the causal factors continue operating.

Criteria:

- Species which are known, or believed to occur, as only a single population within one post-1970 10km square of the National Grid.
- Species which occur in habitats known to be especially vulnerable.
- Species that have shown a rapid and continuous decline over the last twenty years and are now estimated to exist in five or fewer post 1970 10km squares.
- Species which are believed extinct but which if rediscovered would need protection. Such species are denoted RDB1+.

RDB 2 – VULNERABLE

Definition: Taxa which are believed to move into the Endangered category in the near future if the causal factors continue operating.

Criteria:

- Species declining throughout their range.
- Species in vulnerable habitats.
- Species whose populations are low.

RDB 3 – RARE

Definition: Taxa with small populations that are not at present Endangered or Vulnerable, but are at risk.

Criteria:

- Species which are estimated to exist in only fifteen or fewer post-1970 10km squares.

NOTABLE

Nationally scarce species which are estimated to occur within the range of sixteen to one hundred post-1970 10km squares. This category has been subdivided into two categories:

Na – those species estimated to occur within the range of sixteen to thirty modern 10km squares.

Nb – those species estimated to occur within the range of thirty-one to one hundred modern 10km squares.

Note that the rarity categories for our more threatened invertebrates and other wildlife are being replaced by new IUCN assessments. However, new status reviews for aculeates are not yet available.

Threatened bees in Wales – Species profiles

Summary table: Summary of the target species in the Wales Threatened Bee Report, the vice-counties in which they occur, the vice-counties from which they have been lost (not recorded post-1990), and their conservation status.

Target species	Vice-counties in which target species occur	Vice-counties that have lost target species	Conservation status
<i>Andrena hattorfiana</i> (Large scabious bee)	Glamorgan, Monmouthshire, Pembrokeshire	Merionethshire	Rare (RDB3)
<i>Andrena marginata</i> (Small scabious bee)	Glamorgan, Merionethshire, Pembrokeshire	Breconshire, Caernarvonshire	Notable a (Na)
<i>Andrena niveata</i> (Long-fringed mini-mining bee)	Glamorgan	Caernarvonshire	Vulnerable (RDB2)
<i>Andrena rosae</i> (Perkins' mining bee)	Glamorgan, Pembrokeshire	Monmouthshire	Vulnerable (RDB2)
<i>Andrena proxima</i> (Broad-faced mining bee)	Caernarvonshire, Merionethshire		Rare (RDB3)
<i>Andrena tarsata</i> (Tormentil mining bee)	Anglesey, Caernarvonshire, Glamorgan, Merionethshire, Montgomeryshire, Radnorshire		Section 7
<i>Bombus humilis</i> (Brown-banded carder bee)	Anglesey, Breconshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Glamorgan, Merionethshire, Montgomeryshire, Monmouthshire, Pembrokeshire	Flintshire, Radnorshire	Section 7
<i>Bombus muscorum</i> (Moss carder bee)	Anglesey, Caernarvonshire, Cardiganshire, Carmarthenshire, Glamorgan, Merionethshire, Monmouthshire, Pembrokeshire, Radnorshire	Monmouthshire	Section 7; Vulnerable in European Red List of bees

Threatened bees in Wales – Species profiles (Cont)

Target species	Vice-counties in which target species occur	Vice-counties that have lost target species	Conservation status
<i>Bombus ruderarius</i> (Red-shanked carder bee)	Breconshire, Carmarthenshire, Denbighshire, Glamorgan, Monmouthshire, Montgomeryshire, Pembrokeshire	Anglesey, Radnorshire	Section 7
<i>Bombus ruderatus</i> (Large garden bumblebee)	Pembrokeshire	Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan	Section 7, Notable b (Nb)
<i>Bombus soroeensis</i> (Broken-belted bumblebee)	Anglesey, Cardiganshire, Carmarthenshire, Denbighshire, Glamorgan, Pembrokeshire	Caernarvonshire, Montgomeryshire	None
<i>Bombus sylvarum</i> (Shrill carder bee)	Carmarthenshire, Glamorgan, Monmouthshire, Pembrokeshire	Anglesey, Caernarvonshire, Cardiganshire, Merionethshire, Radnorshire	Section 7, Notable b (Nb)
<i>Coelioxys mandibularis</i> (Square-jawed sharp-tail bee)	Anglesey, Cardiganshire, Carmarthenshire, Glamorgan, Merionethshire, Pembrokeshire		Rare (RDB3)
<i>Colletes cunicularius</i> (Vernal colletes bee)	Anglesey, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan, Merionethshire, Pembrokeshire		Rare (RDB3)
<i>Eucera longicornis</i> (Long-horned bee)	Carmarthenshire, Glamorgan, Monmouthshire, Pembrokeshire, Radnorshire		Section 7, Notable a (Na)
<i>Nomada argentata</i> (Silver-sided nomad bee)	Glamorgan		Rare (RDB3)
<i>Nomada fulvicornis</i> (Orange-horned nomad bee)	Pembrokeshire	Glamorgan, Monmouthshire	Rare (RDB3)
<i>Nomada hirtipes</i> (Long-horned nomad bee)	Breconshire, Denbighshire, Glamorgan, Montgomeryshire	Merionethshire	Rare (RDB3)

Threatened bees in Wales – Species profiles (Cont)

Target species	Vice-counties in which target species occur	Vice-counties that have lost target species	Conservation status
<i>Nomada roberjeotiana</i> (Tormential nomad bee)	Anglesey, Cardiganshire, Pembrokeshire	Caernarvonshire, Glamorgan	Rare (RDB3)
<i>Nomada signata</i> (Broad-banded nomad bee)	Glamorgan, Monmouthshire		Vulnerable (RDB2)
<i>Osmia parietina</i> (Wall mason bee)	Anglesey, Caernarvonshire, Denbighshire, Merionethshire, Montgomeryshire	Cardiganshire, Glamorgan, Pembrokeshire	Section 7, Rare (RDB3)
<i>Osmia xanthomelana</i> (Large mason bee)	Caernarvonshire	Merionethshire	Section 7, Endangered (RDB1)
<i>Sphecodes scabricollis</i> (Rough-backed blood bee)	Glamorgan, Monmouthshire		Rare (RDB3)
<i>Sphecodes spinulosus</i> (Spined blood bee)	Pembrokeshire	Glamorgan	Vulnerable (RDB2)
<i>Stelis ornatula</i> (Spotted dark bee)	Cardiganshire, Carmarthenshire, Denbighshire, Glamorgan, Pembrokeshire		Rare (RDB3)
<i>Stelis phaeoptera</i> (Plain dark bee)	Cardiganshire, Denbighshire, Glamorgan, Monmouthshire, Montgomeryshire		Vulnerable (RDB2)



Female *Andrena hattorfiana*, dark form © Steven Falk.

Andrena hattorfiana (Large scabious mining bee)

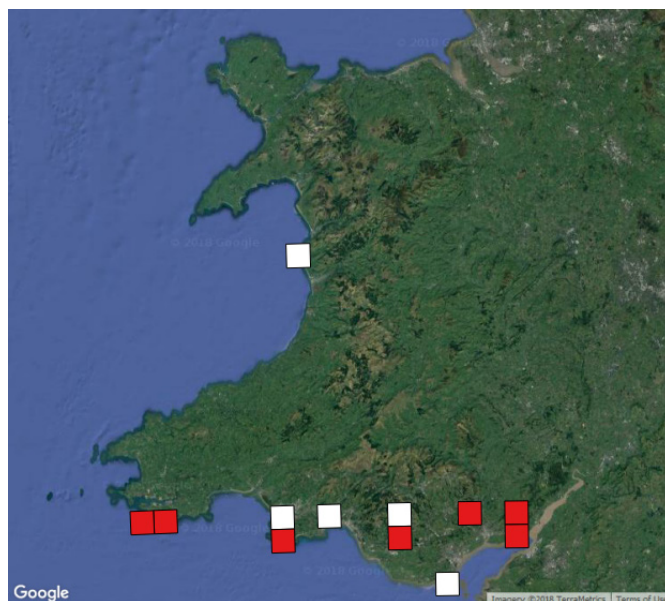
Andrena hattorfiana is a large, attractive mining bee which is strongly associated with scabious flowers. Females are our largest mining bees in terms of body size, with an abdomen that varies from all black to conspicuously red-banded across its base. Pollen is obtained primarily from Field Scabious (*Knautia arvensis*), but Small scabious (*Scabiosa columbaria*) is occasionally used. Various flowers are used for nectar such as Wild parsnip (*Pastinaca sativa*), knapweeds, clovers and hawk's-beards. Nesting occurs in bare ground and very short turf, with nests dispersed rather than in aggregations. It flies between late June and mid-August. It is host to the much rarer Armed nomad bee (*Nomada armata*), which has historically been recorded from Glamorgan.

Further information can be found here: [Buglife species management sheets: *Nomada armata*](#), [BWARS species information sheet: *Andrena hattorfiana*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Friends of the Earth Iconic Bees Report](#), [Hymettus aculeate](#) information sheets: *Nomada armata*, and [Steven Falk's Flickr collection](#).

Distribution and status

A. hattorfiana is listed as Rare (RDB3)³. Despite being widely distributed in southern England and South Wales, it has declined substantially over much of its former range. Last recorded in the following vice-counties: Glamorgan in 2016 (I. Tew), Monmouthshire in 2015 (R. Bacon) and

Pembrokeshire in 2008. Seemingly lost from Merionethshire vice-county (last recorded in 1899).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, and South East Wales Biodiversity Records Centre (SEWBReC).

Typical habitat

In Wales, it is typically found in scabious-rich habitats such as unimproved calcareous grasslands (e.g. Brockwell's Meadows, Monmouthshire), and cliff-top grasslands (e.g. Horton Cliffs, Glamorgan; Linney Head and Castlemartin Range, Pembrokeshire). Other British habitats include chalk downland, chalk heath, roadside verges, traditional agricultural settings, moorland edge and stabilised coastal dunes³. Pollen is gathered from Field scabious flowers at Brockwell's Meadows and RAF Caerwent, and Small scabious on the Gower Peninsular. Population size is strongly related to the availability of these scabious flowers⁵³. *A. hattorfiana* is a qualifying feature of Horton, Eastern and Western Slade SSSI where it was last monitored in 2009.



Andrena hattorfiana habitat at Castlemartin, Pembrokeshire
© Steven Falk.

Reasons for decline

This bee has likely declined due to a reduction of its host plant, Field scabious. This is as a consequence of over-grazing, poorly-timed grass cutting, and the loss of suitable grassland through agricultural intensification, urbanisation, commercial forestry, scrub encroachment, and coastal development³.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. In Sweden, the amount of Field scabious needed to support populations was determined to be an average of 72 inflorescences per bee nest⁵³. Recommendations for the conservation of *A. hattorfiana* and its cuckoo bee *Nomada armata* have been made by [Buglife](#) and [Hymettus](#). This involves increasing the abundance of Field scabious flowers at a landscape scale and providing a mosaic of habitat structures for nesting and foraging.

Proposed action

1. Use published habitat management recommendations to implement practical site enhancements, such as increasing the abundance of Field scabious using appropriate grazing and cutting regimes, and ensure guidelines are included in management plans.
2. Consider targeted habitat enhancement or creation, such as planting Field scabious and providing nesting sites.
3. Identify opportunities to connect fragmented and isolated populations through habitat creation, restoration and enhancement – for example via B-Lines.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. On-going monitoring of known populations and resurvey historic sites to identify new populations.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Promote uptake of agri-environment options such as field margin options to preserve flower-rich open grasslands containing Field scabious⁵⁴.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
9. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain sites in an open state with plenty of Field scabious and some relatively short cropped swards or sparsely vegetated areas in sunny situations for nesting. Continue established management such as grazing or cutting that contributes to the character and stability of a site, especially the presence of Field scabious, and holds back succession. Avoid grazing or cutting in scabious-rich areas between April and October. Management should be irregular, and on rotation to promote areas of short turf and taller swards with flowering Field scabious; avoid grazing an entire site at once. Avoid the use of insecticides in the vicinity of foraging and nesting areas.



Female *Andrena marginata*, red form © Steven Falk.

Andrena marginata (Small scabious mining bee)

Andrena marginata is a mining bee which requires scabious-rich habitats. Like *A. hattorfiana*, it comes in both a dark and red-banded form. Pollen is obtained almost exclusively from scabiouses. It also forages on a wide range of other plants for nectar, including brambles, knapweeds, thistles, Meadowsweet (*Filipendula ulmaria*) and willowherbs. Nesting occurs in light, sparsely vegetated ground or short turf. It flies between mid-July and late September. It is host to the much rarer *Nomada argentata* (Silver-sided nomad bee), which has recently been recorded from Glamorgan.

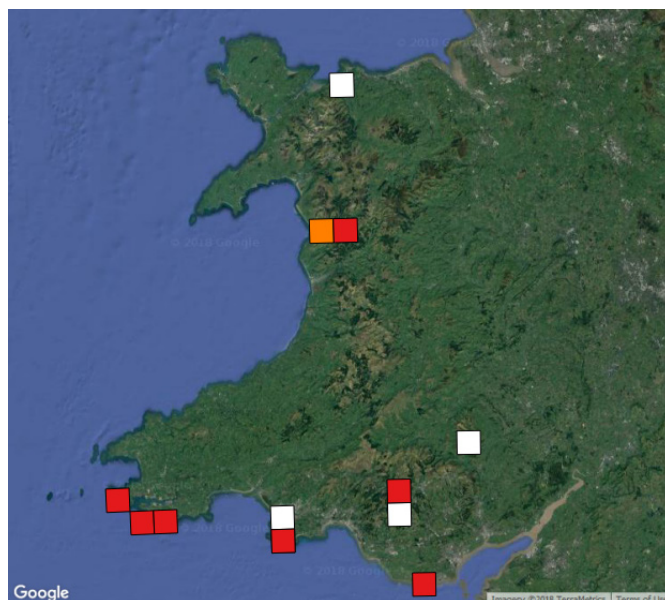
Further information can be found here: [Buglife species management sheets: *Andrena marginata*](#), [BWARS species information sheet: *Andrena marginata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus Report 2003](#), [Hymettus Report 2006](#), [Hymettus Report 2007](#), and [Steven Falk's Flickr collection](#).

In the UK, *A. marginata* may exist as two discrete populations that do not inter-breed; one flies in mid to late July, is associated with calcareous soils and forages on Small and/or Field scabious for pollen, and the other which flies in late August, is associated with acidic soils and forages on Devil's-bit scabious (*Succisa pratensis*) for pollen⁵⁵. Genetic studies are being undertaken to investigate this⁵⁶. If the UK population occurs as two discrete populations, then the conservation of *A. marginata* will be even more pressing⁵⁵.

Distribution and status

A. marginata is listed as Notable a (Na)³. Despite its

widespread distribution across Britain, it is local and uncommon and has experienced a severe decline almost everywhere. Last recorded in the following vice-counties: Glamorgan in 2004 (M. Pavett), Merionethshire in 2004 (M. Howe) and Pembrokeshire in 2016 (S. Falk). Seemingly lost from Breconshire (last recorded in 1942) and Caernarvonshire (1939) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, it is typically found in scabious-rich habitats such as unimproved grasslands (acidic and calcareous) (e.g. at Penywaun, Glamorgan) and cliff-top grassland (e.g. Horton Cliffs, Glamorgan; Linney Head, Pembrokeshire and Skomer Island, Pembrokeshire). Other British habitats include heathland, moorland, open woodland, roadside verges, stabilised coastal dunes, and grasslands on clay³.



Andrena marginata habitat at Castlemartin Common, Pembrokeshire © Steven Falk.

Reasons for decline

This bee has likely declined due to habitat loss through agricultural intensification, development, commercial forestry and cliff stabilisation. Changes in traditional land use have probably led to the loss of this species on some sites, either through overgrazing, the use of fertilisers, or the effects of succession³.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has also been surveyed by Buglife as part of the [South West Bees Project](#) and by Hymettus ([Hymettus Report 2003](#), [Hymettus Report 2006](#), [Hymettus Report 2007](#)). Buglife have also produced a species management sheet which can be found here: [Buglife species management sheets: *Andrena marginata*](#).

Proposed action

1. Address gaps in autecological knowledge.
2. Use published habitat management recommendations to implement practical site enhancements, such as increasing the abundance of Field and Devil's-bit scabious using appropriate grazing and cutting regimes, and ensure guidelines are included in management plans.
3. Consider targeted habitat enhancement or creation, such as planting Field and Devil's-bit scabious and providing nesting sites.
4. Identify opportunities to connect fragmented and isolated populations through habitat creation, restoration and enhancement – for example via B-Lines.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
6. On-going monitoring of known populations and resurvey historic sites to identify new populations.
7. Encourage recorders of Marsh fritillary butterfly (*Euphydryas aurinia*) to be vigilant for this species when conducting larval web surveys in scabious-rich habitats.
8. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
9. Promote uptake of agri-environment options such as field margin options to preserve flower-rich open grasslands containing scabious⁵⁴.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
11. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain an open sward with plenty of scabious, and some short cropped or sparsely vegetated areas in sunny conditions for nesting (such as south-facing slopes and banks). Continue any established management (e.g. grazing or cutting) or disturbance that contributes to the overall character of the site (especially the presence of scabious) and holds back succession. Avoid grazing or cutting in scabious-rich areas between April and October. Management should be irregular, and on rotation to promote areas of short turf and taller swards with flowering scabious; avoid grazing an entire site at once. Avoid the use of insecticides in the vicinity of foraging and nesting areas.



Female *Andrena niveata* © Steven Falk. Note the very broad and dense fringes of white hairs along the hind margins of the abdominal segments, making it one of our more distinctive mini-miners.

Andrena niveata (Long-fringed mini-mining bee)

Andrena niveata is a mining bee which is strongly associated with crucifer-rich habitats. Pollen seems to be obtained exclusively from crucifers such as Charlock (*Sinapis arvensis*), Hedge mustard (*Sisymbrium officinale*) and Brassicas. It will also visit umbellifers, Hawthorn and speedwells, probably for nectar. Nesting has been rarely observed but is presumed similar to *A. minutula* (Common mini-mining bee). It flies between mid-May and late June.

Further information can be found here: [BWARS species information sheet: *Andrena niveata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

A. niveata is listed as Vulnerable (RDB2)³. This rare species has experienced a substantial decline and is at risk of extinction in Wales. Given that it has not been recorded since 2004 it is a real possibility that this species is now extinct in Wales. Last recorded in Glamorgan vice-county in 2004 (C. Clee). Seemingly lost from Caernarvonshire vice-county (last recorded in 1913).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Natural Resources Wales, and South East Wales Biodiversity Records Centre (SEWBRc).

Typical habitat

In Wales, it is typically found in crucifer-rich habitats in coastal locations. The only modern population is found at Horton Cliffs, Glamorgan, where it was recorded in 2004. Other British habitats include arable margins, heathland, vegetated shingle, gardens and allotments.



Cliff-top grassland on the Gower Peninsular, Glamorgan © Steven Falk.

Reasons for decline

This bee has likely declined due to the loss of habitat to agricultural intensification, coastal development, cliff stabilisation, urbanisation and commercial forestry. Changes in traditional land use practices, and the removal of grazing, has led to problems of scrub encroachment on some sites³.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. With urgency, resurvey historic sites to identify new populations and determine its current status in Wales.
2. If and where it is rediscovered, advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
3. Focus habitat creation and restoration work at and around the current population to ensure that this species does not go extinct in Wales.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
5. Develop and disseminate habitat management guidelines, which include appropriate grazing regimes, and ensure these are included in management plans.
6. Address gaps in autecological knowledge.

Habitat management recommendations³

Maintain sites in a reasonably open state with plenty of exposed soil or sand in sunny situations for nesting, and flower-rich areas (especially of crucifers) for adult foraging. On soft rock cliffs and coastal landslips, suitable conditions may occur naturally, providing stabilisation does not take place. Oppose any activities which might significantly reduce or accelerate the natural rates of erosion and attempt to retain adjacent areas of unimproved grassland and other flower-rich areas. Maintain and restore wildflower-rich cliff top grasslands as these are a key forage resource for bees nesting on the cliff face/slope. At inland sites such as heaths, encourage open conditions with plenty of bare earth and flower-rich areas. Continue any established management (e.g. grazing and cutting), or disturbance, that contributes to the overall character and stability of a site, and holds back succession. Consider the introduction of management on unmanaged sites, especially where succession is a problem.



Female *Andrena proxima* © Tim Ransom.

Andrena proxima (Broad-faced mining bee)

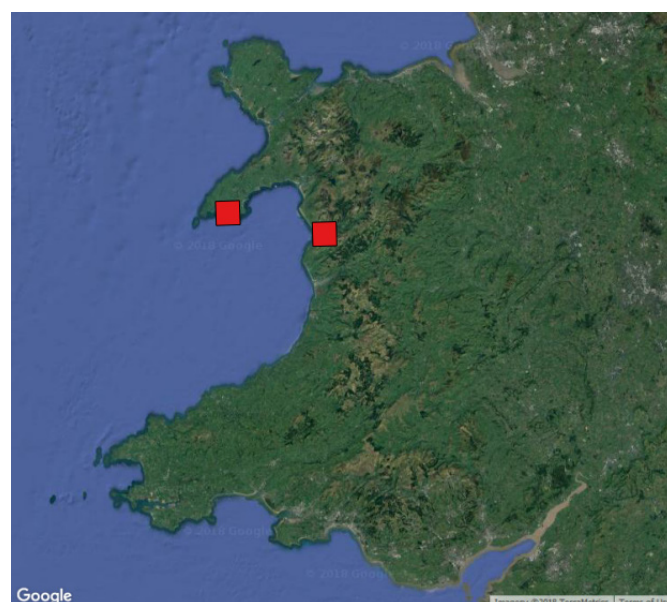
Andrena proxima is a mining bee which is strongly associated with umbellifer-rich habitats including chalk grassland, coastal grassland, soft-rock cliffs, quarries and sometimes coastal grazing marsh. Pollen seems to be obtained exclusively from umbellifers such as Cow parsley (*Anthriscus sylvestris*), Hogweed (*Heracleum sphondylium*), Alexanders (*Smyrniolum olusatrum*) and Ground-elder (*Aegopodium podagraria*). It will also visit Hawthorn and spurges, probably for nectar. Nesting typically occurs in very short turf or sparsely vegetated areas on south-facing slopes. It flies between May and July. Two distinct forms of *A. proxima* appear to exist, and recent DNA analysis suggests that one of these forms is *A. ampla* (S. Falk, personal communication, in prep.). At present, it appears that all Welsh records of *A. proxima* records are infact *A. ampla* (S. Falk, pers. comm.).

Further information can be found here: [BWARS species information sheet: *Andrena proxima*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

A. proxima is listed as Rare (RDB3)³. The majority of records for this scarce southern species are from south-east England. Very rare in Wales, just two modern records exist. Last

recorded in Caernarvonshire vice-county in 2002 (G. T. Knight) and Merionethshire vice-county in 2007.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via NBN Atlas from the following sources: Natural Resources Wales.

Typical habitat

In Wales, it is known only from crucifer-rich habitats on the coast such as coastal grassland (e.g. Morfa Mawddach, Merionethshire), coastal landslips and soft rock cliffs (e.g. Porth Neigwl, Caernarvonshire). Other British habitats include chalk grassland, quarries and coastal grazing marsh.



Andrena proxima habitat at Porth Neigwl, Caernarvonshire © Mike Howe.

Reasons for decline

There is no current evidence of a decline in Wales. Threats, however, include coastal development and the stabilisation of soft rock cliffs and landslips at coastal sites. At inland sites, threats include habitat loss caused by agricultural intensification, urbanisation, commercial forestry, and inappropriate management (such as a lack of appropriate grazing levels) resulting in vegetative encroachment via successional processes and the subsequent loss of foraging and nesting areas.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Clarify genetics of the two distinct forms of *Andrena proxima*.
2. Should DNA analysis confirm the presence of *Andrena ampla*, carry out surveys to determine its current status and range in Wales.
3. Develop and disseminate habitat management guidelines, which include appropriate grazing regimes, and ensure these are included in management plans.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
6. Ensure representation on all relevant LBAPs or Nature Partnerships.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.

Habitat management recommendations³

Maintain sites in a reasonably open state with plenty of bare or sparsely vegetated ground in warm, sunny situations for nesting, and plenty of flowering umbellifers for foraging. On soft rock cliffs and coastal landslips, suitable conditions may occur naturally, providing stabilisation does not take place. Oppose any activities which might significantly reduce or accelerate the natural rates of erosion, and attempt to retain adjacent areas of unimproved grassland and other flower-rich areas. At inland sites, continue any established management (e.g. grazing or cutting), or disturbance, that contributes to the overall character and stability of a site, and holds back succession. Consider the introduction of management on unmanaged sites, especially where succession is a problem.



Female *Andrena rosae* (red-banded form) © Steven Falk.

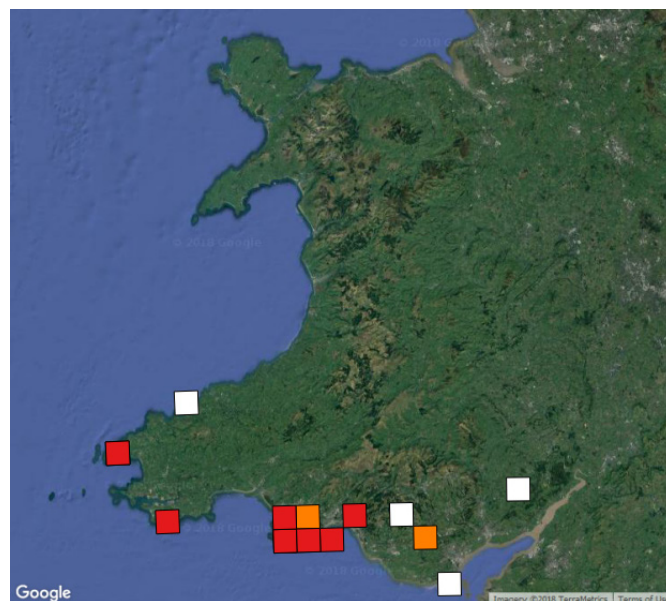
Andrena rosae (Perkins' mining bee)

Andrena rosae is a mining bee typical of exposed coastal scrublands and cliffs, suggesting it may favour harsher maritime climates. It is, however, also found in moorland settings. It is bivoltine, the first generation flying from late March to late May, the second from mid-July to early September. The summer generation is thought to obtain pollen only from umbellifers such as Hogweed, Wild carrot (*Daucus carota*), Wild angelica (*Angelica sylvestris*) and Sea-holly, though it will also visit brambles and thistles for nectar. Little is known about the nesting habits of this species.

Further information can be found here: [BWARS species information sheet: *Andrena rosae*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

A. rosae is listed as Vulnerable (RDB2)³. This species is extremely scarce throughout much of its known range and has probably declined considerably in most areas. It has scattered distribution across southern England and South Wales; there is an apparent distinct western bias. Last recorded in the following vice-counties: Glamorgan in 2017 (L. Olds) and Pembrokeshire in 2016 (S. Falk). Seemingly lost from Monmouthshire vice-county (last recorded in 1897).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: National Trust, Natural Resources Wales, and South East Wales Biodiversity Records Centre (SEWBRc).

Typical habitat

In Wales, it is typically found in exposed coastal scrubland and cliff-tops (e.g. Horton Cliffs and Pwlldu Head, Gower, Glamorgan), coastal dunes (e.g. Pennard Burrows, Glamorgan and Stackpole NNR, Pembrokeshire), and coastal heath and moorlands (e.g. Giants Grave, Briton Ferry, Glamorgan and Trefeiddan Moor SSSI, Pembrokeshire).



Habitat of *Andrena rosae* at Dowrog Common, Pembrokeshire © Steven Falk.

Reasons for decline

This bee has likely declined due to habitat loss to coastal development, the stabilisation of coastal landslips and soft rock cliffs, and inland through urbanisation, agricultural intensification and commercial forestry. Many sites have probably become unsuitable through changing vegetation structure such as scrub development and the loss of nesting and foraging sites. Changes in land use and decline in rabbit populations following myxomatosis are the main causes of these problems³.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Carry out surveys to determine its current status and range in Wales, as well as on-going monitoring of known populations and resurveying historic sites to identify new populations.
2. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
3. Develop and disseminate habitat management guidelines, which include appropriate grazing regimes, and ensure these are included in management plans.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. Ensure representation on all relevant LBAPs or Nature Partnerships.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.

Habitat management recommendations³

Maintain sites in a reasonably open state with plenty of sparsely vegetated or short cropped areas for nesting and also plenty of flower-rich areas for foraging. Sallow and sloe scrub are probably essential for the first generation, brambles and umbellifers for the second. On coastal landslips and soft rock cliffs, the bee's requirements may occur naturally providing stabilisation does not take place. Oppose any activities which might significantly reduce or accelerate the natural rates of erosion and attempt to retain adjacent areas of unimproved scrub or grassland for foraging. At inland sites such as heaths, ensure a diversity of habitats are represented within a site across all successional stages, from bare ground to scrub and isolated trees. Consider the introduction of management on unmanaged sites, especially where succession is a problem.



Female *Andrena tarsata* on Tormantil © Liam Olds.

Andrena tarsata (Tormantil mining bee)

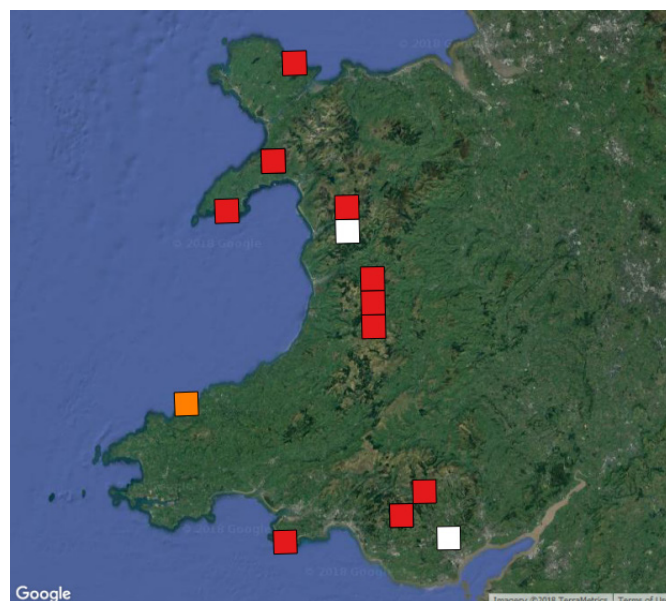
Andrena tarsata is a mining bee which gets its common name because of its dependency on Tormantil (*Potentilla erecta*), the main pollen source at most of its British sites. It also takes pollen from other species of *Potentilla*, such as Marsh cinquefoil (*P. palustris*) and Shrubby cinquefoil (*P. fruticosa*) (S. Roberts, pers. comm.). It will also visit brambles, Bridewort (*Spiraea salicifolia*), Harebell (*Campanula rotundifolia*), heathers, Wild angelica and Yarrow (*Achillea millefolium*), possibly just for nectar. Nesting occurs in light, sparsely vegetated soils, with a preference for south-facing slopes. It flies between mid-June and late August. Low bank features are likely to be particularly important for nesting (P. Saunders, pers. comm.). It is host to the much rarer Tormantil nomad bee (*Nomada roberjeotiana*).

Further information can also be found here: [Buglife species management sheets: *Andrena tarsata* and *Nomada roberjeotiana*](#), [BWARS species information sheet: *Andrena tarsata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Friends of the Earth Iconic Bees Report](#), [Hymettus Report 2007](#), [Hymettus Report 2011](#) and [Steven Falk's Flickr collection](#).

Distribution and status

A. tarsata is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. It is widespread across Britain, but is estimated to have been lost from 50% of known sites since 1970⁵⁷. Last recorded

in the following vice-counties: Anglesey in 2016 (M. Howe), Caernarvonshire in 2014 (M. Howe), Glamorgan in 2017 (L. Olds), Merionethshire in 2016 (M. Howe), Montgomeryshire in 2017 (R. Becker) and Radnorshire in 2013 (J. Vincett). Last recorded in Pembrokeshire vice-county in 1988 but seemingly overlooked given the presence of its cuckoo *N. roberjeotiana* until at least 2007.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, and South East Wales Biodiversity Records Centre (SEWBReC).

Typical habitat

In Wales, it is typically found in Tormentil-rich habitats such as heathland, moorland, acid grasslands (e.g. Hirnant Meadow, Radnorshire), the rides and clearings of both broadleaf and coniferous woodland (e.g. Hafren Forest, Montgomeryshire) and heathery brownfield sites such as revegetated coal tips (e.g. Maerdy Colliery, Glamorgan). It is also found in lowland wood-pasture and parkland, mires (e.g. Cors Goch, Anglesey), and purple moor-grass and rush pasture.



Andrena tarsata habitat at Clydach Vale Country Park, Glamorgan © Liam Olds.

Reasons for decline

This bee has likely declined due to the loss and degradation of Tormentil-rich habitats through agricultural intensification, commercial forestry, and inappropriate habitat management such as the over-grazing or under-grazing of livestock. It is associated with an abundance of Tormentil flowers, but also has other undetermined requirements being apparently absent from suitable areas where the plant is abundant.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has been surveyed by Hymettus as part of the Northern Bees Project, and monitoring protocols have been tested and developed (Hymettus Report 2011). Autecological and survey work has been undertaken by Buglife as part of the South West Bees Project. Buglife have also produced a species management sheet which can be found here: Buglife: *Andrena tarsata* species management sheet.

Proposed action

1. Use published habitat management recommendations to implement practical site enhancements, such as increasing the abundance of Tormentil using appropriate grazing and cutting regimes, and ensure guidelines are included in management plans.
2. Consider targeted habitat enhancement or creation, such as encouraging an abundance of Tormentil using appropriate grazing and cutting regimes, and providing nesting sites.
3. Identify opportunities to connect fragmented and isolated populations through habitat creation, restoration and enhancement – for example via B-Lines.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. On-going monitoring of known populations and resurvey historic sites to identify new populations.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.

Habitat management recommendations

At heathland and moorland locations, maintain open conditions with structural diversity, using traditional management (e.g. grazing and cutting) as appropriate. Restore suitable grazing regimes, particularly around nest sites. Better drained areas, especially sandy slopes and banks with south-facing aspect, are likely to provide ideal nesting sites. Footpaths and better grazed or trampled areas will probably be especially important in this respect, but avoid over-grazing an entire site. At woodland sites, maintain the presence of wide rides and any large clearings. Under any circumstances, encourage Tormentil by opposing scrub, bracken etc. Consider the introduction of management on unmanaged sites, especially where succession is a problem. *A. tarsata* responds well to fairly heavy grazing but with a period of no grazing between June and August; sites do not need to be floristically-rich but abundant Tormentil in warm and sheltered locations is essential. Avoid the use of insecticides in the vicinity of foraging and nesting areas.



Male *Bombus humilis* © Steven Falk. This species can be very difficult to distinguish from *B. muscorum* and pale examples of *B. pascuorum*. Difficulties in identification mean that it is likely to be under-recorded.

Bombus humilis (Brown-banded carder bee)

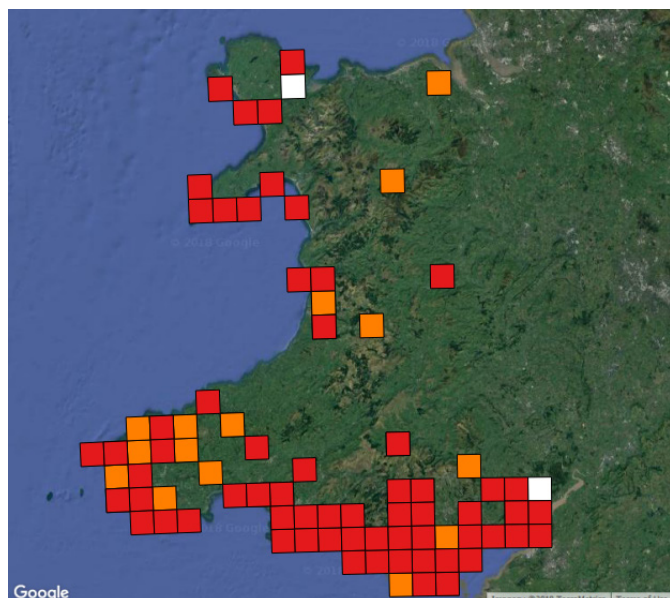
Bombus humilis is a long-tongued bumblebee species that tends to forage on flowers with deep corollas. Perennial plants associated with species-rich old grassland communities are important⁵⁸, but it is also found in early successional communities such as brownfield sites. It can occur alongside *B. sylvarum* and the similar *B. muscorum* along the Welsh coast but favours drier and warmer sites. Queens like legumes (especially Kidney vetch *Anthyllis vulneraria*, clovers, bird's-foot-trefoils, ever-lasting peas and *Vicia* vetches), labiates (such as dead-nettles), Honeysuckle, roses, thistles and Teasel (*Dipsacus fullonum*). Workers and males visit many of the same species but are also known to like Red bartsia (*Odontites vernus*), Wild basil (*Clinopodium vulgare*), knapweeds, scabiouses, sowthistles, Bristly oxtongue (*Helminthotheca echioides*), hawk's-beards, Cat's-ear (*Hypochaeris radicata*) and Viper's-bugloss (*Echium vulgare*).

Nesting typically occurs in undisturbed tall grasslands, which provide shelter, warmth and nest materials. Carder bees nest on the surface of the ground and comb together grass and moss to cover the surface of their nest⁵⁹. Like other bumblebees, *B. humilis* needs large areas of habitat to support its populations and a continuous supply of forage plants throughout the flight period. It flies between May and October, often peaking later than other bumblebees.

Further information can be found here: [Buglife: Brown-banded carder bee species management sheet](#), [BWARS species information sheet: *Bombus humilis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2006: Bumblebees associated with open grasslands](#), [Hymettus 2008: The possible replacement of *B. muscorum* by *B. humilis* in Kent](#) and [Steven Falk's Flickr collection](#).

Distribution and status

B. humilis is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. Once widespread in lowland Britain, it declined substantially during the 20th century. It is locally distributed in many regions of Britain, but remains fairly common in Wales (particularly in the south). Last recorded in the following vice-counties: Anglesey in 2016 (M. Howe), Breconshire in 2014 (E. Tomkins), Caernarvonshire in 2016 (M. Howe), Cardiganshire in 2001 (C. Clee), Carmarthenshire in 2016 (I. Macho), Glamorgan in 2017, Merionethshire in 2006 (C. Clee), Montgomeryshire in 2013 (M. Caplin), Monmouthshire in 2017, and Pembrokeshire in 2017. Seemingly lost from Flintshire (last recorded in 1984) and Radnorshire (last recorded in 1939) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS), Bumblebee Conservation Trust, Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, *Bombus humilis* is found in a wide variety of habitats including heathland (e.g. Giants Grave, Glamorgan), marshy grassland, coastal grassland and cliff-tops (e.g. Linney Head and Castlemartin Range, Pembrokeshire), coastal dunes (e.g. Newborough Warren, Anglesey and Ynyslas NNR, Cardiganshire), coastal vegetated shingle, flowery brownfield sites (e.g. TATA Steel, Port Talbot, Glamorgan), roadside verges, and occasionally arable settings. Modern sites tend to be characterised by large and well-connected flowery habitat mosaics.



Bombus humilis habitat at Coedely Colliery, Glamorgan © Liam Olds.

Reasons for decline

Despite a substantial decline in many areas of southern Britain, *B. humilis* remains fairly common in Wales (especially along the South Wales coast). It is, however, rather vulnerable inland, particularly in agricultural settings. Declines in some areas are thought to be largely attributed to the loss and fragmentation of flower-rich grassland through agricultural intensification, commercial forestry and development (such as the insensitive restoration of mineral extraction sites). Inappropriate land management such as intensive grassland management, inappropriate grazing (timing, intensity or livestock type), loss of field margins, reseeding and/or drainage of pastureland, and scrub encroachment have also contributed to its decline.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. This species has been worked on extensively by Hymettus, including [Hymettus 2006: Bumblebees associated with open grasslands](#). Management guidelines have been produced by Buglife and can be found here: [Buglife: Brown-banded carder bee species management sheet](#). Buglife have been involved in the surveying and restoration of brownfield sites as part of the [West Glamorgan Stepping Stones](#) project, and have worked to raise the profile of brownfield sites for invertebrate conservation. Survey work through the Colliery Spoil Biodiversity Initiative has also identified the importance of coal tips for this species and other aculeates in Wales. This species may have benefited from agri-environment schemes. BBCT has worked to conserve sites for rare bumblebees across South Wales through their 'Bees for Everyone' project, and subsequently through 'Bee Wild West Wales', as well as providing land management advice to a range of landowners and land managers. BBCT staff and volunteers regularly survey target sites for this species, primarily in South Wales.

Proposed action

1. Use published habitat management recommendations to implement practical site enhancements, such as creation and restoration of grassland and suitable grazing regimes, encouraging late flowering.
2. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
3. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
4. Encourage on-going surveying of known populations by experienced bumblebee recorders.
5. Ensure representation on all relevant LBAPs or Nature Partnerships, and site management documents for all SSSIs and LNRs where the species has been recorded or which support suitable habitat within 10 km of a known population.
6. Promote the appropriate management of brownfield sites and mineral extraction sites to conserve and enhance populations in these habitats.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
9. Promote uptake of agri-environment options such as field margin options which may have contributed to stabilising the decline of this species. Glastir should be specifically geared towards maintaining flower-rich grasslands⁵⁴.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

rotation. Avoid the use of insecticides and other agricultural chemicals in the vicinity of foraging and nesting areas. Prevent large scale habitat disturbances, however small scale disturbances are important for maintaining habitat heterogeneity, floral diversity and open swards. Retain isolated bushes and patches of coarse vegetation for nesting. However, oppose excessive scrub encroachment, preferably using rotational management. Encourage brambles adjacent to flower-rich habitat for late season pollen and nectar provisions. Edge habitats such as hedges, ditches and banks are vital forage and nesting habitat and should be sensitively managed to help connect larger habitat patches and sustain healthy populations. In Warwickshire, seeding with Kidney Vetch for Small blue butterfly (*Cupido minimus*) has helped this bumblebee. The large tracts of habitat apparently required to support stable populations of some bumblebees such as *B. humilis* should be noted and accommodated in management plans, proposed site boundaries etc. Large brownfield sites can be valuable for this species because they often support all the necessary habitat requirements.

More information can be found here:

<http://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/brownfields>.

Management recommendations can also be found here: [Buglife: Brown-banded carder bee species management sheet](#).

Habitat management recommendations

Encourage and maintain a diverse landscape supporting a high proportion of mosaic habitats including open flowery habitats, ruderal vegetation, banks, ditches, hedges and scrub. Encourage a good variety of flowers, particularly legumes (such as Kidney vetch, clovers, bird's-foot-trefoils and vetches), labiates (such as dead-nettles) and composites (such as thistles). This will ensure a continuous supply of forage plants throughout the flight season of the colony (May to September). Avoid cutting or grazing habitats during this period. If necessary, cut on a small scale and in sections or on rotation as this will ensure suitable plants are always available. Likewise, any grazing should be light and on



Male *Bombus muscorum* © Steven Falk. This species can be very difficult to distinguish from *B. humilis* and pale examples of *B. pascuorum*, and specimens are often needed for confirmation. Difficulties in identification mean that it is likely to be under-recorded.

Bombus muscorum (Moss carder bee)

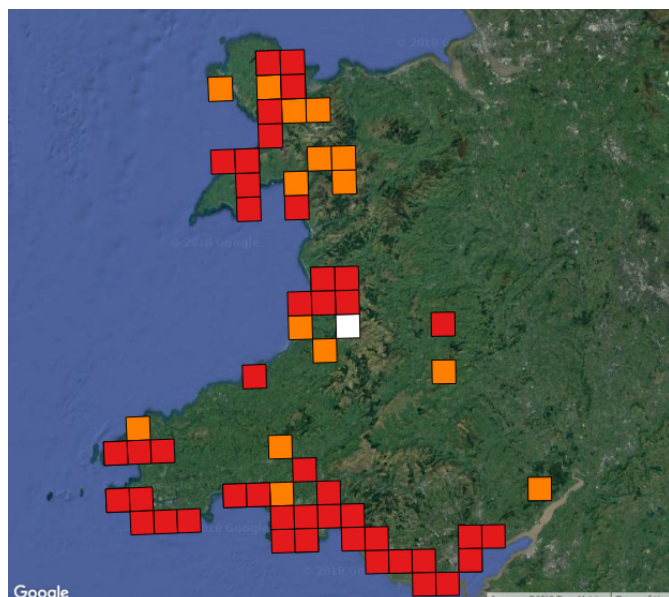
Bombus muscorum is a long-tongued bumblebee that closely resembles *B. humilis* and very pale examples of *B. pascuorum*, and identification of older workers and males can be tricky. Hibernated queens like legumes, especially clovers, *Lathyrus* peas and *Vicia* vetches. New summer queens will also visit thistles and Teasel. Workers will visit these species plus bird's-foot-trefoils, brambles, Common knapweed (*Centaurea nigra*), heathers, wall-rockets, Viper's-bugloss, Sea aster (*Tripolium pannonicum*), sowthistles, Bristly oxtongue and Devil's-bit scabious. Males visit thistles, yellow-flowered composites such as sowthistles and Bristly oxtongue, Water mint (*Mentha aquatica*), heathers, scabiouses, willowherbs, ragworts and knapweeds.

Its nesting biology is similar to *B. humilis*. Nests are made at the base of dense vegetation in tall, but open grassland. Carder bees nest on the surface of the ground and comb together grass and moss to cover the surface of their nest⁵⁹. Although similar to *B. humilis* in its nesting biology it differs in other requirements, being more dependent on ditches, in-field legumes (such as clovers in grazing marsh pasture), and flowers of upper salt marsh. Like other bumblebees, *B. muscorum* needs large areas of habitat to support its populations and a continuous supply of forage plants throughout the flight period. It mostly flies between May and September.

More information can be found here: [BWARS species information sheet: *Bombus muscorum*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2008: *Bombus muscorum* and *Bombus humilis* in the South West in 2008](#), [Hymettus 2008: The possible replacement of *B. muscorum* by *B. humilis* in Kent](#), [Hymettus 2011: The importance of sea walls for the moss carder bee *Bombus muscorum* in Essex](#), and [Steven Falk's Flickr collection](#).

Distribution and status

B. muscorum is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. Although widespread across Britain, it has declined since 1970. It is more common in the north of Britain. In Europe, it is considered 'Vulnerable' and is declining⁶. In Wales, it is largely found in damp and coastal habitats. Last recorded in the following vice-counties: Anglesey in 2016 (M. Howe), Caernarvonshire in 2016 (M. Howe), Cardiganshire in 2010 (K. McGee), Carmarthenshire in 2017 (S. Lynch), Glamorgan in 2017 (R. Ruston; L. Olds), Merionethshire in 2006 (C. Clee), Monmouthshire in 2015 (R. Ruston), Pembrokeshire in 2016 (S. Falk) and Radnorshire in 1995. Locally common along the coastline of Pembrokeshire and some heathlands inland (e.g. Dowrog Common) in 2016 (S. Falk, pers. comm.).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

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Typical habitat

In Wales, *Bombus muscorum* is typically found in open flower-rich grassland, brownfield sites (e.g. TATA Steel and Cardiff Docks, Glamorgan), damp heaths (e.g. Dowrog Common, Pembrokeshire), fens (e.g. Cors Bodeilio NNR, Anglesey and Cors Geirch NNR, Caernarvonshire), coastal dunes (e.g. Ynyslas NNR, Cardiganshire and Morfa Dyffryn NNR, Merionethshire), plus coastal grasslands such as grazing levels and cliff-tops (e.g. Linney Head and Castlemartin Range, Pembrokeshire). There seems to be a distinct preference for damp and exposed legume-rich locations over much of Britain.



Bombus muscorum cliff-top habitat at Castlemartin, Pembrokeshire © Steven Falk.

Reasons for decline

Despite a substantial decline in many areas of Britain, *B. muscorum* remains locally common along the coastline of Wales (particularly Glamorgan and Pembrokeshire) and some inland heaths (e.g. Dowrog Common, Pembrokeshire) (S. Falk, pers. comm.). Declines are largely due to the loss and fragmentation of habitat through agricultural intensification. Development, afforestation of coastal dunes, and inappropriate land management (such as intensive grassland management, inappropriate grazing, loss of field margins, reseeding and/or drainage of pastureland, and scrub encroachment) have also likely contributed to its decline. A lack of forage late in the season poses a threat to this species. Climate change could pose a threat by drying habitats and making them less favourable.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. This species has been worked on extensively by Hymettus, including [Hymettus 2008: The possible replacement of *B. muscorum* by *B. humilis* in Kent](#), and [Hymettus 2011: The importance of sea walls for *Bombus muscorum*](#). Buglife have been involved in the surveying and restoration of brownfield sites as part of the [West Glamorgan Stepping Stones](#) project, and have worked to raise the profile of brownfield sites for invertebrate conservation. Agri-environment schemes may have contributed to stabilising the decline of this species. BBCT has worked to conserve sites for rare bumblebees across South Wales through their 'Bees for Everyone' project, and subsequently through 'Bee Wild West Wales', as well as providing land management advice to a range of landowners and land managers. BBCT staff and volunteers regularly survey target sites for this species, primarily in South Wales.

Proposed action

1. Address gaps in autecological knowledge, which include: foraging distances, resource dispersion preferences, nest-site selection, hibernation requirements, viable population sizes, population structures and dynamics, landscape-scale population ecology, and habitat creation/restoration techniques.
2. Develop and disseminate habitat management guidelines (e.g. creation and restoration of grassland and suitable grazing regimes, encouraging late flowering), and ensure these are included in management plans.
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. Encourage on-going surveying of known populations by experienced bumblebee recorders and resurvey historic sites to identify new populations.
6. Ensure representation on all relevant LBAPs or Nature Partnerships, and site management documents for all SSSIs and LNRs where the species has been recorded or which support suitable habitat within 10 km of a known population.
7. Promote the appropriate management of brownfield sites and mineral extraction sites to conserve and enhance populations in these habitats.
8. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
9. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
10. Promote uptake of agri-environment options such as field margin options which may have contributed to stabilising the decline of this species. Glastir should be specifically geared towards maintaining flower-rich grasslands⁵⁴.
11. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

Habitat management recommendations

Encourage and maintain a diverse landscape supporting a high proportion of mosaic habitats including open flowery habitats, ruderal vegetation, banks, ditches, hedges and scrub. Encourage a good variety of flowers, particularly legumes (such as bird's-foot-trefoils, clovers, *Lathyrus* peas and *Vicia* vetches), thistles, knapweeds and yellow-flowered composites. This will ensure a continuous supply of forage plants throughout the flight season of the colony (May to September). Scabiouses (especially Devil's-bit) and heathers are particularly important in marshy grassland, heathland and moorland habitats. Avoid cutting or grazing habitats between April and September. If necessary, cut on a small scale and in sections or on rotation as this will ensure suitable plants are always available. Likewise, grazing should be light and on rotation. Avoid the use of fertilisers and other agricultural chemicals. Prevent large scale habitat disturbances, however small scale disturbances are important for maintaining habitat heterogeneity, floral diversity and open swards. Retain isolated bushes and patches of coarse vegetation for nesting. However, oppose excessive scrub encroachment, preferably using rotational management. Encourage brambles adjacent to flower-rich habitat for late season pollen and nectar provisions. Edge habitats such as hedges, ditches and banks are vital forage and nesting habitat and should be sensitively managed to help connect larger habitat patches and sustain healthy populations.

In coastal dunes, maintain a succession of dune vegetation; dune slacks are particularly favoured by this species. Prevent excessive scrub encroachment or overgrazing. Continue any established management, such as grazing or cutting, that contributes towards the overall character and stability of the dune system, and holds back succession. Consider the introduction of management on unmanaged sites, especially where succession is a problem. Maintain heathland and moorland in an open condition with structural diversity, using traditional management (e.g. grazing and cutting) as appropriate. Encourage heathers, scabiouses, knapweeds and ragworts for late season pollen and nectar provisions. The large tracts of habitat apparently required to support stable populations of some bumblebees such as *B. muscorum* should be noted and accommodated in management plans, proposed site boundaries etc. Brownfield sites are important to preserve for this species because they represent the necessary habitat requirements.

More information can be found here:

<http://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/brownfields>.



Queen *Bombus ruderarius* © Steven Falk. Note the presence of red hairs on the hind tibia, in contrast to black hairs in the similar and more common *B. lapidarius* (Red-tailed bumblebee). Workers can be difficult to distinguish from workers of *B. lapidarius*. Difficulties in identification mean that it is likely to be under-recorded.

Bombus ruderarius (Red-shanked carder bee)

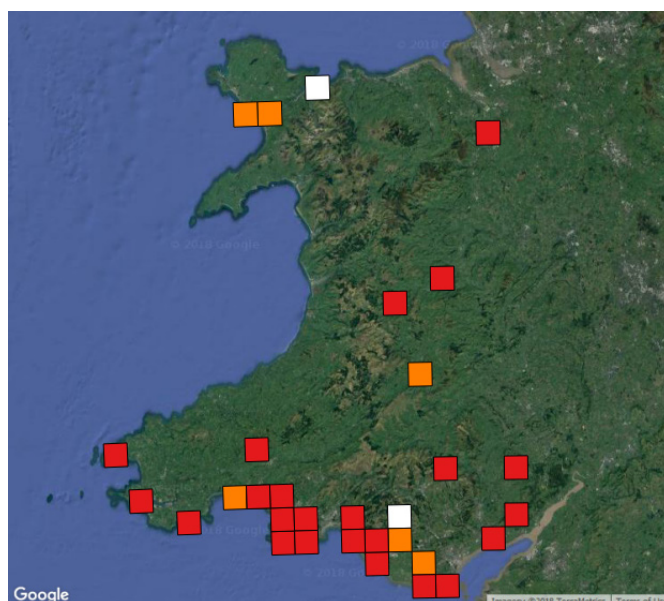
Bombus ruderarius is a medium-tongued species which forages on a wide range of plant species for nectar. Queens can be especially dependent on White dead-nettle (*Lamium album*) and Ground-ivy (*Glechoma hederacea*) in spring but will also visit sallow blossom. New summer queens like Kidney vetch, Red clover (*Trifolium pretense*), bird's-foot-trefoils, and scabiouses. Workers forage on a wide variety of plants especially legumes, labiates, brambles and stork's-bills. Males visit thistles, knapweeds, Viper's-bugloss and Teasel. Like other bumblebee species, *B. ruderarius* needs large areas of habitat to support its populations and a continuous supply of forage plants throughout the flight period. It nests at the surface of tall tussocky grassland and builds its nest out of shredded grass clippings and moss⁶⁰. It mostly flies between April and September.

Further information can be found here: [BWARS species information sheet: *Bombus ruderarius*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2008: *Bombus ruderarius*](#) and [Steven Falk's Flickr collection](#).

Distribution and status

B. ruderarius is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. Formerly widespread in England and Wales, it has

shown a substantial decline in many areas. Last recorded in the following vice-counties: Breconshire in 2001 (P. Morgan), Carmarthenshire in 2015 (B. Stewart), Denbighshire in 2000 (J. B. Formstone), Glamorgan in 2014 (B. Stewart), Monmouthshire in 2014, Montgomeryshire in 2014 (R. Becker) and Pembrokeshire in 2000 (B. Stewart). Seemingly lost from Anglesey (last recorded <1979), Caernavonshire (last recorded 1924-1925) and Radnorshire (1984) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS), Bumblebee Conservation Trust, Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, *Bombus ruderarius* is typically found in coastal dunes (e.g. Laugharne Burrows, Carmarthenshire and Kenfig NNR, Glamorgan), wetlands, coastal grassland and cliff-tops (e.g. Lydstep Point, Pembrokeshire), agricultural sites that are not intensively managed (e.g. Shirenewton Meadows, Monmouthshire and Llwynderw Farm, Llanidloes, Montgomeryshire), and brownfield sites (e.g. Borrass Quarry, Denbighshire and Margam Tip, Glamorgan). Other habitats include gardens and roadside verges.



Bombus ruderarius habitat at Kenfig NNR, Glamorgan © Steven Falk.

N.B. Although it can co-occur with other scarce carder bees (*B. humilis*, *B. muscorum* and *B. sylvarum*), it is rarely abundant in grasslands favoured by these species.

Reasons for decline

Declines have been largely attributed to habitat loss and fragmentation due to agricultural intensification, with the subsequent loss of hedgerows and other landscape features, and loss or conversion of grassland to silage or 'improved' pasture⁶⁰. The increased use of agricultural chemicals may have also had an influence. Habitat loss to development (particularly of brownfield sites) and inappropriate land management (e.g. inappropriate cutting and grazing regimes) has also likely attributed to such declines. It is particularly vulnerable to early meadow cutting which eliminates both nests and forage, and is under threat from a lack of forage late in the season. It's continuing UK decline, when other scarce bumblebees seem to be showing a recovery (e.g. *B. humilis* and *B. ruderatus*), also suggests that climatic factors

might be at play (such as the impact of poor springs).

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has been subject to intensive surveying between 1998 and 2000 as part of the [UK Biodiversity Action Plan Bumblebee Project](#). *Hymettus* has also researched its autecology and reasons for decline. Other studies have had problems with transect surveys due to the low numbers of individuals, therefore targeting colonies was more effective⁶¹.

Proposed action

1. Address gaps in autecological knowledge, which includes investigating why the ecologically similar *B. pascuorum* is common whereas *B. ruderarius* is declining⁶⁰, by examining the foraging range and queen dispersal distance of the latter; competition for nesting sites (*B. pascuorum* emerges earlier and may have a competitive advantage); fragmentation of suitable nesting habitat may prevent males finding new queens; and examining habitat requirements - it may be best suited to later successional communities of grassland to scrub typical of revegetated urban brownfield sites. Study of the foraging and nesting behaviour is urgently needed.
2. Develop and disseminate habitat management guidelines and include these in management plans (e.g. creation and restoration of grassland and suitable grazing regimes, encouraging late flowering).
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. On-going surveying of known populations and resurvey historic sites to determine status.
6. Ensure representation on all relevant LBAPs or Nature Partnerships.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
9. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

Habitat management recommendations

Encourage and maintain a diverse landscape supporting a high proportion of mosaic habitats including open flowery habitats, ruderal vegetation, banks, ditches, hedges and scrub. Encourage a good variety of flowers, particularly legumes (such as Kidney Vetch, clovers, bird's-foot-trefoils and vetches) and labiates (such as dead-nettles). This will ensure a continuous supply of forage plants throughout the flight season of the colony (April to September). Avoid cutting or grazing habitats during this period. If necessary, cut on a small scale and in sections or on rotation as this will ensure suitable plants are always available. Likewise, grazing should be light and on rotation. Avoid the use of insecticides and other agricultural chemicals. Prevent large scale habitat disturbances, however small scale disturbances are important for maintaining habitat heterogeneity, floral diversity and open swards. It is important to encourage White dead-nettle at arable margins and Ground-ivy on grasslands. Retain isolated bushes and patches of coarse vegetation for nesting. There appears to be a connection with areas of tussocky grass and scattered scrub (not dense scrub), which may be specific nesting habitat⁶². However, oppose excessive scrub encroachment, preferably using rotational management. Encourage brambles adjacent to flower-rich habitat for late season pollen and nectar provisions. Edge habitats such as hedges, ditches and banks are vital forage and nesting habitat and should be sensitively managed to help connect larger habitat patches and sustain healthy populations. Brownfield sites are important to preserve for this species because they represent the necessary habitat requirements.

More information can be found here:

<http://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/brownfields>.



Queen *Bombus ruderatus* © Steven Falk. This species can sometimes be very difficult to distinguish from the closely related *B. hortorum*, which is a common species. Difficulties in identification mean that it is potentially under-recorded.

Bombus ruderatus (Large garden bumblebee)

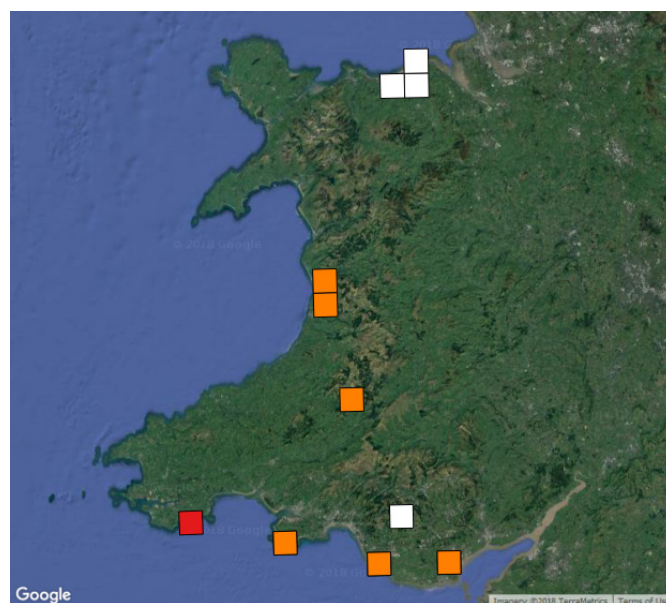
Bombus ruderatus is a very long-tongued species which forages on a wide range of plant species, but is particularly reliant on Red clover at many sites. Kidney vetch and everlasting-peas are also used where available. Hibernated queens also like White dead-nettle and comfrets in late spring, and workers will visit bird's-foot-trefoils, woundworts, knapweeds, thistles, Borage (*Borago officinalis*) and Viper's-bugloss. New summer queens will often congregate on Spear thistle (*Cirsium vulgare*), Musk thistle (*Carduus nutans*), Foxglove, Red campion (*Silene dioica*), Honeysuckle and Teasel. Nesting typically occurs underground in old mammal burrows. It has a short life-cycle, as queens usually emerge from hibernation in May and colonies die off by August.

Further information can be found here: [Buglife: Large garden bumblebee species management sheet](#), [Bumblebee Working Group Report 2002](#), [BWARS species information sheet: *Bombus hortorum*](#), [BWARS species information sheet: *Bombus ruderatus*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Friends of the Earth Iconic Bees Report](#), [Hymettus 2006: Bumblebees associated with open grasslands](#), and [Steven Falk's Flickr collection](#).

Distribution and status

B. ruderatus is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance

in Wales. It is also listed as Notable b (Nb)³. Formerly widespread across Wales, it has suffered a severe decline in its distribution and is at threat of extinction in Wales, or may already be extinct. Last known from a single population on the Castlemartin Peninsular, Pembrokeshire, where it was last recorded in 2002 (A. Poole). Seemingly lost from Cardiganshire (last recorded in 1958), Carmarthenshire (last recorded in 1970), Denbighshire (last recorded in 1911), Flintshire (last recorded in 1923) and Glamorgan (last recorded in 1953) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS), Bumblebee Conservation Trust, Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, *Bombus ruderatus* is typically associated with river systems, where it is often recorded along river corridors. It is also found in coastal grassland and cliff-tops (e.g. Lydstep Point, Pembrokeshire), agricultural settings (e.g. Bow Street, Cardiganshire and Rhandirmwyn, Carmarthenshire), and coastal dunes (e.g. Ynyslas NNR, Cardiganshire) where legumes (particularly clovers) are abundant. Other British habitats include flood banks, ditch margins, brownfield sites, and occasionally woodland and urban settings. *B. ruderatus* is not characteristic of species-rich grassland. It has recolonised areas planted with wildflowers as part of agri-environment schemes.



Bombus ruderatus habitat at Kenfig NNR, Glamorgan © Steven Falk.

Reasons for decline

Declines have been largely attributed to the loss of large expanses of unimproved open habitat to agricultural intensification, development and commercial forestry. Scrub encroachment and a loss of forage areas may have made many sites unsuitable for this species. The decline of traditional land use with its unimproved soils, flower-rich habitat and hedge banks, will have undoubtedly had an impact on this and many other bumblebees.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. This species has been worked on extensively by the Bumblebee Working group (now Hymettus): [Bumblebee Working Group Report 2002](#),

[Aculeate Conservation Group Report 2003](#), [Hymettus 2006: Bumblebees associated with open grasslands](#). It has also been studied by the Centre for Ecology and Hydrology. Buglife have also produced a species management sheet which can be found here: [Buglife: Large garden bumblebee species management sheet](#).

Proposed action

1. With urgency, resurvey historic sites to identify new populations and determine its current status in Wales. Targeted surveys along river corridors could prove successful in identifying new populations.
2. If and where it is rediscovered, advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
3. Focus habitat creation/restoration work at and around current population to ensure that this species does not go extinct in Wales.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. Use published habitat management recommendations to implement practical site enhancements, such as creation and restoration of flower-rich habitat, particularly in river valley systems and field margins.
6. Address gaps in autecological knowledge, which includes understanding its nesting biology and foraging needs, and how these may be promoted. In Warwickshire, massive success has been achieved using clover-rich field margins.

Habitat management recommendations³

Encourage and maintain a diverse landscape supporting a high proportion of mosaic habitats including open flowery habitats, ruderal vegetation, banks, ditches, hedges and scrub. Encourage a good variety of flowers, particularly legumes (such as Kidney Vetch, clovers and bird's-foot-trefoils) and labiates (such as dead-nettles). This will ensure a continuous supply of forage plants throughout the flight season of the colony (May to September). White dead-nettle is particularly important for hibernated queens, as is Spear thistle or Musk thistle for new summer queens and males. Avoid cutting or grazing habitats between April and September. If necessary, cut on a small scale and in sections or on rotation as this will ensure suitable plants are always

available. Likewise, any grazing should be light and on rotation. Avoid the use of insecticides and other agricultural chemicals in the vicinity of foraging and nesting areas. Prevent large scale habitat disturbances, however small scale disturbances are important for maintaining habitat heterogeneity, floral diversity and open swards. Retain isolated bushes and patches of coarse vegetation for nesting. However, oppose excessive scrub encroachment, preferably using rotational management. Edge habitats such as hedges, ditches and banks are vital forage and nesting habitat and should be sensitively managed to help connect larger habitat patches and sustain healthy populations. The large tracts of habitat apparently required to support populations should be noted and accommodated in management plans, proposed site boundaries etc. This species has benefited from pollen and nectar wildflower margins planted as part of agri-environment schemes, as well as from simple Red clover leys. Management guidelines can also be found here: [Buglife: Large garden bumblebee species management sheet](#). Flower-rich brownfield sites are important habitats to preserve for this species. More information can be found here: <http://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/brownfields>.



Queen *Bombus soroeensis* © Steven Falk. This species is distinguished from the very similar and common *B. lucorum* sensu lato by the curved yellow band across the abdomen that is weakened in the middle. It is difficult, however, to reliably distinguish from *B. lucorum* sensu lato in the field. Difficulties in identification mean that it is likely under-recorded.

***Bombus soroeensis* (Broken-belted bumblebee)**

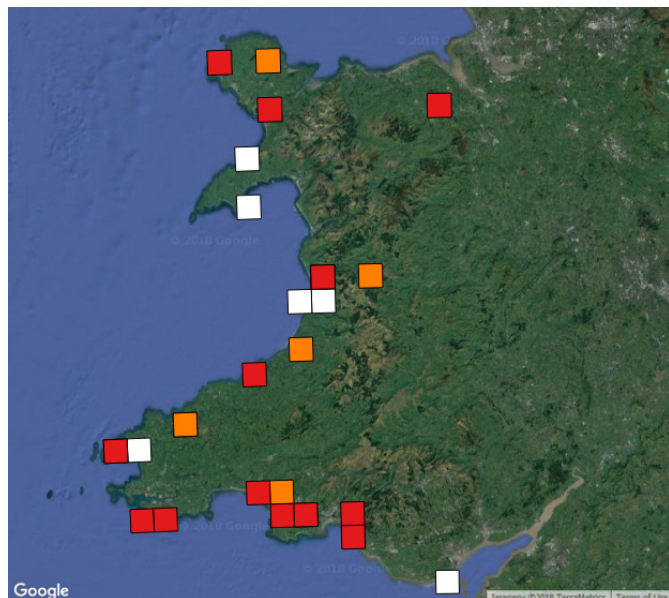
Bombus soroeensis is one of our least known bumblebees. Queens and workers closely resemble members of the *B. lucorum* (White-tailed bumblebee) complex and consequently it is probably overlooked in some areas. It visits a wide range of flowers but particularly important are scabiouses and small-flowered legumes (such as Melilots) for pollen. White dead-nettle and Wild raspberry are important for hibernated queens, though they will also visit clovers, bird's-foot-trefoils, brambles, comfrees and Bell heather (*Erica cinerea*). Workers and new autumn queens like Devil's-bit scabious, but workers will also use a variety of legumes, bellflowers, heathers, knapweeds and willowherbs. Males are most often seen on scabiouses. Sites that have a late-flowering peak are key for *B. soroeensis*.

Like the similar *B. lucorum* sensu lato (White-tailed bumblebee), nesting occurs underground, usually in disused small mammal burrows. It flies between late May and October, which most likely makes it the latest emerging bumblebee species and workers can peak very late, especially at sites with Devil's-bit scabious.

More information can be found here: [BWARS species information sheet: *Bombus soroeensis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

B. soroeensis is not currently regarded as scarce or threatened as a UK species, and has strong populations in Northern Scotland, but it has disappeared from many of its previous locations in southern Britain indicating that its status should be reviewed. Last recorded in the following vice-counties: Anglesey in 2010 (M. Howe), Cardiganshire in 2015 (R. Becker), Carmarthenshire in 1999 (M. Pavett), Denbighshire in 2004 (G. Nisbet), Glamorgan in 2015 (I. Tew) and Pembrokeshire in 2014 (S. Lynch; R. Comont). Seemingly lost from Caernarvonshire (last recorded in 1912) and Montgomeryshire (1972) vice-counties. Could not be re-discovered at Dowrog Common, Pembrokeshire by S. Falk in 2016 (recorded there in 1988).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, Highland Biological Recording Group, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC)

Typical habitat

In Wales, *Bombus soroensis* is typically found in lowland heathland (e.g. Llanmadoc Hill, Glamorgan), open moorland (e.g. Trefil Ddu, Breconshire), lowland raised bog (e.g. Cors Fochno, Cardiganshire), coastal dunes (e.g. Newborough Warren, Anglesey) and coastal grassland (e.g. St Govans, Pembrokeshire). Habitats with large areas of late-flowering plants are important. Other British habitats include coastal saltmarsh, limestone pavement, maritime cliffs and slopes, purple moor grass, rush pastures and hay meadows⁶³. It is strongly reliant on the abundance of scabiouses.



Bombus soroensis habitat at St David's Airfield, Pembrokeshire © Steven Falk.

Reasons for decline

Declines have been largely attributed to the loss of habitat through agricultural intensification and over-grazing⁶³. Climate change may also be a factor as it seems to have a northern and western bias. *B. soroensis* requires large areas of suitable habitat, and is therefore particularly vulnerable to habitat fragmentation. It is under threat from a lack of forage late in the season. It may also be under-recorded due to its similar appearance to the *B. lucorum* complex.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. S. Falk tried unsuccessfully to rediscover it at Dowrog Common in 2016, having previously seen it in 1988.

Proposed action

1. Address gaps in autecological knowledge.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans (e.g. creation and restoration of grassland and suitable grazing regimes, and encouraging late flowering of legumes).
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. Encourage on-going surveying of known populations by experienced bumblebee recorders, and resurvey historic sites to identify new populations.
6. Ensure that this species is represented on all relevant LBAPs or Nature Partnerships.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
9. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations

Protect existing patches of scabious-rich grassland and encourage a diversity of late-flowering plants. It is under threat from a lack of forage late in the season. Create further habitat by restoring improved or semi-improved grassland through reseedling or the use of plant plugs. Avoid cutting or grazing scabious-rich areas between April and October. Management should be irregular, and on rotation to promote habitat heterogeneity. Avoid grazing an entire site at once and the use of agricultural chemicals. *B. soroeensis* is closely associated with tall grasslands which are only cut or grazed intermittently and which have a high proportion of late-summer flowering plants such as scabiouses⁶³. Management should also encourage White dead-nettle and clovers, which are important for foraging queens on roadside verges and field margins. The large tracts of habitat apparently required to support stable populations of some bumblebees such as *B. soroeensis* should be noted and accommodated in management plans, proposed site boundaries etc.



Bombus sylvarum male © Steven Falk. Note the distinctive appearance - a greyish body with a broad black band between the wings, several ill-defined dark bands on the abdomen, and a dull orange tail.

Bombus sylvarum (Shrill carder bee)

Bombus sylvarum is a long-tongued bumblebee species which forages on a wide range of plant species for nectar and pollen. Key forage plants for hibernated queens are Red clover, Common knapweed, Red bartsia and bird's-foot-trefoils. Workers visit a wide range of flowers, especially composites, legumes, labiates, Red bartsia, brambles, Teasel and scabiouses. Workers were observed foraging heavily on Betony (*Stachys officinalis*) at Castlemartin, Pembrokeshire, in 2016 (S. Falk, pers. comm.). Males tend to visit flowers such as thistles, ragworts, Bristly oxtongue, Fleabane, Hedge woundwort (*Stachys sylvatica*), Marsh woundwort (*Stachys palustris*), Purple-loosestrife (*Lythrum salicaria*), and Teasel.

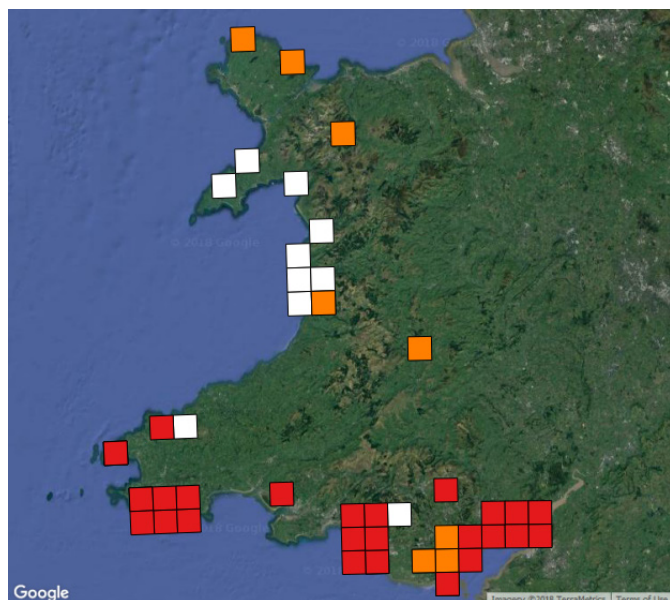
Its nesting biology is similar to other carder bees, nesting on the surface of the ground and combing together grass and moss to cover the surface of their nest. It usually flies between May and September. Like other bumblebees, *B. sylvarum* needs large areas of habitat to support its populations and a continuous supply of forage plants throughout the flight period.

More information can be found here: [Aculeate Conservation Group Report 2003](#), [Buglife: Shrill carder bee species management sheet](#), [Bumblebee Conservation Trust: Shrill carder bee factsheet](#), [BWARS species information sheet: *Bombus sylvarum*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2006](#):

[Bumblebees associated with open grasslands](#), [Hymettus: Bumblebee Working Group Report 2002](#), [Hymettus Report 2009](#) and [Steven Falk's Flickr collection](#).

Distribution and status

B. sylvarum is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. It is also listed as Notable b (Nb)³. Once widespread in England and Wales, it has undergone major range contraction and is now one of Britain's rarest bumblebees. Although it has recently experienced some range expansion, it is unknown whether this is a long-term change. The Gwent Levels, Castlemartin Peninsula, and the Glamorgan coast between Bridgend and Swansea support nationally important populations of this rare species. Last recorded in the following vice-counties: Carmarthenshire in 1999 (M. Edwards, S. Roberts, G. Else & M. Pavett), Glamorgan in 2016 (P. Denning; S. Lynch), Monmouthshire in 2017, and Pembrokeshire in 2017 (S. Lynch). Recorded by S. Lynch in Ebbw Vale in 2015, quite far outside of its known range. Seemingly lost from Anglesey (last recorded in 1973), Caernarvonshire (1969), Cardiganshire (1953), Merionethshire (1905) and Radnorshire (1970) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS), Bumblebee Conservation Trust, Cofnod - North Wales Environmental Information Service, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, *Bombus sylvarum* is found in a variety of habitats including coastal grazing levels (e.g. Margam Moors, Glamorgan and Gwent Levels, Monmouthshire), wetlands (e.g. RSPB Newport Wetlands, Monmouthshire), brownfield sites (e.g. Tranch Pyle lime works and TATA Steel, Glamorgan), cliff-top grassland and heathland (e.g. Sker Point, Glamorgan and Castlemartin Peninsula, Pembrokeshire), hay meadows (e.g. Somerton Farm, Pembrokeshire), sea walls, saltmarsh, coastal dunes (e.g. Kenfig NNR, Glamorgan) and vegetated shingle. Some of the most abundant modern populations are found in coastal grazing levels such as Gwent Levels, especially those with flower-rich sea banks³. RSPB Newport Wetlands is probably one of the most reliable sites in Wales for finding this species. *B. sylvarum* is a qualifying feature on 9 SSSIs in Wales (e.g. Castlemartin Range, Kenfig and Margam Moors), including 6 on the Gwent Levels.

Reasons for decline

Declines are largely attributed to habitat loss and fragmentation caused by agricultural intensification, commercial forestry, and development. Scrub encroachment and a loss of forage areas may have made many sites unsuitable for this species. The decline of traditional land use with its unimproved soils, flower-rich habitat and hedge banks, will have undoubtedly had an impact on this and many other bumblebees.



Bombus sylvarum grazing marsh habitat at Gwent Levels, Monmouthshire © Steven Falk.

Previous action

This species has been worked on extensively in Wales in the recent past by the former Countryside Council for Wales (CCW) to determine its status and distribution on the Gwent Levels and Castlemartin Range. It has also been surveyed for in the Kenfig and Port Talbot areas by Natural Resources Wales (NRW). Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. This species has also been worked on extensively by Hymettus and the Bumblebee Working Group: [Aculeate Conservation Group Report 2003](#), [Hymettus 2006: Bumblebees associated with open grasslands](#), [Hymettus: Bumblebee Working Group Report 2002](#), and [Hymettus Report 2009](#). Buglife have also produced a species management sheet which can be found here: [Buglife: Shrill carder bee species management sheet](#). Buglife have been involved in the surveying and restoration of brownfield sites as part of the [West Glamorgan Stepping Stones](#) project, and have worked to raise the profile of brownfield sites for invertebrate conservation. Agri-environment schemes may have contributed to stabilising the decline of this species. *Bombus sylvarum* is the primary target species for BBCT in Wales, and they work extensively with landowners and land managers in key areas to manage land for this species. BBCT have produced bilingual resources to aid the recording of this species, including a pocket sized 'ID card' to aid identification in the field. BBCT also undertake survey days targeting this species.

Proposed action

1. Address gaps in autecological knowledge.
2. Use published habitat management recommendations to implement practical site enhancements, such as creation and restoration of grassland and suitable grazing regimes, and encouraging late flowering of legumes.
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. Ensure ongoing monitoring of known populations by experienced bumblebee recorders and resurvey historic sites to identify new populations.
6. Ensure representation on site management documents for all SSSIs and LNRs where the species has been recorded or which support suitable habitat within 10km of a known population.
7. Promote the appropriate management of brownfield sites and mineral extraction sites to conserve and enhance populations in these habitats.
8. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
9. Ensure future agri-environment schemes are better targeted for this species and include a wider range of more attractive options to encourage farmer take-up.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

rotation. Avoid the use of insecticides and other agricultural chemicals in the vicinity of foraging and nesting areas. Prevent large scale habitat disturbances, however small scale disturbances are important for maintaining habitat heterogeneity, floral diversity and open swards. Retain isolated bushes and patches of coarse vegetation for nesting. However, oppose excessive scrub encroachment, preferably using rotational management. Edge habitats such as hedges, ditches and banks are vital forage and nesting habitat and should be sensitively managed to help connect larger habitat patches and sustain healthy populations. The large tracts of habitat apparently required to support stable populations of some bumblebees such as *B. sylvarum* should be noted and accommodated in management plans, proposed site boundaries etc. Management recommendations can also be found here: [Buglife: Shrill carder bee species management sheet](#) and [Bumblebee Conservation Trust: Shrill carder bee factsheet](#).

Habitat management recommendations³

Encourage and maintain a diverse landscape supporting a high proportion of mosaic habitats including open flowery habitats, ruderal vegetation, banks, ditches, hedges and scrub. Encourage a good variety of flowers (particularly clovers, Red bartsia, Betony and Creeping thistle *Cirsium arvense*) to ensure pollen and nectar supplies throughout the flight season of the colony (May to September), which is essential. Avoid cutting or grazing habitats during this period. If necessary, cut on a small scale and in sections or on rotation as this will ensure suitable plants are always available. Likewise, any grazing should be light and on



Female *Coelioxys mandibularis* © Steven Falk. Females are readily distinguished by the shape of the mandibles, which are 'elbowed' with a right-angled outer margin.

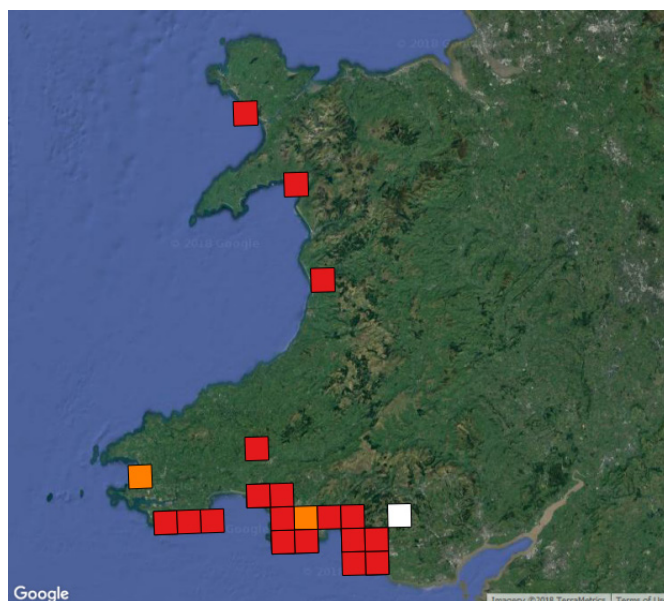
Coelioxys mandibularis (Square-jawed sharp-tail bee)

Coelioxys mandibularis is a cuckoo of the leafcutter bees *Megachile maritima* (Coast leafcutter bee) and *M. leachella* (Silvery leafcutter bee). It is found exclusively on coastal dunes where its hosts are found, and flies from early June to late August. In Wales, *M. maritima* seems to be the main host (S. Falk pers. comm.).

Further information can be found here: [BWARS species information sheet: *Coelioxys mandibularis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr Collection](#).

Distribution and status

C. mandibularis is listed as Rare (RDB3)³ and has a very restricted distribution, being found on coastal dune systems in disjunct regions of the British Isles including Wales, Lancashire, Sussex and Kent. Most British records are from the larger coastal dunes of South Wales. Last recorded in the following vice-counties: Anglesey in 2006 (C. Clee), Cardiganshire in 2001 (C. Clee), Carmarthenshire in 2017 (M. Howe), Glamorgan in 2016 (I. Tew), Merionethshire in 2009 (C. Clee) and Pembrokeshire in 2010 (D. Boyce).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre (SEWBRc), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

It is found exclusively on coastal dunes such as Pembrey Burrows (Carmarthenshire), Ynyslas NNR (Cardiganshire), Kenfig NNR (Glamorgan), Morfa Harlech NNR (Merionethshire) and Stackpole NNR (Pembrokeshire), where its main host, *M. maritima*, is found. Its host excavates nesting burrows in the sand of sunny, sparsely vegetated areas, frequently those with a southerly aspect³.



Habitat of *Coelioxys mandibularis* at Kenfig NNR, Glamorgan
© Steven Falk.

Reasons for decline

This bee has likely declined due to habitat loss caused by coastal development, agricultural intensification, sea defence systems, afforestation of dunes, and inappropriate management (such as a lack of appropriate grazing levels) resulting in vegetative encroachment via successional processes³. In Wales, afforestation and the over-stabilisation of dunes are likely its greatest threats (S. Falk, pers. comm.). The over-stabilisation of dunes and the subsequent loss of open, bare sand is seen as a major threat to dune biodiversity. Bare sand now accounts for just 1.7% of the total sand dune resource in Wales⁶⁴. Further information can be found here - [Buglife: Coastal sand dunes](#).

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. A series of rejuvenation projects have been undertaken by Natural Resources Wales to restore sand dune systems such as Newborough Warren (Anglesey), Kenfig NNR (Glamorgan) and Merthyr Mawr NNR (Glamorgan). Further work to restore Welsh sand dunes is anticipated under the 'Dynamic Dunescapes' project, funded by The Heritage Lottery Fund. Such projects to increase the amount of open, bare sand in coastal dune systems will prove beneficial to this species and other invertebrates dependent upon this habitat. *C. mandibularis* has been recorded using

such excavated areas at Merthyr Mawr, and areas cleared of Sea-buckthorn (*Hippophae rhamnoides*) on Tywyn Burrows (Pembrey Aerial Firing Range) (M. Howe, pers. comm.).

Proposed action

1. Address gaps in autecological knowledge.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans (e.g. such as implementing appropriate grazing regimes).
3. Engage with the Dynamic Dunescapes project to identify opportunities to benefit this species.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. Ensure the requirements of this species and its habitat are understood in drawing up coastal zone management plans (including Shoreline Management Plans) for relevant stretches of coasts.
6. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
7. Resurvey historic sites and current populations to gather up to date information on status and distribution in Wales.
8. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
9. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
10. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain a full transition of dune vegetation and conditions, allowing the natural stabilisation of dune vegetation and encouraging flowery conditions. Promote dynamic dune systems and natural sand movements which would create bare or sparsely vegetated sand essential for nesting. Extensive grazing, particularly if heavy and prolonged, should be avoided as this will significantly reduce the inflorescences of flowering plants. Use fences or boardwalks where necessary to minimise excessive disturbance. However, the over-stabilisation of dunes and the subsequent loss of open, bare sand is a great threat to dune biodiversity. Bare sand now accounts for just 1.7% of the total sand dune resource in Wales⁶⁴. As a more appropriate bare sand threshold is likely to range between 10 and 30%, radical action is required to remobilise sand dune systems⁶⁴.



Female *Colletes cunicularius* © Steven Falk. Note the absence of the banded abdomen seen in other *Colletes* bees.

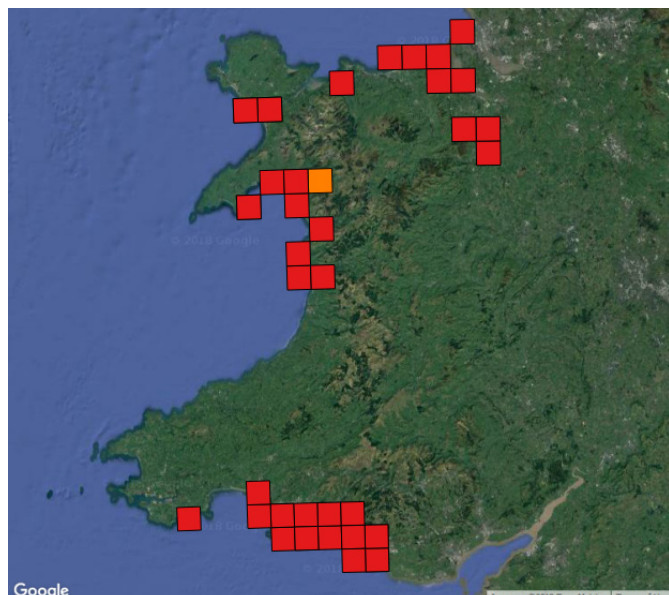
Colletes cunicularius (Vernal colletes bee)

Colletes cunicularius is so-called because it is the only British *Colletes* to fly in the spring. Until recently, it was confined to western coastal dunes. Since around 2010, however, it has started to colonise sandy sites well inland such as heathlands, sand pits and quarries. Western dune populations are strongly associated with Creeping willow (*Salix repens*) in dune slacks. New inland populations seem to have much broader foraging habits, using salallows such as Grey willow (*Salix cinerea*), Goat willow (*Salix caprea*), and possibly *Prunus* species. It has also been noted visiting other spring-blossoming shrubs such as Blackthorn (*Prunus spinosa*) and cherries, and dandelion (*Taraxacum* sp.) flowers, presumably only for nectar (R. Paxton, pers. comm.). It flies from early March to early May. Nesting typically occurs in large aggregations, especially in slopes of very loose, non-compacted sand with mosses and sparse vegetation.

Further information can be found here: [BWARS species information sheet: *Colletes cunicularius*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr Collection](#).

Distribution and status

C. cunicularius is listed as Rare (RDB3)³. Once considered a rare species of western coastal dune systems, it has recently turned up in sandpits and heathland sites over much of southern Britain, and this is thought to represent a new wave of colonisation from continental Europe as opposed to an expansion of western dune populations. Investigations have started to compare the genetics of dune and non-dune populations. Last recorded in the following vice-counties: Anglesey in 2016 (A. Fowles & M. Howe), Caernavonshire in 2016 (M. Howe & E. Meilleur), Cardiganshire in 2010 (K. McGee), Carmarthenshire in 2005 (C. Clee & G.T. Knight), Denbighshire in 2017 (W. Hawkes), Flintshire in 2016 (E. Thomas), Glamorgan in 2017 (L. Olds; S. Falk), Merionethshire in 2016 and Pembrokeshire in 2017 (C. Flynn & S. Falk).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, Royal Horticultural Society, South East Wales Biodiversity Records Centre (SEWBReC), and West Wales Biodiversity Information Centre (WWBIC).

Typical habitat

In Wales, *Colletes cunicularius* is typically found on large, mature coastal dunes with Creeping Willow growing in damp slacks. This includes sites such as Kenfig NNR (Glamorgan), Morfa Harlech NNR (Merionethshire), Newborough Warren NNR (Anglesey) and Ynyslas NNR (Cardiganshire). *C. cunicularius* is a site quality feature of 8 dune SSSIs in Wales. In recent years, it has also been recorded from a number of brownfield sites including sandpits (e.g. Fagl Lane Sand Pit and Fron Haul Sand Pit, Flintshire) and Bersham Colliery Tip (Denbighshire). A newly discovered site at Freshwater East, Pembrokeshire, is unusual in a Welsh context in being a small dune system with plentiful sallow but no Creeping Willow. This is the same situation at Morfa Conwy and Kinnel Dunes, both of which have been colonised over the last decade or so and both support small populations (M. Howe, pers. comm.).

Reasons for decline

There is little evidence of a decline in Wales, however it does remain a rare species. Threats include habitat loss caused by coastal development, agricultural intensification, sea defence systems, afforestation of dunes, and inappropriate management (such as a lack of appropriate grazing levels) resulting in vegetative encroachment via successional processes³. Storm damage of dunes is another threat as invading seawater could kill the Creeping willow growing in dune slacks (S. Falk, pers. comm.).



Nesting habitat of *Colletes cunicularius* at Whiteford Burrows, Glamorgan © Steven Falk.

The dune-loving western UK form of *Colletes cunicularius* (which may be genetically distinct from other forms) has a high proportion of its population within Wales, and thus the conservation of Welsh populations is particularly important. Afforestation and the over-stabilisation of dunes are likely its greatest threats in Wales (S. Falk, pers. comm.). The over-stabilisation of dunes and the subsequent loss of open, bare sand is seen as a major threat to dune biodiversity. Bare sand now accounts for just 1.7% of the total sand dune resource in Wales⁶⁴. Further information can be found here - [Buglife: Coastal sand dunes](#).

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. A series of rejuvenation projects have been undertaken by Natural Resources Wales to restore sand dune systems such as Newborough Warren (Anglesey), Kenfig NNR (Glamorgan) and Merthyr Mawr NNR (Glamorgan). Further work to restore Welsh sand dunes is anticipated under the 'Dynamic Dunescapes' project, funded by The Heritage Lottery Fund. Such projects to increase the amount of open, bare sand in coastal dune systems will prove beneficial to this species and other invertebrates dependent upon this habitat. It has colonised excavated areas on Kenfig NNR and Newborough Warren. Clare Flynn started investigating the genetics of Welsh western dune populations versus English non-dune populations in 2018.

Proposed action

1. Address gaps in autecological knowledge.
2. Clarify genetics of old Welsh dune populations compared with new inland colonies.
3. Develop and disseminate habitat management guidelines and ensure these are included in management plans (e.g implementing appropriate grazing regimes).
4. Engage with the Dynamic Dunescapes project and aggregate/minerals industries to identify opportunities to benefit this species.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
6. Ensure the requirements of this species and its habitat are understood in drawing up coastal zone management plans (including Shoreline Management Plans) for relevant stretches of coasts.
7. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
8. On-going monitoring of known populations and resurvey historic sites to identify new populations.
9. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
11. Raise awareness within the minerals industry of the importance of quarries, sand pits and colliery spoil tips for *C. cunicularius* and advise on management and restoration.
12. Engage with the minerals industry to create suitable habitat for this species in land reclamation /restoration schemes.
13. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain a full transition of dune vegetation and conditions, allowing the natural stabilisation of dune vegetation and encouraging flowery conditions. Promote dynamic dune systems and natural sand movements which would create bare or sparsely vegetated sand essential for nesting.

Extensive grazing, particularly if heavy and prolonged, should be avoided as this will significantly reduce the inflorescences of flowering plants. Use fences or boardwalks where necessary to minimise excessive disturbance. However, the over-stabilisation of dunes and the subsequent loss of open, bare sand is a great threat to dune biodiversity. Bare sand now accounts for just 1.7% of the total sand dune resource in Wales⁶⁴. As a more appropriate bare sand threshold is likely to range between 10 and 30%, radical action is required to remobilise sand dune systems⁶⁴.



Male *Eucera longicornis* © Steven Falk. The male is distinguishable from all other UK bee species (except *E. nigrescens*, which is considered extinct in the UK) by its extremely long antennae.

Eucera longicornis (Long-horned bee)

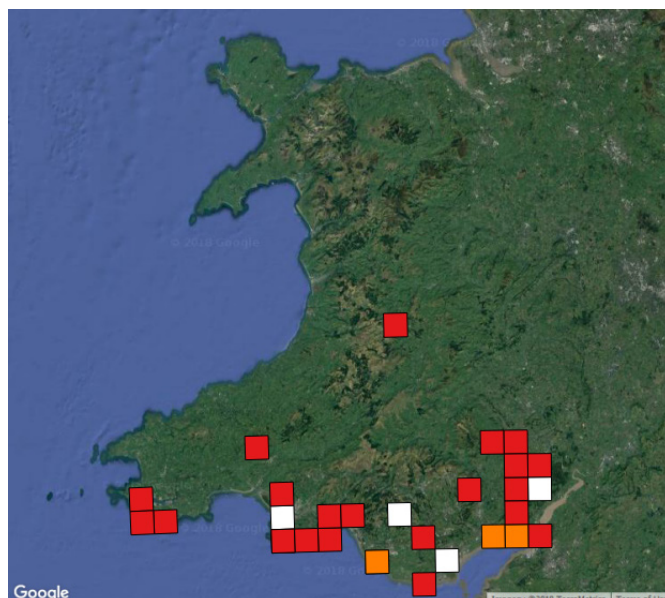
Eucera longicornis is so-called because the males have exceptionally long antennae. It is strongly associated with legumes such as clovers, Kidney vetch, *Vicia* vetches, Meadow vetchling (*Lathyrus pratensis*) and everlasting-peas. It also visits a wide range of flowers for nectar. Males also like labiates such as Ground-ivy and Bugle (*Ajuga reptans*). Nesting typically occurs in aggregations in bare or sparsely vegetated light soils, preferring south-facing slopes or vertical cliff faces. It flies between mid-May and mid-July, although females can persist into August. It is host to the very rare Six-banded nomad bee (*Nomada sexfasciata*).

Further information can be found here: [Buglife species management sheets: *Eucera longicornis*](#), [BWARS species information sheet: *Eucera longicornis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Friends of the Earth Iconic Bees Report](#), [Hymettus Report 2010](#), and [Steven Falk's Flickr Collection](#).

Distribution and status

E. longicornis is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. It is also listed as Notable a (Na)³. Previously widespread and locally common in southern Britain, it has declined substantially and is now considered to be one of Britain's most declined bees, though some recent expansion into inland sites such as sand pits and mineral extraction sites, as well as some grasslands, has been noted in England.

Last recorded in the following vice-counties: Carmarthenshire in 2005 (I. Morgan), Glamorgan in 2017 (L. Olds; R. Wistow), Monmouthshire in 2016 (R. Ruston), Pembrokeshire in 2016 (J. Hudson) and Radnorshire in 2017 (B. Brown). It's recent discovery in Radnorshire suggests this species may be overlooked in some areas.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre, and West Wales Biodiversity Information Centre.

Typical habitat

In Wales, *Eucera longicornis* is found in a wide variety of habitats including coastal soft rock cliffs and slopes (e.g. Horton cliffs and Rhossili Bay, Glamorgan), coastal grasslands (e.g. Castlemartin Range, Pembrokeshire), hay meadows (e.g. Kingcoed Meadow, Raglan, Monmouthshire), coastal grazing levels (e.g. Gwent Levels, Monmouthshire), saltmarsh (e.g. Kidwelly Marsh and Banc y Lord, Carmarthenshire), riverbanks (e.g. River Monnow, Monmouth, Monmouthshire), fens (e.g. Crymlyn Bog NNR, Glamorgan), lowland heath (e.g. Giants Grave, Briton Ferry, Glamorgan) and roadside verges (e.g. Miskin, Glamorgan). It is also found in the open rides of deciduous woodland and in more agricultural settings, where it is presumably nesting in river banks. Soft rock cliffs have become especially important sites in recent years⁶⁵.



Eucera longicornis nesting area at Flimston Bay, Castlemartin, Pembrokeshire © Steven Falk.

Reasons for decline

This bee has likely declined due to the loss of legume-rich habitats caused by agricultural intensification, inappropriate habitat management resulting in vegetative encroachment or over-grazing or mistimed cutting, as well as cliff stabilisation, coastal development, and loss of cliff top flower-rich grasslands³.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has been surveyed for by Hymettus: [Hymettus Report 2010](#). The [Buglife: Managing Soft Cliffs for Invertebrates](#) report describes the importance of coastal soft cliff sites for UK invertebrate conservation, identifies threats, and provides management guidance. The Countryside Council for Wales (now Natural Resources Wales) report 'A Review of the Coastal Soft Rock Cliff Resource in Wales' and [Buglife species management sheets: *Eucera longicornis*](#) demonstrates the importance of soft rock cliffs for invertebrates, and threats to this habitat.

Proposed action

1. Address gaps in autecological knowledge, including whether this decline is partly due to a lack of open woodland glades⁵⁴.
2. Use published habitat management recommendations to implement practical site enhancements.
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Ensure the requirements of this species and its habitat are understood in drawing up coastal zone management plans (including Shoreline Management Plans) for relevant stretches of coasts.
5. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat (e.g. flower-rich cliff top grasslands), and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
6. On-going monitoring of known populations and resurvey historic sites to identify new populations.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.

Habitat management recommendations³

Maintain plenty of suitable nesting sites (e.g. south-facing slopes and unstable banks) in warm, sunny situations, and plenty of flowers (especially legumes such as Meadow vetchling and ever-lasting peas, plus clovers). On soft rock cliffs and associated landslips, these conditions should occur naturally provided that stabilisation is opposed. However, as unstabilised areas become more isolated, individual landslips become more threatening to localised colonies of the bee and the area of suitable nesting habitat becomes prone to greater fluctuation. Oppose any activities which might significantly reduce or accelerate the natural rate of erosion and attempt to retain adjacent areas of unimproved grassland for foraging. At inland localities, the presence of nesting sites may depend on active management (e.g. grazing, cutting) to maintain reasonable patches of bare soil and prevent encroachment of invasive vegetation. However, avoid over-grazing legume-rich areas, especially where Meadow vetchling is present. Consider the introduction of management on unmanaged sites, especially where succession is a problem. Maintain natural dynamic process on coastal soft cliffs, improve cliff top management by restoring flower-rich semi-natural cliff top grasslands, and ensure cliff tops are grazed/cut appropriately and scrub is managed appropriately.



Male *Nomada argentata* © Steven Falk.

Nomada argentata (Silver-sided nomad bee)

Nomada argentata is a cuckoo bee that uses *Andrena marginata* (Small scabious mining bee) as its only host. Like its host, it is typically found in scabious-rich habitats. It is known to forage largely on scabiouses (Field, Small or Devil's-bit), although it will also visit thistles before scabiouses are in flower. The flight period extends from mid-July to mid-September, peaking later where the host forages on Devil's-bit scabious.

Further information can be found here: [BWARS species information sheet: *Nomada argentata*](#), Falk and Lewington (2015) [Field Guide to the Bees of Great Britain and Ireland](#), [Hymettus Report 2003](#), [Hymettus Report 2006](#), [Hymettus Report 2007](#), and [Steven Falk's Flickr collection](#).

Distribution and status

N. argentata is listed as Rare (RDB3)³. Like its host, this species has declined substantially in the UK. In Wales, it is known only from a single site in Glamorgan (last recorded in 2004) and is at risk of extinction.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: South East Wales Biodiversity Records Centre (SEWBReC).

Typical habitat

As for its host, *A. marginata*.

Habitat management recommendations

As for its host, *A. marginata*.

Reasons for decline

This bee has likely declined as a result of the decline of its host *A. marginata*, perhaps especially the loss of strong host colonies and host metapopulations.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has also been surveyed by Buglife as part of the [South West Bees Project](#) and by Hymettus ([Hymettus Report 2003](#), [Hymettus Report 2006](#), [Hymettus Report 2007](#)).

Proposed action

1. With urgency, resurvey the last remaining Welsh site and suitable habitat in the vicinity to establish its current status in Wales.
2. If and where it is rediscovered, advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
3. Focus habitat creation/restoration work at and around current population to ensure that this species does not go extinct in Wales.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat (e.g. planting Field and Devil's-bit scabious and providing nesting sites), and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
5. Develop and disseminate habitat management guidelines, which include appropriate grazing regimes, and ensure these are included in management plans.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Encourage recorders to be vigilant for this species when recording its host, *A. marginata*.
8. Encourage recorders of Marsh fritillary butterfly (*Euphydryas aurinia*) to be vigilant for this species when conducting larval web surveys in scabious-rich habitats.
9. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
10. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.



Female *Nomada fulvicornis* © Steven Falk.

Nomada fulvicornis (Orange-horned nomad bee)

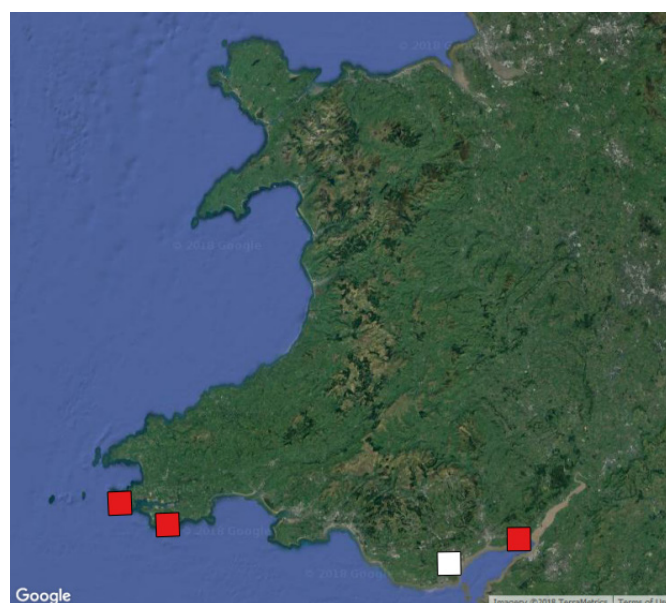
Nomada fulvicornis is a cuckoo bee that uses *Andrena bimaculata* (Large gorse mining bee), *A. pilipes* (Black mining bee) and *A. tibialis* (Grey-gastered mining bee) as its hosts. It has been found in the majority of habitats inhabited by its hosts, encompassing heathland, sandy brownfield sites, coastal grassland, and soft rock cliffs. It is bivoltine in most parts of its range (i.e. it has two generations a year), in common with two of its hosts, *A. bimaculata* and *A. pilipes*. The first generation flies from March to May, the second from July to late August. Populations associated with *A. tibialis* appear to be univoltine, flying in spring. The first generation will visit willows, Wild cherry (*Prunus avium*), spurge, brassicas and daisy. The second generation uses brambles, thistles, Rosebay willowherb (*Chamerion angustifolium*), Common ragwort (*Senecio jacobaea*) and Goldenrod (*Solidago virgaurea*).

Further information can be found here: [BWARS species information sheet: *Nomada fulvicornis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus Report 2010](#), and [Steven Falk's Flickr collection](#).

Distribution and status

N. fulvicornis is listed as Rare (RDB3)³. It is widespread but very localised in England north to Yorkshire, and few records exist in Wales. Last recorded in the following vice-counties:

Monmouthshire in 1991 (S. Foster) and Pembrokeshire in 2009. Seemingly lost from Glamorgan (last recorded in 1911). There is a real possibility that it has now been lost from Monmouthshire given that it has not been recorded since 1991.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre, and West Wales Biodiversity Information Centre.

Typical habitat

In Wales, *Nomada fulvicornis* is typically associated with soft rock cliffs (e.g. Marloes Sands and Stackpole Warren NNR, Pembrokeshire), especially populations associated with *A. pilipes*. Elsewhere in Britain, it is also found in heathland and sandy brownfield sites (especially populations associated with *A. bimaculata*).



Nomada fulvicornis habitat at St Govan's Head, Pembrokeshire © Steven Falk.

Reasons for decline

This bee has likely declined as a result of the decline of its hosts, perhaps especially the loss of strong host colonies and host metapopulations.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has also been surveyed by Hymettus ([Hymettus Report 2010](#)).

Proposed action

1. On-going monitoring of known populations and resurvey historic sites to identify new populations.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans.
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat for host species, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
5. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
6. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
7. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain sites in a reasonably open state with plenty of suitable host nesting sites in warm and sunny situations (south-facing banks and slopes, hard trodden footpaths and pits). Crucial to hosts in the spring are blossoming shrubs, such as willows and Blackthorn; and brambles and umbellifers are needed for hosts in the summer. Therefore a variety of successional stages are required. At coastal soft rock cliffs and landslips, conditions may occur naturally, providing stabilisation is avoided. Oppose any activities which might significantly reduce or accelerate the natural rates of erosion at such sites, and retain any adjacent scrub or unimproved grassland for host foraging.



Female *Nomada hirtipes* © Steven Falk.

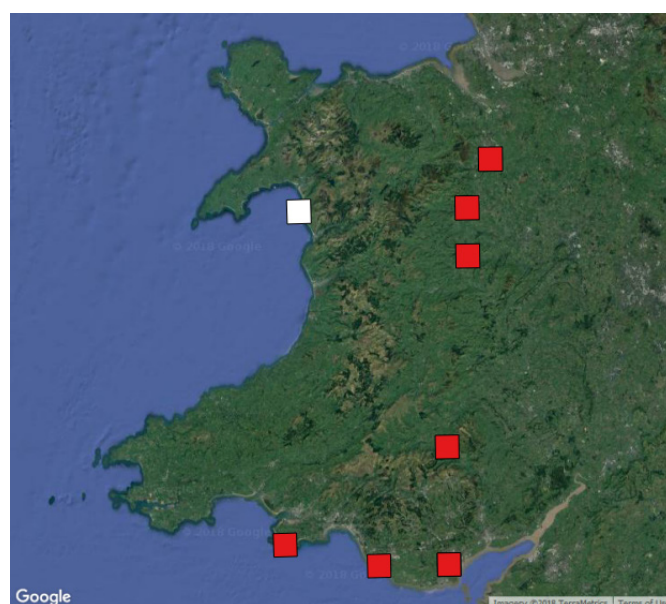
Nomada hirtipes (Long-horned nomad bee)

Nomada hirtipes is a cuckoo bee that uses *Andrena bucephala* (Big-headed mining bee) as its only host. Like its host, it is found in a wide variety of habitats including calcareous grassland, scrubby hillsides, coastal scrub and open woodland. It is known to forage on Cow parsley, dandelions, Wild strawberry (*Fragaria vesca*), Cypress spurge (*Euphorbia cyparissias*) and Cuckooflower (*Cardamine pratensis*). The flight period extends from late April to mid-June.

Further information can be found here: [BWARS species information sheet: *Nomada hirtipes*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

N. hirtipes is listed as Rare (RDB3)³. It is very scarce with scattered records across southern England (north to Shropshire) and Wales. Last recorded in the following vice-counties: Breconshire in 1998 (M. Pavett), Denbighshire in 1996 (J. B. Formstone), Glamorgan in 2016 (I. Tew) and Montgomeryshire in 2009 (M. Howe). Seemingly lost from Merionethshire vice-county (last recorded in 1902).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Biodiversity Information Service (BIS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, Nottinghamshire Biological and Geological Records Centre, and South East Wales Biodiversity Records Centre.

Typical habitat

Like its host *A. bucephala*, it is found in a wide variety of habitats. In Wales, it is typically found in open woodland (e.g. Erbistock, Denbighshire), scrubby hillsides (e.g. Allt-yr-Esgair, Breconshire), old cuttings and quarries (e.g. Llanymynech Rocks Nature Reserve, Montgomeryshire), and wood pastures and parklands (e.g. Penrice Castle, Glamorgan and Powis Castle and Garden, Montgomeryshire). Other British habitats include calcareous grassland and churchyards. The host forages mainly on flowering shrubs such as on Hawthorn and Field Maple (*Acer campestre*).



Potential *Nomada hirtipes* habitat at Cwm Ivy, Gower, Glamorgan © Steven Falk.

Reasons for decline

This bee has likely declined due to the loss of strong host colonies and host metapopulations. The decline of its host is likely attributed to habitat loss to agricultural intensification, development, commercial forestry and the stabilisation of coastal landslips. The decline in traditional land use, and the effects of myxomatosis on rabbit populations, has also led to the loss of nesting and foraging sites.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Address gaps in autecological knowledge.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans.
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat for host species (e.g. creating rides and clearings in woodland), and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. On-going monitoring of known populations and resurvey historic sites to identify new populations.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
8. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain plenty of south-facing slopes, steep banks etc. in warm, sunny situations for host nesting, and also flower-rich areas for host foraging; Hawthorn, Blackthorn and Field Maple are particularly important. Do not allow the encroachment of scrub or coarse vegetation onto open habitat. Maintain any management (e.g. grazing, cutting), or disturbance, that contributes to the overall character and stability of the site and holds back succession. Prevent the shading out of open rides and clearings, maintain sunny areas suitable for host nesting, flower-rich areas and spring-flowering shrubs.



Male *Nomada roberjeotiana* © Steven Falk.

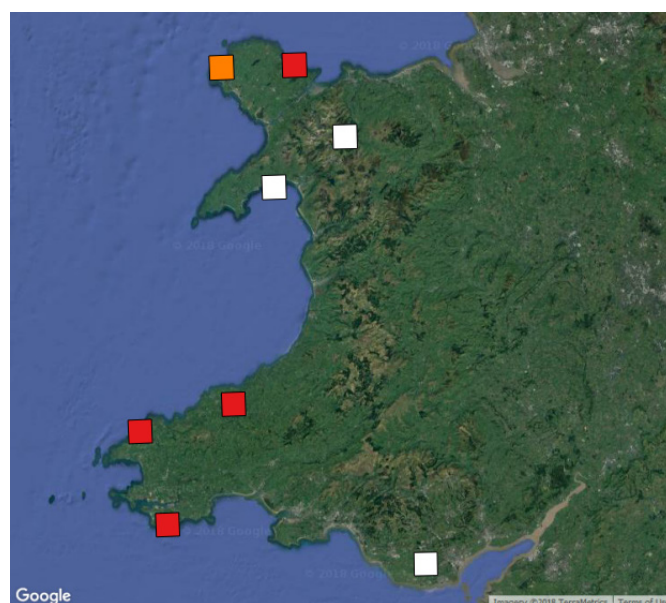
Nomada roberjeotiana (Tormentil nomad bee)

The cuckoo bee *Nomada roberjeotiana* uses *Andrena tarsata* (Tormentil mining bee) as its only host. It is found in Tormentil-rich habitats where it requires strong populations of its host. It forages largely on Tormentil, and occasionally ragworts, and flies between late June and late August.

More information can be found here: [Buglife species management sheets: *Andrena tarsata* and *Nomada roberjeotiana*](#), [BWARS species information sheet: *Nomada roberjeotiana*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

N. roberjeotiana is listed as Rare (RDB3)³. It is a rare but widely distributed species in Britain, the range extending from southern England north to southern Scotland. Most modern records are from Cornwall, though historical records are scattered thinly across heathland districts of England, Wales and Scotland. Last recorded in the following vice-counties: Anglesey in 2012 (M. Howe), Cardiganshire in 2000 (P. Skidmore) and Pembrokeshire in 2007 (M. Howe). Seemingly lost from Caernarvonshire (last recorded in 1913) and Glamorgan (1927) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, South East Wales Biodiversity Records Centre.

Typical habitat

As for its host, *A. tarsata*

Reasons for decline

This bee has likely declined due to the decline of its host *A. tarsata*, perhaps especially the loss of strong host colonies and host metapopulations.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has also been surveyed by Buglife as part of the [South West Bees Project](#) and by Hymettus (unpublished). Buglife have also produced a species management sheet which can be found here: [Buglife species management sheets: *Andrena tarsata* and *Nomada roberjeotiana*](#).

Habitat management recommendations

As for its host, *A. tarsata*.

Proposed action

1. Resurvey historic sites to identify new populations and determine its current status in Wales.
2. Use published habitat management recommendations to implement practical site enhancements, such as increasing the abundance of Tormentil using appropriate grazing and cutting regimes, and ensure guidelines are included in management plans.
3. Consider targeted habitat enhancement or creation, such as encouraging an abundance of Tormentil using appropriate grazing and cutting regimes, and providing nesting sites.
4. Identify opportunities to connect fragmented and isolated populations through habitat creation, restoration and enhancement. Identify opportunities within the B-Lines network where appropriate.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
6. On-going monitoring of known populations and resurvey historic sites to identify new populations.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
9. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
10. Encourage recorders to be vigilant for this species when recording its host, *A. tarsata*.
11. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.



Female *Nomada signata* © Steven Falk.

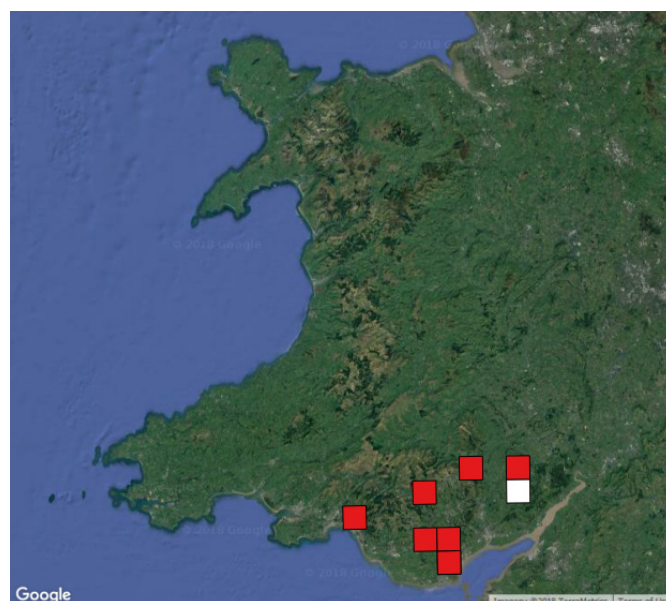
Nomada signata (Broad-banded nomad bee)

Nomada signata is a cuckoo bee that uses *Andrena fulva* (Tawny mining bee) as its only host. Like its host, it is found in a wide variety of open habitats including open grassland and clearings in broad-leaved woodland. It is known to forage on dandelions, willows and Wood spurge (*Euphorbia amygdaloides*). The flight period extends from early April to late May.

Further information can be found here: [BWARS species information sheet: *Nomada signata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

N. signata is listed as Vulnerable (RDB2)³. It has never been a common bee in Britain, though there has been a slight indication of an increase in southern England over recent decades. Last recorded in the following vice-counties: Glamorgan in 2017 (L. Olds) and Monmouthshire in 2017 (R. Ruston).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: National Trust, Natural Resources Wales, and South East Wales Biodiversity Records Centre.

Typical habitat

Like its host *A. fulva*, it is found in a wide variety of habitats. In Wales, it is typically found in open grasslands (e.g. Giants Grave, Glamorgan), gardens (e.g. Miskin, Glamorgan and Monmouth, Monmouthshire), parklands (e.g. Bute Park, Cardiff, Glamorgan) and open woodland (e.g. Cwmbach Mountain, Glamorgan).



Nomada signata habitat at Giants Grave, Briton Ferry, Glamorgan © Liam Olds.

Reasons for decline

Its host remains common and widespread, and often abundant in suburban situations, thus the scarcity of *N. signata* is somewhat surprising. Climatic change may be partly responsible for the decline of this species, in addition to the general loss of host colonies. It is, however, showing local recovery in some areas and expansion in others.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Address gaps in autecological knowledge.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans (e.g. implementing appropriate grazing regimes).
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities to connect fragmented and isolated populations through habitat creation, restoration and enhancement. Identify opportunities within the B-Lines network where appropriate.
5. On-going monitoring of known populations and resurvey historic sites to identify new populations.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
8. Encourage recorders to be vigilant for this species when recording its host, *A. fulva*.
9. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Encourage plenty of situations suitable for host nesting. This may involve an appropriate grazing or cutting regime to provide areas of short turf, or disturbance, or light trampling along footpaths. In more urban situations, mowing lawns appears to achieve this quite adequately. Maintain plenty of spring-flowering shrubs, and limited areas of scrub on otherwise open habitat are likely to prove favourable. Do not allow the excessive encroachment of scrub or coarse vegetation onto open habitat. In wooded situations, maintain spring flowering shrubs in rides, clearings and on woodland margins.



Female *Osmia parietina* pinned specimen © Steven Falk.

Osmia parietina (Wall mason bee)

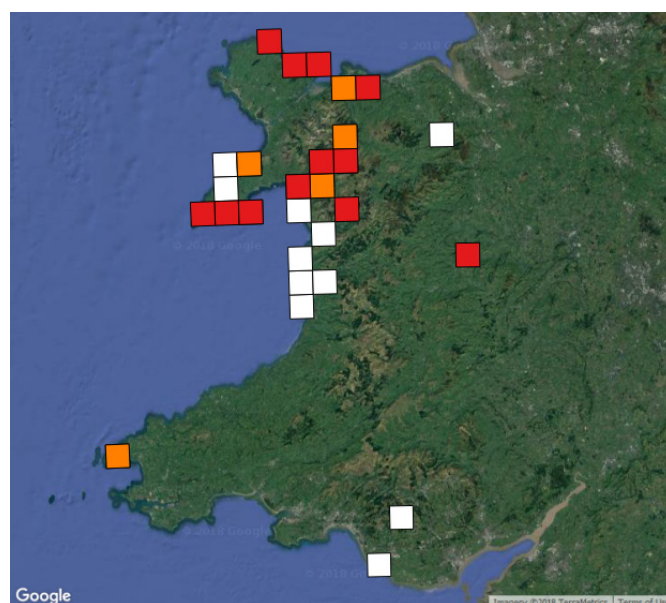
Osmia parietina is mostly a bee of upland pastures and limestone pavement. However, it has also been recorded at coastal sites and even gardens in North Wales. Pollen is obtained largely from Common bird's-foot trefoil (*Lotus corniculatus*) though a variety of other plants are visited for nectar including Bugle, brambles and Ramsons. Females make their nests in a variety of cavities including dry stone walls, but it is presumed that natural fissures are used in limestone pavement areas. The nest cells are made of chewed plant material. The flight period extends from early May to late July.

Further information can be found here: [BWARS species information sheet: *Osmia parietina*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Friends of the Earth Iconic Bees Report](#), [Hymettus Report 2011](#) and [Steven Falk's Flickr collection](#).

Distribution and status

Osmia parietina is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. It is also listed as Rare (RDB3)³. It is restricted to the north and west of Britain including North Wales, northern England and Scotland. Last recorded in the following vice-counties: Anglesey in 2015 (M. Howe), Caernarvonshire in 2005 (C. Clee), Denbighshire in 2015 (A. Perkins), Merionethshire in 2016 (M. Howe) and Montgomeryshire in 1997 (C. Clee). Seemingly lost from Cardiganshire (last

recorded in 1941), Glamorgan (1936) and Pembrokeshire (1979) vice-counties.



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, National Trust, Natural Resources Wales, South East Wales Biodiversity Records Centre.

Typical habitat

In Wales, *Osmia parietina* is found in a variety of habitats including limestone pavements, upland pasture with drystone walls, woodland clearings (e.g. Glasdir, Coed y Brenin, Merionethshire), coastal grassland (e.g. Penrhyn Mawr, Caernarvonshire), maritime cliffs (e.g. Arfordir Gogleddol Penmon SSSI, Anglesey and Porth Ysgo, Caernarvonshire), brownfield sites (e.g. Tan-dinas Quarry and Parys Mountain, Anglesey), and wood pastures and parkland (e.g. Powis Castle and Garden, Montgomeryshire). *O. parietina* is a site quality feature of Arfordir Gogleddol Penmon SSSI - the population here is remarkable with counts of over 100 adults in the recent past.



Osmia parietina habitat at Parys Mountain, Anglesey © Liam Olds.

Reasons for decline

This bee has likely declined due to habitat loss caused by afforestation and agricultural improvement of traditionally grazed pasture. The latter can make sites unsuitable through changes in floristic composition (especially the loss of bird's-foot-trefoils) and possibly a reduction in natural nesting sites, though dry stone walls may provide ample compensation for the latter. The effects of succession, such as the invasion of scrub onto open habitat, could make some sites unsuitable by a shading out of nesting sites and flowers. Overgrazing could also lead to a loss of forage flowers.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has been surveyed for by Hymettus: [Hymettus Report 2011](#).

Proposed action

1. Address gaps in autecological knowledge.
2. Develop and disseminate habitat management guidelines and ensure these are included in management plans (e.g. implementing appropriate grazing regimes).
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. On-going monitoring of known populations and resurvey historic sites to identify new populations. Montgomeryshire vice-county should be a priority area for survey effort given *Osmia parietina* has not been recorded there for over twenty years.
6. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
7. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
8. Promote uptake of agri-environment options such as field margin options, particularly sowing of legume-rich pollen and nectar mixes, which are likely to be beneficial to this species.
9. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

Habitat management recommendations³

Maintain traditional management of sites, where known, to provide a constant supply of Common bird's-foot-trefoil and nesting locations such as exposed rocky areas, dry stone walls and piles of stones, in warm, sunny situations. Prevent the invasion of scrub or coarse vegetation onto open grassy habitat, though limited areas will provide shelter (and flowers in the case of *Rubus*).



Female *Osmia xanthomelana* © Natural Resources Wales/Mike Hammett.

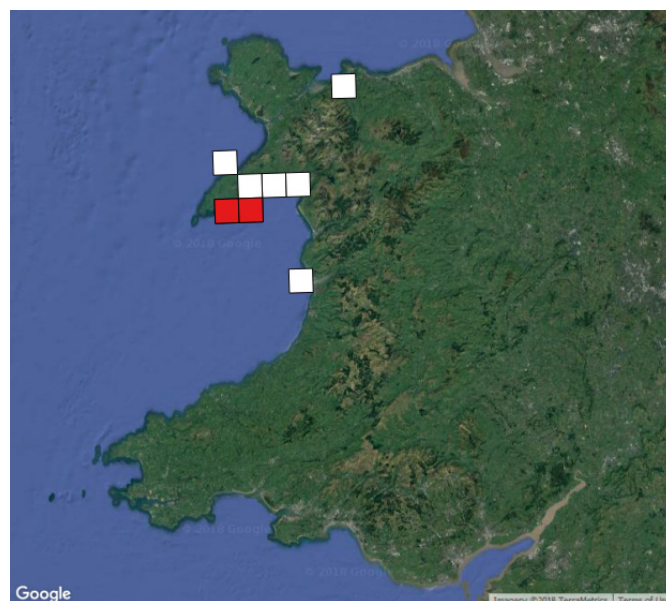
Osmia xanthomelana (Large mason bee)

Osmia xanthomelana is also known as the Cliff mason bee because of its specialist habitat requirement of coastal soft rock cliffs. It forages almost exclusively on Common bird's-foot-trefoil and Horseshoe vetch (*Hippocrepis comosa*). The wet mud of cliff seepages is used to construct pot-like nests cells (sometimes in clusters) in soft ground, usually amongst the roots of vegetation. The flight period extends from mid-April to July.

Further information can be found here: [BWARS species information sheet: *Osmia xanthomelana*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus Report 2006](#), [Hymettus Report 2008](#), [Hymettus Report 2009](#) and [Steven Falk's Flickr collection](#).

Distribution and status

Osmia xanthomelana is listed under Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales. It is considered to be Wales' rarest bee and is listed as Endangered (RDB1)³. Its only remaining populations in the UK appear to be confined to a small stretch of the North Wales coastline within the Llyn Peninsula and it is extremely vulnerable to national extinction. Last recorded in Caernarvonshire vice-county in 2017 (M. Howe). Seemingly lost from Merionethshire vice-county (last recorded in 1904).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, Tullie House Museum.

Typical habitat

In Wales, *Osmia xanthomelana* is associated exclusively with south-facing soft rock cliffs with extensive slumping and plenty of wet seepages (e.g. Porth Ceiriad and Porth Neigwl, Caernarvonshire). *O. xanthomelana* is a site quality feature of Porth Ceiriad, Porth Neigwl ac Ynysoedd Sant Tudwal SSSI.



Osmia xanthomelana habitat at Porth Neigwl, Caernarvonshire © Mike Howe.

Reasons for decline

This bee has likely declined due to the loss of unimproved, eroding cliffs and landslips to coastal development and especially through cliff stabilisation measures. The loss of cliff seepages and associated wet mud could also result from local water abstraction and other changes to the local hydrology such as drilling of bore holes for cliff stabilisation. The improvement of flower-rich cliff top grassland through the use of fertilisers could also be damaging. The extremely localised nature of the bee at its remaining sites, means that landslips which might normally be beneficial, could now threaten it with extinction.

Previous action

Since its re-discovery in Wales at Porth Ceiriad (1998) and Porth Neigwl (1999), extensive work has been undertaken by CCW and NRW to determine its status and ecology on the Llŷn Peninsula⁶⁶⁻⁷⁵, as well as the efficacy of habitat management for this species. CCW, via Gwynedd Council, excavated 10+ artificial nest banks in January 2011 and these have been used since at low density, although favoured nesting areas are those perilously close to the cliff edge. Irregular small-scale management (strimming) and some winter sheep grazing have attempted to keep these banks open. Distribution has been monitored by BWARS members, and by the production of BWARS Atlases. It has also been surveyed for by Hymettus ([Hymettus Report 2006](#), [Hymettus Report 2008](#), [Hymettus Report 2009](#)).

The Buglife report [Managing Soft Cliffs for Invertebrates](#) describes the importance of coastal soft cliff sites for UK invertebrate conservation, identifies threats, and provides management guidance. The Countryside Council for Wales (now Natural Resources Wales) report 'A Review of the Coastal Soft Rock Cliff Resource in Wales' demonstrates the importance of soft rock cliffs for invertebrates, and threats to this habitat.

Proposed action

1. Ensure on-going annual monitoring of known populations.
2. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
3. Ensure the requirements of this species and its habitat are understood in drawing up coastal zone management plans (including Shoreline Management Plans) for relevant stretches of coast around Llŷn Peninsula.
4. Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.

Habitat management recommendations³

Maintain cliffs and landslips in a natural state, opposing any changes to the character of the vegetation (especially with respect to the pollen sources and seepages). Any activities that might significantly reduce or accelerate the rate of erosion of soft rock cliffs could be damaging and should be opposed. Adjacent areas of unimproved grassland and scrub will probably provide important forage areas. Maintain any grazing regimes that contribute to the overall character and flower richness of these cliff tops and prevent the invasion of tall rank revegetation or excessive scrub. The presence of the pollen sources will probably require grazing or natural erosion to avoid domination by coarser vegetation, and the bee may prefer to nest in similar situations, where a warmer microclimate is present.



Male *Sphecodes scabricollis* © Steven Falk.

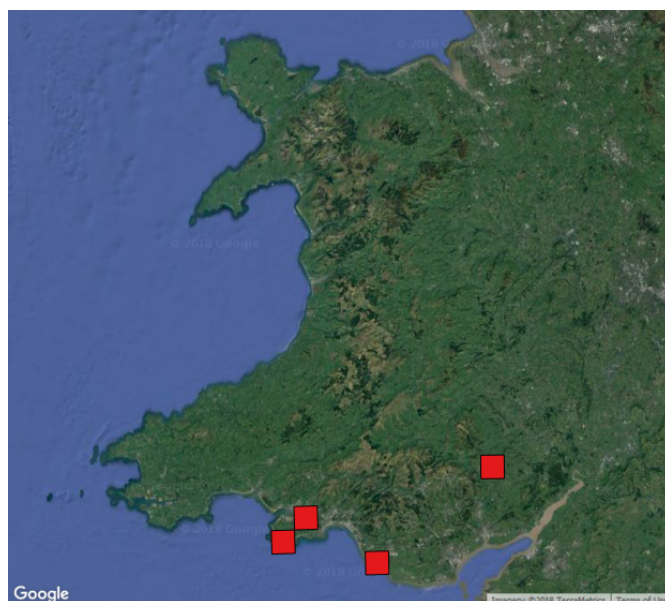
Sphecodes scabricollis (Rough-backed blood bee)

Sphecodes scabricollis is a cuckoo bee that is believed to use the furrow bee *Lasioglossum zonulum* (Bull-headed furrow bee) as its host. Like the host, it is usually found at sites that afford both dry, well-drained areas plus damper areas with plentiful Common Fleabane (*Pulicaria dysenterica*) and Devil's-bit scabious. It usually forages on umbellifers and composites such as thistles, oxtongues, and Yarrow. Females fly from April to September, and males from July to September.

Further information can be found here: [BWARS species information sheet: *Sphecodes scabricollis*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

S. scabricollis is listed as Rare (RDB3)³. This rare southern species has been recorded sparsely in southern England and South Wales. Last recorded in the following vice-counties: Glamorgan in 2004 (M. Pavett; C. Clee) and Monmouthshire in 1997 (M. Edwards).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: National Trust, Natural Resources Wales, and South East Wales Biodiversity Records Centre.

Typical habitat

In Wales, *Sphecodes scabricollis* is typically found in coastal dunes (e.g. Merthyr Mawr NNR, Glamorgan) and coastal grassland (e.g. Slade Sands, Glamorgan). It has also been recorded in additional habitats including saltmarsh (e.g. Llanrhidian Marsh, Glamorgan). Other known British habitats include heathland, brownfield sites, and the rides and clearings of clay woodland.



Sphecodes scabricollis habitat at Llanrhidian Marsh, Glamorgan © Steven Falk.

Reasons for decline

This bee has likely declined due to habitat loss to development, intensive agriculture, commercial forestry and inappropriate management (such as a lack of appropriate grazing levels) resulting in vegetative encroachment via successional processes. The loss of both dry-wet habitat combinations (such as the drying up of dune slacks, succession of wetlands into carr etc.) is a significant threat at many of its modern sites as these habitat combinations are crucial for this bee and its host. The excessive grazing of wet grassland and the shading out of woodland rides and clearings is also a significant threat at some sites.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Address gaps in autecological knowledge.
2. Resurvey historic sites to identify new populations and determine its current status in Wales.
3. Develop and disseminate habitat management guidelines and ensure these are included in management plans.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
6. On-going monitoring of known populations and resurvey historic sites to identify new populations.
7. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
8. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
9. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

Habitat management recommendations³

Maintain sites in a reasonably open state (including sunny rides and clearings in woods) with plenty of bare or sparsely vegetated ground in warm, sunny situations (e.g. footpaths and south-facing banks or slopes). Flower-rich areas for host foraging, especially those rich in yellow composites, should also be maintained. Continue any established management (e.g. grazing, cutting, coppicing), or disturbance, that contributes to the overall character of a site and holds back succession. Consider the introduction of management on unmanaged sites, especially where succession is a problem.



Female *Sphecodes spinulosus* pinned specimen © Steven Falk.

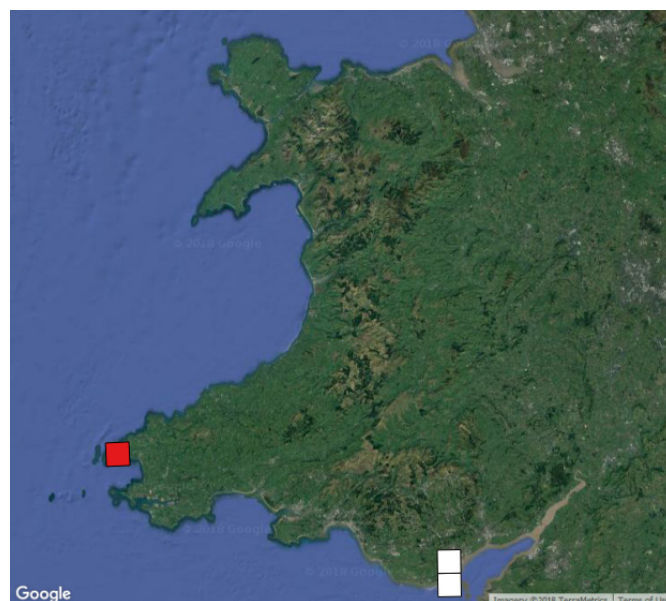
Sphecodes spinulosus (Spined blood bee)

Sphecodes spinulosus is a cuckoo bee that uses *Lasioglossum xanthopus* (Orange-footed furrow bee) as its host. It is usually found in chalk and limestone grassland, quarries, cuttings and coastal landslips, reflecting the habitats of its host. It is known to visit the flowers of spurge, buttercups, brambles, Hogweed and Wild carrot. The flight period extends from May to late June.

Further information can be found here: [BWARS species information sheet: *Sphecodes spinulosus*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

S. spinulosus is listed as Vulnerable (RDB2)³. This species has always been rare in the UK, but in the past it was reasonably widespread with many inland sites. Today, it is extremely rare and much declined, and in Wales it is at risk of extinction. Last recorded in Pembrokeshire vice-county in 1994 (A. Foster), but may now be lost. Seemingly lost from Glamorgan vice-county (last recorded in 1935).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Natural Resources Wales.

Typical habitat

In Wales, it is known only from the Pembrokeshire coast where it is likely using coastal landslips and soft rock cliffs (at Caer Bwdy Bay, Pembrokeshire). Other British habitats include chalk and limestone grassland, quarries, woodland (probably the margins or open areas), disturbed open ground, and unimproved grassland.

Reasons for decline

Decline is the result of the decline of its host *L. xanthopus*, perhaps especially the loss of strong host colonies and host metapopulations.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

The Buglife report [Managing Soft Cliffs for Invertebrates](#) describes the importance of coastal soft cliff sites for UK invertebrate conservation, identifies threats, and provides management guidance. The Countryside Council for Wales (now Natural Resources Wales) report 'A Review of the Coastal Soft Rock Cliff Resource in Wales' demonstrates the importance of soft rock cliffs for invertebrates, and threats to this habitat.

Habitat management recommendations³

Maintain sites in a reasonably open state (including sunny rides and clearings in woods) with good expanses of flower-rich situations for host foraging. Areas of bare soil or short cropped turf in warm, sunny situations (e.g. south-facing banks and slopes) are required for host nesting. Continue any established management (e.g. grazing, cutting), or disturbance, that contributes to the overall character of a site and holds back succession. Consider the introduction of management on unmanaged sites, especially where succession is a problem. On coastal landslips and soft rock cliffs, suitable conditions may occur naturally, providing stabilisation is avoided. Oppose any activities which might significantly reduce or accelerate the natural rates of erosion at such sites, and retain any adjacent areas of unimproved grassland or scrub for host foraging.

Proposed action

1. With urgency, resurvey historic sites to identify new populations and determine its current status in Wales.
2. If and where it is rediscovered, advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation.
3. Focus habitat creation/restoration work at and around current population to ensure that this species does not go extinct in Wales.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify opportunities within the B-Lines network where appropriate.
5. Address gaps in autecological knowledge.
6. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.



Female *Stelis ornatula* © Steven Falk.

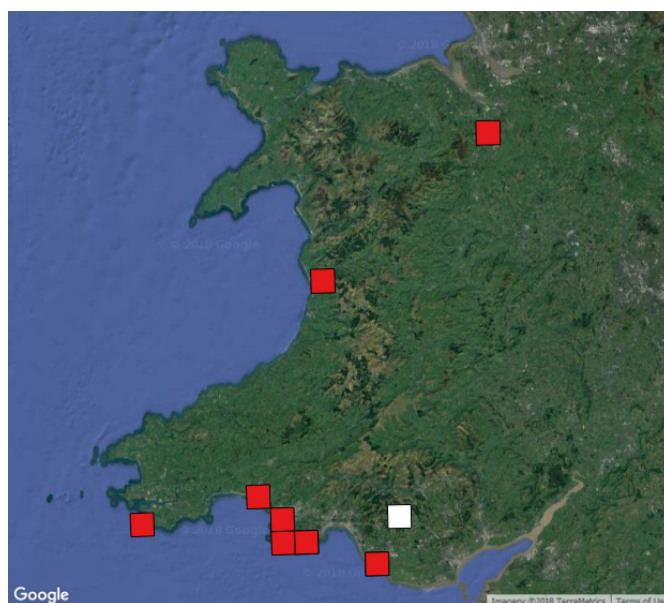
Stelis ornatula (Spotted dark bee)

Stelis ornatula is a cuckoo bee that uses the mason bee *Hoplitis claviventris* (Welted mason bee) as its only known host. It occurs in the same range of habitats as it hosts, particularly open habitats with plentiful bird's-foot-trefoils. It is known to forage on cinquefoils, bird's-foot-trefoils, and yellow composites such as ragworts, hawkweeds, and hawk's-beards. The flight period extends from late May to late August.

Further information can be found here: [BWARS species information sheet: *Stelis ornatula*](#), Falk and Lewington (2015) [Field Guide to the Bees of Great Britain and Ireland](#), and [Steven Falk's Flickr collection](#).

Distribution and status

S. ornatula is listed as Rare (RDB3)³. Although widespread, it is much rarer than its host with scattered records mostly in southern England and Wales. Last recorded in the following vice-counties: Cardiganshire in 2001 (C. Clee), Carmarthenshire in 2005 (C. Clee), Denbighshire in 2013 (J. B. Formstone), Glamorgan in 2015 (I. Tew) and Pembrokeshire in 2006 (C. Clee; G. Knight; M. Howe).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the Local Environmental Records Centres Wales and NBN Atlas from the following sources: Cofnod - North Wales Environmental Information Service, Natural Resources Wales, and South East Wales Biodiversity Records Centre.

Typical habitat

As per its host *H. claviventris*, it is typically found in open habitats with plentiful bird's-foot-trefoils. In Wales, it is known only from coastal dunes (e.g. Ynyslas NNR, Cardiganshire and Whiteford Burrows, Glamorgan) and brownfield sites (e.g. Marford Quarry, Denbighshire). At Castlemartin, it was found to be associated with a massive accumulation of driftwood on the beach at Frainslake. Other British habitats include heathland, chalk grassland, open broad-leaved woodland, and landslips.



Stelis ornatula habitat at Whiteford Burrows, Glamorgan © Steven Falk.

Reasons for decline

This bee has likely declined due to the loss of strong host colonies and host metapopulations. The decline of its host is likely attributed to habitat loss to agricultural intensification, development, afforestation of coastal dunes, and inappropriate land management (such as a lack of appropriate grazing levels) resulting in vegetative encroachment via successional processes. Overgrazing of grassland sites could lead to the loss of structural and floral diversity. In wooded situations, the shading out of rides and clearings is likely to be damaging.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Habitat management recommendations³

Prevent the invasion of scrub and coarse vegetation onto open habitat, but retain some areas either as a scrub ecotone, or as a scattering of bushes, brambles etc. Continue any established management (e.g. grazing or cutting), or disturbance, that maintains a balance between open and scrubby vegetation types and holds back succession. Consider the introduction of management on unmanaged

Proposed action

1. On-going monitoring of known populations and resurvey historic sites to identify new populations. Cardiganshire, Carmarthenshire and Pembrokeshire vice-counties should be priority areas for survey effort given an absence of *S. ornatula* records since at least 2006.
2. Develop habitat management guidelines and ensure these are included in management plans (e.g. implementing appropriate grazing regimes).
3. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, such as encouraging an abundance of bird's-foot-trefoils using appropriate grazing and cutting regimes, and improving connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
5. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
6. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
7. Promote the appropriate management of brownfield sites and mineral extraction sites to conserve and enhance populations in these habitats.
8. Raise awareness within the minerals industry of the importance of quarries and sand pits for *S. ornatula* and advise on management and restoration.
9. Engage with the minerals industry to create suitable habitat for this species in land reclamation /restoration schemes.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.
11. Consider adding to Section 7 of the Environment (Wales) Act 2016 as a Species of Principle Importance in Wales.

sites, especially where succession is a problem. Note the importance of dead stems, twigs, bramble clumps etc. in sunny locations when undertaking scrub removal. Prevent excessive grazing or cutting of a site which will lead to a loss of structural and floristic diversity. In woods, maintain rides and clearings in an open condition and retain the presence of suitable host nesting sites and flower-rich situations. The host uses a variety of pollen sources, especially legumes.



Female *Stelis phaeoptera* © Steven Falk.

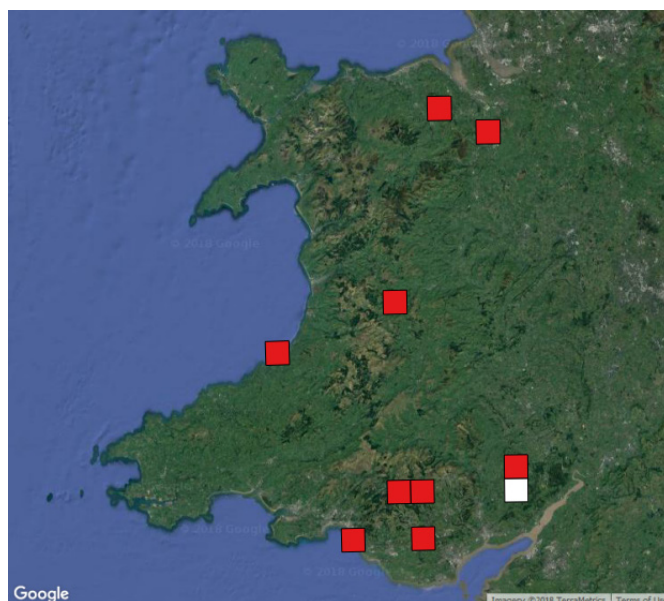
Stelis phaeoptera (Plain dark bee)

Stelis phaeoptera is a cuckoo bee that uses the solitary mason bee *Osmia leaiana* (Orange-vented mason bee) as its main host, although other megachilid species may also be hosts of this cleptoparasite. It occurs in a similar range of habitats to *O. leaiana*, including gardens. It is known to forage on bird's-foot-trefoils, Field scabious, thistles, hawkweeds and speedwells; exotic garden flowers like *Cistus* are also used. The flight period extends from late May to mid-August.

Further information can be found here: [BWARS species information sheet: *Stelis phaeoptera*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Distribution and status

S. phaeoptera is listed as Vulnerable (RDB2). Formerly widespread across southern Britain, though never common, it has declined substantially. A flurry of recent records suggest, however, that it is slowly increasing in Wales. Last recorded in the following vice-counties: Cardiganshire in 2016 (D. Baldock), Denbighshire in 2016 (J. B. Formstone), Glamorgan in 2017 (R. Wistow), Monmouthshire in 2016 (R. Ruston) and Montgomeryshire in 2017 (R. Becker).



Its distribution in Wales. Red squares show distribution between 1990 and 2017; orange squares between 1950 and 1989; white squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the NBN Gateway from the following sources: Bees, Wasps and Ants Recording Society (BWARS), Cofnod - North Wales Environmental Information Service, Natural Resources Wales, South East Wales Biodiversity Records Centre.

Typical habitat

In Wales, *Stelis phaeoptera* is typically found in gardens (e.g. Gresford, Denbighshire and Monmouth, Monmouthshire) and brownfield sites (e.g. Borrass Quarry and Marford Quarry, Denbighshire), however it has also been found in coastal dunes (e.g. Kenfig NNR, Glamorgan). It appears to show an even stronger attachment to gardens than its main host *O. leaiana*.



Stelis phaeoptera garden habitat at Gresford, Denbighshire © Bryan Formstone.

Reasons for decline

No evident decline in Wales. Threats, however, include the loss of strong host colonies and host metapopulations. Recent records from Cardiganshire, Denbighshire, Glamorgan, Monmouthshire and Montgomeryshire suggest it may be under-recorded in some districts.

Previous action

Distribution has been monitored by BWARS members, and by the production of BWARS Atlases.

Proposed action

1. Raise awareness of the importance of gardens and urban green spaces for this species, and how wildlife-friendly gardening and the addition of bee hotels to could prove beneficial in increasing the availability of foraging and nesting habitat.
2. Develop habitat management guidelines and ensure these are included in management plans (e.g. implementing appropriate grazing regimes).
3. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
4. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improving connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.
5. Consider notifying sites supporting key populations as County Wildlife Sites or equivalent.
6. Communicate the need to conserve brownfield biodiversity to planners and policy makers.
7. Promote the appropriate management of brownfield sites and mineral extraction sites to conserve and enhance populations in these habitats.
8. Raise awareness within the minerals industry of the importance of quarries for *S. phaeoptera* and advise on management and restoration.
9. Engage with the minerals industry to create suitable habitat for this species in land reclamation/restoration schemes.
10. Advise landowners and managers of the presence of this species and the importance of beneficial management for conservation.

Habitat management recommendations³

Retain features such as dead trees, old wooden posts and stumps and old masonry, especially if these support nesting aculeates, particularly the likely hosts. Both *O. leaiana* and *S. phaeoptera* can be frequent in gardens and are known to exploit bee hotels. The addition of bee hotels to gardens and urban green spaces could prove beneficial in increasing the availability of host nesting. Sunny, flower-rich areas are necessary for host foraging. A good variety of composites such as thistles, knapweeds and hawk's-beards are especially important for *O. leaiana*; legumes and labiates are especially favoured by *O. caerulea*. Continue any established management (e.g. grazing, cutting), or disturbance, that contributes to the overall character of a site, and holds back succession. Consider the introduction of management on

unmanaged sites, especially where succession is a problem. In woods, maintain rides and clearings in an open, sunny condition and retain the presence of suitable host nesting sites and forage plants.

Further information on bee-friendly gardening and establishing a bee hotel can be found here: [Buglife: wildlife gardening](#), [Buglife: make a bee hotel](#) and [Buglife: Who's in your bee hotel?](#).

Species losses in Wales

Andrena minutuloides (Plain mini-miner)

A. minutuloides is listed as Notable a (Na)³. Seemingly lost from Glamorgan, its only known Welsh vice-county (last recorded in 1921). It is strongly associated with open chalk grassland (especially downland), but also recorded from chalk heath, coastal grasslands, vegetated shingle and heathland. It is bivoltine, the first generation flying from April to early June, the second from mid-July to September. The first generation visits a variety of spring-flowering shrubs and herbs including Hawthorn, Cow parsley, speedwells, Daisy, spurges and *Brassica* species. The summer generation is particularly attracted by umbellifers, notably Wild carrot, Wild parsnip, Upright hedge-parsley (*Torilis japonica*) and Burnet-saxifrage (*Pimpinella saxifrage*).

More information can be found here: [BWARS species information sheet: *Andrena minutuloides*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Bombus distinguendus (Great yellow bumblebee)

B. distinguendus is listed as Notable b (Nb)³ however this status is in need of review since its distribution has declined dramatically and it is now restricted to the northern coast of Scotland, the Hebrides and Orkney. It has been lost from the following vice-counties in Wales: Caernavonshire (last recorded in 1926), Cardiganshire (1922), Glamorgan (1974) and Monmouthshire (1922). It flies between May and September, and forages on a range of species although bird's-foot-trefoils and knapweeds are especially important¹³.

More information can be found here: [BWARS species information sheet: *Bombus distinguendus*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2006: Bumblebees associated with open grasslands](#), [Hymettus](#), [BWARS](#) and [BBCT Information Sheet](#), and [Steven Falk's Flickr collection](#).



Queen *Bombus distinguendus* © Nick Owens.

Bombus subterraneus (Short-haired bumblebee)

B. subterraneus is listed as Notable a (Na)³ however this status is in need of review. Formerly widespread in southern England and Wales, it has experienced a catastrophic decline during the last fifty years and was declared extinct in 2000. Its decline was almost certainly the result of the loss of the species-rich grassland habitats on which it depends. It has been lost from the following vice-counties in Wales: Caernarvonshire (last recorded in 1920), Cardiganshire (1922) and Glamorgan (1956).

B. subterraneus has since been reintroduced at Dungeness by [Bumblebee Conservation Trust](#).

More information can be found here: [BWARS species information sheet: *Bombus subterraneus*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus 2011: The short-haired bumblebee reintroduction project report 2009-2011](#), and [Steven Falk's Flickr collection](#).

Coelioxys quadridentata (Grooved sharp-tail bee)

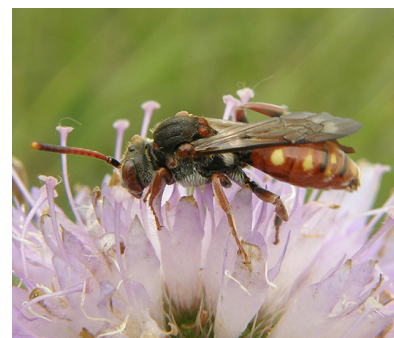
C. quadridentata is listed as Rare (RDB3)³. Seemingly lost from Glamorgan, its only known Welsh vice-county (last recorded in 1935). Most records of this species relate to sandy heathland and coastal dunes, but it also occurs on calcareous grassland and in suburban situations. It flies from mid-June to early August and has been recorded visiting bird's-foot-trefoils and White bryony (*Bryonia dioica*), though a much wider variety of species are used abroad. Known hosts for this cleptoparasite include *Megachile circumcincta*, *Anthophora furcata* and *A. quadrimaculata*, though the pattern of decline and choice of sites suggests a strong dependence on the first species.

More information can be found here: [BWARS species information sheet: *Coelioxys quadridentata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Nomada armata (Armed nomad Bee)

N. armata is listed as Endangered (RDB1)³. This rare and declining species has been seemingly lost from Glamorgan, its only known Welsh vice-county (last recorded in 1854). All modern UK sites are chalk downland, but previously also found off chalk on coastal grassland, moorland edge and soft rock cliffs. It flies from late June to early August, and forages mostly on Field Scabious and Small Scabious. It uses *Andrena hattorfiana* as its only host.

More information can be found here: [Buglife species management sheets: *Nomada armata*](#), [BWARS species information sheet: *Nomada armata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, [Hymettus aculeate information sheets: *Nomada armata*](#), and [Steven Falk's Flickr collection](#).



Nomada armata female © Steven Falk.

Nomada ferruginata (Yellow-shouldered nomad bee)

N. ferruginata is listed as Endangered (RDB1)³. Seemingly lost from Merionethshire, its only known Welsh vice-county (last recorded in 1902). This rare species is associated with a variety of willow-rich habitats, including old quarries, woodland rides and heathland, where it uses *Andrena praecox* (a willow-specialist) as its only host. It flies from late March to mid-May, peaking with the pussy-willow blossom. It visits Grey willow, Goat willow, dandelions, Lesser celandine (*Ranunculus ficaria*) and Blackcurrant. *N. ferruginata* is thought to be expanding in some parts of Britain and would no longer qualify as RDB1.

More information can be found here: [BWARS species information sheet: *Nomada ferruginata*](#), Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).



Nomada ferruginata female © Steven Falk.

Nomada subcornuta (Kirby's nomad bee)

Previously regarded as a variant of the closely related *N. fulvicornis* (Orange-horned nomad bee), recent DNA analysis has confirmed it as a distinct species. Seemingly lost from Wales, this very rare and much declined species is associated with sandy habitats such as heathland, sandy arable margins and brownfield sites, but rarely at coastal sites. On the British mainland, it uses *Andrena nigrospina* (Scarce black mining bee) as its host. It is univoltine, flying from early May to mid-July, peaking between the two generations of *N. fulvicornis*, which is typically a bivoltine species. Bramble is the only species it has been noted visiting. The split in this species from the rare (RDB3) *N. fulvicornis* postdates Falk (1991)³ and thus the status of this species needs review but is likely to be Vulnerable/Nationally Rare using current criteria.

More information can be found here: Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, and [Steven Falk's Flickr collection](#).

Other bees of conservation concern in Wales

In addition to the 26 bee species covered in the species profiles above, further scarce species of conservation concern are found in Wales. Information on the habitats and distribution of these species in Wales can be found in the table below.

Species	Status in Falk (1991)	Comment
<i>Andrena apicata</i> (Large sallow mining bee)	Notable b	A spring-flying mining bee found in various willow-rich habitats where it obtains pollen almost exclusively from pussy-willow. Widespread but localised in Wales, it has been recorded in the following vice-counties: Breconshire, Denbighshire, Glamorgan, Monmouthshire and Montgomeryshire.
<i>Andrena bucephala</i> (Big-headed mining bee)	Notable a	A mining bee which is found in a variety of habitats where it gathers pollen largely from Hawthorn and Field Maple. Evidently under-recorded in Wales given the widespread distribution of its cuckoo <i>Nomada hirtipes</i> . It has been recorded in the following vice-counties: Carmarthenshire, Glamorgan, and Monmouthshire.
<i>Andrena congruens</i> (Long-fringed mining Bee)	Notable a	A scarce mining bee which is found in a variety of habitats. In Wales, it is known only from Carmarthenshire, Glamorgan and Monmouthshire, where it is largely associated with coastal habitats.
<i>Andrena falsifica</i> (Thick-margined mini-miner)	Notable a	A rare and poorly understood mini-mining bee that is associated with various habitats, particularly heathland and calcareous grassland. In Wales, it seemingly restricted to Glamorgan, though it may be under-recorded in many areas. An old record exists for Caernarvonshire.
<i>Andrena fulvago</i> (Hawk's-beard mining bee)	Notable a	A scarce mining bee which gathers pollen mainly from yellow hawkish composites such as hawk's-beards, hawkbits, Cat's-ear and dandelions. Found in various habitats, it mostly commonly occurs on calcareous and coastal grasslands. Very rare in Wales, it is known only from a few sites in Glamorgan, Monmouthshire and Montgomeryshire.
<i>Andrena humilis</i> (Cat's-ear mining bee)	Notable a	A mining bee which is found in a variety of habitats featuring compacted, sandy soils. Pollen is obtained exclusively from yellow hawkish composites such as Cat's-ear, Mouse-ear Hawkweed (<i>Pilosella officinarum</i>) and hawk's-beards. Widespread but localised in Wales, it has been recorded in the following vice-counties: Caernarvonshire, Cardiganshire, Flintshire, Glamorgan, Monmouthshire, Montgomeryshire, and Pembrokeshire. Old records also exist for Anglesey.

Species	Status in Falk (1991)	Comment
<i>Andrena labialis</i> (Large meadow mining bee)	Not status	A fairly large and robust mining bee found in various legume-rich habitats where it obtains pollen exclusively from legumes such as clovers, vetches and bird's-foot-trefoils. Though fairly-frequent in parts of southern England, it is rare in Wales. It has been recorded from the following vice-counties: Caernarvonshire, Denbighshire, Glamorgan and Monmouthshire.
<i>Andrena labiata</i> (Red-girdled mining bee)	Notable a	A mining bee with a bright red abdominal band in both sexes that creates the appearance of a large <i>Sphecodes</i> . It occurs in a variety of flowery habitats where it visits various flowers but shows a particular preference for Germander speedwell (<i>Veronica chamaedrys</i>). Although widespread in Wales, it is rare and largely coastal. It has been recorded from the following vice-counties: Caernarvonshire, Cardiganshire, Denbighshire, Glamorgan, Monmouthshire, and Montgomeryshire. An historic record also exists for Pembrokeshire.
<i>Andrena pilipes</i> (Black mining bee)	Notable a	One of two <i>Andrena</i> species with almost entirely black females, this mining bee is strongly associated with coastal cliffs (especially soft rock cliffs) and the flowery habitats adjacent to these. Rare in Wales, it is found only from a few coastal sites in Caernarvonshire, Merionethshire and Glamorgan.
<i>Andrena similis</i> (Red-backed mining bee)	Notable a	A scarce but widespread mining bee that is found in various legume-rich habitats where it gathers pollen mainly from legumes such as Common Gorse (<i>Ulex europaeus</i>), clovers and bird's-foot-trefoils. It has been recorded from the following vice-counties: Anglesey, Breconshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Flintshire, Glamorgan, and Pembrokeshire.
<i>Andrena tibialis</i> (Grey-gastered mining bee)	Notable a	A widespread but very localised mining bee that can be found in a variety of habitats where it forages largely from spring-blossoming shrubs such as willows, hawthorns, Gorse and <i>Prunus</i> species. Rare in Wales it is seeming known from only two coastal locations, one in Caernarvonshire vice-county and the other in Glamorgan.
<i>Andrena trimmerana</i> (Trimmer's mining bee)	Notable a	A widespread but rather scarce bee that can be found in a variety of blossom-rich habitats. It can be especially common in some coastal areas, especially in association with coastal scrub and soft rock cliffs. It has been recorded from the following vice-counties: Caernarvonshire, Carmarthenshire, Glamorgan, Merionethshire, and Pembrokeshire.

Species	Status in Falk (1991)	Comment
<i>Andrena varians</i> (Blackthorn mining bee)	Notable b	A mining bee which is found in various habitats where Blackthorn and fruit trees are plentiful. Pollen is gathered primarily from <i>Prunus</i> species such as Blackthorn and various sorts of plum (both feral and cultivated). Very rare in Wales, it has only been found at one site in Monmouthshire vice-county.
<i>Anthophora quadrimaculata</i> (Four-banded flower bee)	Notable b	A scarce bee largely confined to southern England, it is very rare in Wales and known only from Monmouthshire. It is most frequent in flowery gardens, especially where lamiates such as cat-mints and garden lavenders are present. It also occurs in other habitats such as chalk downland and soft-rock cliffs. This bee was believed extinct in Wales until its recent discovery by Lucy Jones in inner-city Newport.
<i>Bombus rupestris</i> (Red-tailed cuckoo bee)	Notable b	This cuckoo of the Red-tailed bumblebee (<i>Bombus lapidarius</i>) was formerly considered scarce, but has experienced a dramatic increase in parts of southern England and the Midlands in recent decades. It remains rather scarce and largely coastal in Wales where it has been recorded from the following vice-counties: Anglesey, Breconshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan, Merionethshire, Monmouthshire, Montgomeryshire, Pembrokeshire, and Radnorshire.
<i>Colletes fodiens</i> (Hairy-saddled colletes bee)	No status; Vulnerable in European Red List	Strongly associated with sandy habitats, this is one of the commonest <i>Colletes</i> of southern heathlands, coastal dunes and soft-rock cliffs. Widespread and particularly coastal in Wales, it has been recorded from the following vice-counties: Anglesey, Breconshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan, Merionethshire, Monmouthshire, and Pembrokeshire.
<i>Colletes marginatus</i> (Margined colletes bee)	Notable b	Britain's smallest <i>Colletes</i> bee, it is strongly associated with loose sands and is mainly recorded from coastal dunes. Widespread but scarce in Wales, it is recorded from coastal locations in the following vice-counties: Anglesey, Carmarthenshire and Glamorgan.
<i>Dasypoda hirtipes</i> (Pantaloon bee)	Notable b	A fairly large bee which is associated with very sandy habitats such as coastal dunes, heathland, sandpits, sandy brownfield sites and saltmarsh edge. Females are unmistakable due to the oversized, bright yellow pollen brushes on the hind legs and the banded abdomen. Scarce and almost exclusively coastal in Wales, it has been recorded from the following vice-counties: Caernarvonshire, Cardiganshire, Carmarthenshire, Glamorgan, Merionethshire, and Pembrokeshire.

Species	Status in Falk (1991)	Comment
<i>Hyaleus signatus</i> (Large yellow-face bee)	Notable b	A widespread but patchily distributed bee in southern Britain, it is typically associated with mignonette-rich calcareous habitats such as chalk and limestone quarries, calcareous brownfield sites, soft-rock cliffs, disturbed coastal sites and gardens. Rare in Wales, it is seemingly known only from Denbighshire and Glamorgan.
<i>Lasioglossum pauxillum</i> (Lobe-spurred furrow bee)	Notable b	A small furrow bee which is found in a wide variety of open habitats both on the coast and inland. Formerly regarded as scarce, it is now one of the most frequent <i>Lasioglossum</i> species in southern England. It remains very rare in Wales however, and is seemingly known only from Merionethshire.
<i>Lasioglossum prasinum</i> (Grey-tailed furrow bee)	No status	Not regarded as being of conservation concern, its highly restricted range suggests its status should be reviewed. It is a characteristic species of lowland heathland (including that on coastal dunes) where it forages on a variety of flowers, but especially heathers. Rare in Wales, it is seemingly known only from the Gower Peninsula, Glamorgan.
<i>Lasioglossum quadrinotatum</i> (Four-spotted furrow bee)	Notable b	A scarce species of heathland districts of southern Britain, it is typically found in heathland and acid grassland habitats where it forages on a variety of flowers. Very rare in Wales, it is seemingly known only from Denbighshire.
<i>Lasioglossum xanthopus</i> (Orange-footed furrow bee)	Notable b	Britain's largest <i>Lasioglossum</i> , it is easily recognised by the orange hind tibia. Widespread but generally scarce in southern Britain, it is typically found in calcareous grasslands and brownfield sites where it forages on a variety of flowers. Rare in Wales, it is seemingly known only from Glamorgan.
<i>Megachile circumcincta</i> (Black-headed leafcutter bee)	No status	Formerly more widespread, it is now almost entirely confined to coastal sand dunes and coastal brownfield sites. Widespread but scarce in Wales, it has been recorded from coastal locations in the following vice-counties: Anglesey, Carmarthenshire, Glamorgan, Merionethshire, and Pembrokeshire.
<i>Megachile leachella</i> (Silvery leafcutter bee)	Notable b	Our smallest leafcutter, and very distinctive owing to its strongly banded abdomen and silvery-brown appearance, it is widespread and locally common around the coastline of southern Britain. Typically found on coastal dunes, it also uses vegetated shingle and coastal brownfield sites. Scarce in Wales, it has been recorded from coastal locations in the following vice-counties: Anglesey, Caernarvonshire, Cardiganshire, Denbighshire, Glamorgan, Merionethshire, and Pembrokeshire.

Species	Status in Falk (1991)	Comment
<i>Melitta tricincta</i> (Red Bartsia bee)	Notable b	So called because it obtains pollen exclusively from Red Bartsia, this scarce bee is found in various habitats containing Red Bartsia including calcareous grasslands, calcareous brownfield sites, coastal grazing marsh, and the rides and clearings of calcareous woodland. Very rare in Wales, it is seemingly known only from Monmouthshire, though an historic record also exists for Glamorgan.
<i>Nomada flavopicta</i> (Blunthorn nomad bee)	Notable b	A cuckoo of the blunthorn bees <i>Melitta leporina</i> , <i>M. tricincta</i> and <i>M. haemorrhoidalis</i> , it is widespread but very local in southern Britain in a wide range of habitats. Widespread but scarce in Wales, it has been recorded in the following vice-counties: Anglesey, Caernarvonshire, Carmarthenshire, Denbighshire, Glamorgan, Monmouthshire, and Pembrokeshire.
<i>Nomada fucata</i> (Pained nomad bee)	Notable b	Once considered a rarity in Victorian times, this cuckoo bee has undergone a dramatic expansion in recent decades, mirroring the spread of its host, <i>Andrena flavipes</i> . Its current abundance suggests that its status should be revised. Although widespread in Wales, it remains rather scarce, with most records coming from South Wales. It has been recorded in the following vice-counties: Denbighshire, Caernarvonshire, Glamorgan, and Monmouthshire.
<i>Nomada integra</i> (Cat's-ear nomad bee)	Notable a	A scarce cuckoo bee that is found in various habitats alongside its host, <i>Andrena humilis</i> , such as heathland, acid grassland and coastal cliff top grassland. Widespread but rare in Wales, it has been recorded from the following vice-counties: Caernarvonshire, Denbighshire, Glamorgan, Monmouthshire, and Montgomeryshire. An historic record also exists for Merionethshire.
<i>Nomada lathburiana</i> (Lathbury's nomad bee)	Rare (RDB3)	Once considered a rarity in Victorian times, this cuckoo bee has undergone a dramatic expansion in recent decades, mirroring the spread of its main host, <i>Andrena cineraria</i> . Its current abundance suggests that its status should be revised. Widespread and locally common in Wales, it has been recorded from the following vice-counties: Anglesey, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan, Merionethshire, Monmouthshire and Pembrokeshire.
<i>Osmia aurulenta</i> (Gold-fringed mason bee)	Notable b	One of three mason species to nest in empty snail shells, it is most abundant in coastal districts where it likes coastal dunes, vegetated shingle, soft-rock cliffs and well-grazed coastal grasslands. Widespread and locally common in Wales, it has been recorded from the following vice-counties: Anglesey, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorgan, Merionethshire, Monmouthshire, and Pembrokeshire.

Species	Status in Falk (1991)	Comment
<i>Osmia bicolor</i> (Red-tailed mason bee)	Notable b	One of three mason species to nest in empty snail shells, it is predominantly a species of calcareous habitats, especially chalk and limestone grasslands, quarries and cuttings and calcareous coastal dunes. Rare in Wales, it is seemingly known only from Glamorgan and Monmouthshire, though an historic record also exists for Denbighshire.
<i>Osmia pilicornis</i> (Fringe-horned mason bee)	Notable a	One of Britain's rarest and most declined bees, it is mainly a species of coppiced broadleaved woodland, especially ancient woodland with a good ground-flora. Its decline is likely the result of the widespread abandonment of woodland coppicing practices in the twentieth century. Very rare in Wales, it is seemingly known only from Glamorgan.
<i>Sphecodes ferruginatus</i> (Dull-headed blood bee)	Notable b	A scarce cuckoo bee of several <i>Lasioglossum</i> species, it is mainly a species of southern chalk and limestone districts, using habitats such as limestone quarries, open woodland, and chalk and limestone grasslands. Widespread but rare in Wales, it is known only from Denbighshire and Glamorgan.
<i>Sphecodes longulus</i> (Little sickle-jawed blood bee)	Notable a	Amongst our smallest <i>Sphecodes</i> , this rather scarce species is found in wide variety of open sandy habitats including heathland, acid grassland, soft rock cliffs and sandpits. Very rare in Wales, it is seemingly known only from the Gower Peninsula, Glamorgan.
<i>Sphecodes reticulatus</i> (Reticulate blood bee)	Notable a	One of our larger <i>Sphecodes</i> , this cuckoo bee is strongly associated with sandy habitats such as heathland, acid grassland, soft rock cliffs and sandpits. Widespread but rare in Wales, it has been recorded from the following vice-counties: Caernarvonshire, Denbighshire, and Glamorgan.
<i>Sphecodes rubicundus</i> (Red-tailed blood bee)	Notable a	One of our larger <i>Sphecodes</i> , this cuckoo bee is found in a variety of open habitats including heathland, brownfield sites, soft rock cliffs and open areas in woodlands. Very rare in Wales, it is seemingly known only from Carmarthenshire and Monmouthshire, though historical records also exist for Glamorgan.
<i>Stelis punctulatissima</i> (Banded dark bee)	Notable b	Our largest <i>Stelis</i> bee, it is found in many of the same habitats as its main host, <i>Anthidium manicatum</i> , including gardens. However, it is considerably rarer than its host. Widespread but rare in Wales, it has been recorded from the following vice-counties: Cardiganshire, Denbighshire, Glamorgan, Monmouthshire, and Montgomeryshire. Historical records also exist for Caernarvonshire and Merionethshire.

Species associations

Brownfield sites & quarries:

Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus ruderarius (Red-shanked carder bee)
Bombus ruderatus (Large garden bumblebee)
Bombus sylvarum (Shrill carder bee)
Colletes cunicularius (Vernal colletes bee)
Eucera longicornis (Long-horned bee)
Osmia parietina (Wall mason bee)
Nomada fulvicornis (Orange-horded nomad bee)
Nomada hirtipes (Long-horned nomad bee)
Sphecodes scabricollis (Rough-backed blood bee)
Stelis ornatula (Spotted dark bee)
Stelis phaeoptera (Plain dark bee)



Cymmer Tip, Glamorgan © Steven Falk.

Coastal dunes:

Andrena marginata (Small scabious mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus ruderarius (Red-shanked carder bee)
Bombus soroeensis (Broken-belted bumblebee)
Coelioxys mandibularis (Square-jawed sharp-tail bee)
Colletes cunicularius (Vernal colletes bee)
Eucera longicornis (Long-horned bee)
Sphecodes scabricollis (Rough-backed blood bee)
Stelis ornatula (Spotted dark bee)
Stelis phaeoptera (Plain dark bee)



Freshwater West, Pembrokeshire © Steven Falk.

Coastal levels:

Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus sylvarum (Shrill carder bee)
Eucera longicornis (Long-horned bee)



Gwent Levels, Monmouthshire © Steven Falk.

Field margins and arable headlands:

Andrena hattorfiana (Large scabious mining bee)
Andrena marginata (Small scabious mining bee)
Andrena niveata (Long-fringed mini-mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus ruderarius (Red-shanked carder bee)
Bombus ruderatus (Large garden bumblebee)
Bombus soroeensis (Broken-belted bumblebee)
Eucera longicornis (Long-horned bee)
Nomada argentata (Silver-sided nomad bee)
Osmia parietina (Wall mason bee)



Rhossili, Glamorgan © Steven Falk.

Gardens:

Nomada signata (Broad-banded nomad bee)
Osmia parietina (Wall mason bee)
Stelis phaeoptera (Plain dark bee)



Templeton, Pembrokeshire © Steven Falk.

Calcareous grassland:

Andrena hattorfiana (Large scabious mining bee)
Andrena marginata (Small scabious mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus ruderarius (Red-shanked carder bee)
Bombus ruderatus (Large garden bumblebee)
Bombus soroeensis (Broken-belted bumblebee)
Bombus sylvarum (Shrill carder bee)
Osmia parietina (Wall mason bee)
Nomada argentata (Silver-sided nomad bee)
Nomada hirtipes (Long-horned nomad bee)
Nomada signata (Broad-banded nomad bee)
Sphecodes spinulosus (Spined blood bee)
Stelis ornatula (Spotted dark bee)



Coldra, Newport, Monmouthshire © Steven Falk.

Coastal grassland:

Andrena hattorfiana (Large scabious mining bee)
Andrena marginata (Small scabious mining bee)
Andrena niveata (Long-fringed mini-mining bee)
Andrena proxima (Broad-faced mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus muscorum (Moss carder bee)
Bombus ruderatus (Large garden bumblebee)
Bombus soroeensis (Broken-belted bumblebee)
Bombus sylvarum (Shrill carder bee)
Eucera longicornis (Long-horned bee)
Nomada argentata (Silver-sided nomad bee)
Osmia parietina (Wall mason bee)
Sphecodes scabricollis (Rough-backed blood bee)
Sphecodes spinulosus (Spined blood bee)
Stelis ornatula (Spotted dark bee)



St Govan's Head, Pembrokeshire © Steven Falk.

Heath and moorland

Andrena hattorfiana (Large scabious mining bee)
Andrena marginata (Small scabious mining bee)
Andrena niveata (Long-fringed mini-mining bee)
Andrena tarsata (Tormentil mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus soroeensis (Broken-belted bumblebee)
Eucera longicornis (Long-horned bee)
Nomada argentata (Silver-sided nomad bee)
Nomada fulvicornis (Orange-horded nomad bee)
Nomada roberjeotiana (Tormentil nomad bee)
Sphecodes scabricollis (Rough-backed blood bee)
Stelis ornatula (Spotted dark bee)



Dowrog Common, Pembrokeshire © Steven Falk.

Roadside verges:

Andrena hattorfiana (Large scabious mining bee)
Andrena marginata (Small scabious mining bee)
Bombus humilis (Brown-banded carder bee)
Bombus ruderarius (Red-shanked carder bee)
Bombus ruderatus (Large garden bumblebee)
Bombus soroeensis (Broken-belted bumblebee)
Eucera longicornis (Long-horned bee)
Nomada argentata (Silver-sided nomad bee)



Penclawdd, Gower, Glamorgan © Steven Falk.

Soft rock cliffs:

Andrena proxima (Broad-faced mining bee)

Eucera longicornis (Long-horned bee)

Nomada fulvicornis (Orange-horded nomad bee)

Osmia parietina (Wall mason bee)

Osmia xanthomelana (Large mason bee)

Sphecodes spinulosus (Spined blood bee)



Porth Neigwl, Caernarvonshire © Mike Howe.

Wood pasture and parkland:

Andrena proxima (Broad-faced mining bee)

Eucera longicornis (Long-horned bee)

Nomada fulvicornis (Orange-horded nomad bee)

Osmia parietina (Wall mason bee)

Osmia xanthomelana (Large mason bee)

Sphecodes spinulosus (Spined blood bee)



Margam Park, Glamorgan © Liam Olds.

Vice-county summaries

Anglesey (Isle of Anglesey)

Eight target species occur in Anglesey, but two target species have been lost.

Table 1: Target species in Anglesey

Species	Most recent record	Notes
<i>Andrena tarsata</i>	Y Bonc, Marian-glas 2016 ¹	Only known modern population in Anglesey. Formely recorded at Cors Goch (1995) ¹ but may now be extinct there.
<i>Bombus humilis</i>	Tywyn Aberffraw 2016 ¹	Known from several coastal locations in Anglesey.
<i>Bombus muscorum</i>	Cors Bodeilio 2016 ¹	Most modern records originate from Cors Bodeilio NNR and Newborough Warren SSSI.
<i>Bombus soroensis</i>	Newborough Warren 2010 ¹	Only known modern population in Anglesey. Formely recorded at Tre Wilmot SSSI (1995) ¹ but may now be extinct there.
<i>Coelioxys mandibularis</i>	Tywyn Aberffraw 2006 ³	Only known site in Anglesey.
<i>Colletes cunicularius</i>	Newborough Warren 2016 ¹ and Tywyn Aberffraw 2016 ²	Known from several coastal dune locations in south-west Anglesey.
<i>Osmia parietina</i>	Tan-dinas Quarry 2016 ¹	Known from several locations in Anglesey, particularly in the east.
<i>Nomada roberjeotiana</i>	Y Bonc, Marian-glas 2012 ¹	Only know modern population in Anglesey.

¹ M. Howe records

² A. Fowles record

³ C. Clee record

Species losses from Anglesey

Bombus ruderarius: Last record between 1966 and 1979 (Newborough Warren and Ynys Llanddwyn)

Bombus sylvarum: Last recorded in 1973 (Cemlyn Bay)

Breconshire (Powys)

Few records of target species exist for Breconshire, which could reflect that the county has historically been under-recorded. Three target species occur in Breconshire, but one target species has been lost.

Table 2: Target species in Breconshire

Species	Most recent record	Notes
<i>Bombus humilis</i>	Aberbran 2014 ¹	Only known modern population in Breconshire.
<i>Bombus ruderarius</i>	Llangynidr 2001 ²	Only known site in Breconshire.
<i>Nomada hirtipes</i>	Allt Yr Esgair 1998 ³	Only known site in Breconshire.

¹ E. Tomkins record

² P. Morgan record

³ M. Pavett record

Species losses from Breconshire

Andrena marginata: Last recorded in 1942 (Llanbedr)

Caernarvonshire (Conwy, Gwynedd)

Seven target species occur in Caernarvonshire, but nine target species have been lost. Caernarvonshire is of national importance for the solitary mason bee *Osmia xanthomelana*, as its UK distribution is limited to just two sites on the Llŷn Peninsula.

Table 3: Target species in Caernarvonshire

Species	Most recent record	Notes
<i>Andrena proxima</i>	Porth Neigwl 2002 ⁴	Only known site in Caernarvonshire.
<i>Andrena tarsata</i>	Caeau Tan y Bwlch 2014 ¹	Only two modern populations are known to exist in Caernarvonshire, the other is at Plas Yn Rhiw (2011).
<i>Bombus humilis</i>	Porth Neigwl 2016 ¹	Known from several coastal locations.
<i>Bombus muscorum</i>	Cors Geirch 2016 ¹	Historically wider distribution in Caernarvonshire.
<i>Colletes cunicularius</i>	Abersoch 2016 ³ and Morfa Conwy 2016 ¹	Most Caernarvonshire records are from Morfa Conwy.
<i>Osmia parietina</i>	Penrhyn Mawr NT 2005 ²	Only three known modern populations in Caernarvonshire, the others at Porth Ceiriad (2000) ² and Porth Ysgo (2000) ² . Previously more widespread.
<i>Osmia xanthomelana</i>	Porth Ceiriad and Porth Neigwl 2017 ¹	Only two known modern populations in Caernarvonshire. Historically wider distribution.

¹ M. Howe records

² C. Clee records

³ E. Meilleur record

⁴ G. T. Knight record

Species losses from Caernarvonshire

Andrena marginata: Last recorded in 1939 (Deganwy)

Andrena niveata: Last recorded in 1913 (Tal-y-cafn)

Anthophora quadrimaculata: Last recorded before 1956 (Criccieth)

Bombus distinguendus: Last recorded in 1926 (Nefyn)

Bombus ruderarius: Last recorded 1924-1925 (Llanfairfechan)

Bombus soroeensis: Last record in 1912 (Nefyn)

Bombus subterraneus: Last record in 1920 (Bethesda)

Bombus sylvarum: Last recorded in 1969 (Capel Curig)

Nomada roberjeotiana: Last recorded in 1913 (Gorddinan Marsh)

Cardiganshire (Ceredigion)

Eight target species occur in Cardiganshire, but five target species have been lost.

Table 4: Target species in Cardiganshire

Species	Most recent record	Notes
<i>Bombus humilis</i>	Ynyslas Dunes 2001 ¹	Only known modern population in Cardiganshire.
<i>Bombus muscorum</i>	Borth, Cors Fochno and Ynyslas Dunes 2010 ³	Formally more widespread, modern populations currently restricted to the north (around the Dyfi estuary).
<i>Bombus muscorum</i>	Cors Fochno 2015 ⁴	Formally more widespread, modern populations currently restricted to the north (around the Dyfi estuary).
<i>Coelioxys mandibularis</i>	Ynyslas Dunes 2001 ¹	Only known site in Cardiganshire.
<i>Colletes cunicularius</i>	Ynyslas Dunes 2010 ³	Only known site in Cardiganshire.
<i>Nomada roberjeotiana</i>	Banc-y-mwldan 2000 ²	Only know site in Cardiganshire.
<i>Stelis ornatula</i>	Ynyslas Dunes 2001 ¹	Only know site in Cardiganshire.
<i>Stelis phaeoptera</i>	Llanachaeron NT, Aberaeron 2016 ⁵	Only known site in Cardiganshire.

¹ C. Clee record

² P. Skidmore record

³ K. McGee record

⁴ R. Becker record

⁵ D. Baldock record

Species losses from Cardiganshire

Bombus distinguendus: Last recorded in 1922 (Aberystwyth)

Bombus ruderatus: Last recorded in 1958 (Bow Street)

Bombus subterraneus: Last record in 1922 (Ynyslas Dunes)

Bombus sylvarum: Last recorded in 1953 (Borth)

Osmia parietina: Last recorded in 1941 (Aberystwyth)

Carmarthenshire

Nine target species occur in Carmarthenshire, but one target species has been lost.

Table 5: Target species in Carmarthenshire

Species	Most recent record	Notes
<i>Bombus humilis</i>	Morfa Berwig 2016 ⁴	Modern populations are mostly coastal.
<i>Bombus muscorum</i>	Pembrey Burrows 2017 ⁸	Modern populations are mostly coastal.
<i>Bombus ruderals</i>	Laugharne Burrows 2015 ⁵	Modern populations are mostly coastal.
<i>Bombus soroeensis</i>	Pembrey Forest 1999 ⁷	Few records exist in Carmarthenshire, and no modern populations known.
<i>Bombus sylvarum</i>	Pembrey Forest 1999 ⁶	Only known site in Carmarthenshire and no modern populations known.
<i>Coelioxys mandibularis</i>	Tywyn Burrows 2017 ⁹	Few records exist in Carmarthenshire.
<i>Colletes cunicularius</i>	Pembrey Burrows 2005 ¹	Only known site in Carmarthenshire.
<i>Eucera longicornis</i>	Carmel Chapel, Burry Port 2005 ²	Few records exist in Carmarthenshire.
<i>Stelis ornatula</i>	Pembrey Coast SSSI 2005 ³	Only known site in Carmarthenshire.

¹ C. Clee & G.T. Knight records

² I. Morgan record

³ C. Clee record

⁴ I. Macho record

⁵ B. Stewart record

⁶ M. Edwards, S. Roberts, G. Else & M. Pavett record

⁷ M. Pavett record

⁸ S. Lynch record

⁹ M. Howe record

Species losses from Carmarthenshire

Bombus ruderals: Last records in 1970 (Rhandirmwyn)

Denbighshire (Conwy, Denbighshire and Wrexham)

Seven target species occur in Denbighshire, but one target species has been lost.

Table 6: Target species in Denbighshire

Species	Most recent record	Notes
<i>Bombus ruderarius</i>	Borras Quarry 2000 ³	Only known modern population in Denbighshire.
<i>Bombus soroeensis</i>	Moel Famau 2004 ¹	Only known site in Denbighshire.
<i>Colletes cunicularius</i>	Bersham Tip, Rhostyllen 2017 ⁴	Also recorded from Marford Quarry (2013) ³ and Borras Quarry (2013) ⁵ .
<i>Nomada hirtipes</i>	Erbistock 1996	Only known site in Denbighshire.
<i>Osmia parietina</i>	Glan Conwy 2015 ²	Only known modern population in Denbighshire.
<i>Stelis ornatula</i>	Marford Quarry 2013 ³	Only known site in Denbighshire.
<i>Stelis phaeoptera</i>	Gresford 2016 ³	Most records are from Marford Quarry and Borras Airfield.

¹ G. Nisbet record
² A. Perkins record
³ J. B. Formstone record
⁴ W. Hawkes record
⁵ M. Howe and J. B. Formstone record

Species losses from Denbighshire

Bombus ruderatus: Last recorded in 1911 (Llanefydd)

Flintshire

Only one target species currently occurs in Flintshire. Two target species have been lost. The few records of target species for Flintshire could reflect that the county has historically been under-recorded.

Table 7: Target species in Flintshire

Species	Most recent record	Notes
<i>Colletes cunicularius</i>	Bettisfield Park, Bagillt 2016 ¹	Most records are from Gronant Dunes and Talacre Warren.

¹ E. Thomas record

Species losses from Flintshire

Bombus humilis: Last recorded in 1984 (Y Ddol Uchaf)

Bombus ruderatus: Last recorded in 1923 (Dyserth & Rhyl)

Glamorgan (Bridgend, Caerphilly, Cardiff, Merthyr Tydfil, Neath Port Talbot, Rhondda Cynon Taf, Swansea, Vale of Glamorgan)

Nineteen target species occur in Glamorgan, but ten target species have been lost. Glamorgan has historically been a well recorded county.

Table 8: Target species in Glamorgan

Species	Most recent record	Notes
<i>Andrena hattorfiana</i>	Horton Cliffs 2016 ¹	Known from several localities in Glamorgan, both inland and coastal.
<i>Andrena marginata</i>	Penywaun, Aberdare ⁵ , Horton Cliffs ⁵ and Porthkerry 2004 ⁵	Known from several localities in Glamorgan, both inland and coastal.
<i>Andrena niveata</i>	Horton Cliffs 2004 ³	Only modern Welsh record for this species.
<i>Andrena rosae</i>	Giants Grave, Briton Ferry 2017 ⁶	Most Glamorgan records are from the Gower Peninsular.
<i>Andrena tarsata</i>	Maerdy Colliery 2017 ⁶	Known from several localities in Glamorgan, both inland and coastal. Strongly associated with re-vegetated colliery spoil tips in The Valleys.
<i>Bombus humilis</i>	Multiple sites in 2017	Widespread and locally common across Glamorgan.
<i>Bombus muscorum</i>	Kenfig NNR 2017 ^{6,9}	Modern populations are mostly coastal.
<i>Bombus ruderarius</i>	Gorseinon 2014 ²	Modern populations are mostly coastal.
<i>Bombus soroeensis</i>	Llanmadoc Hill 2015 ¹	Few modern records, largely recorded from the coast.
<i>Bombus sylvarum</i>	Kenfig NNR 2016 ⁷ and Barry Docks 2016 ¹⁰	Modern populations are mostly coastal.
<i>Coelioxys mandibularis</i>	St Madoc Centre, Llanmadoc 2016 ¹	Known from several coastal localities in Glamorgan.
<i>Colletes cunicularius</i>	Kenfig NNR ⁶ , Methyr Mawr NNR ⁶ , Oxwich ⁸ and Whiteford Burrows ⁸ 2017	Recorded from several coastal locations. Particularly strong population at Whiteford Burrows (2017) ⁸ .

Species	Most recent record	Notes
<i>Eucera longicornis</i>	Giants Grave, Briton Ferry 2017 ⁶ and Miskin 2017 ⁴	Known from several localities, both inland and coastal.
<i>Nomada argentata</i>	Penywaun, Aberdare 2004 ⁵	Only known site in Wales.
<i>Nomada hirtipes</i>	Penrice Castle 2016 ¹	Also known from St Fagans (1998) ⁵ and Ogmore Down (1998) ⁵ .
<i>Nomada signata</i>	Giants Grave, Briton Ferry 2017 ⁶	Known from several localities in Glamorgan.
<i>Sphecodes scabricollis</i>	Merthyr Mawr NNR 2004 ⁵ and Slade Sands, Port Eynon 2004 ³	Also known from Llanrhidian Marsh (1997) ¹¹ .
<i>Stelis ornatula</i>	Whiteford Burrows 2015 ¹	Also known from Merthyr Mawr, Nicholaston Burrows SSSI, Oxwich Bay SSSI, and Rhossili Bay.
<i>Stelis phaeoptera</i>	Miskin 2016 ⁴	Known from several localities, both inland and coastal.

¹ I. Tew records

² B. Stewart records

³ C. Clee record

⁴ R. Wistow records

⁵ M. Pavett record

⁶ L. Olds record

⁷ P. Denning record

⁸ S. Falk record

⁹ R. Ruston record

¹⁰ S. Lynch record

¹¹ M. Edwards record

Species losses from Glamorgan

Andrena minutuloides: Last recorded in 1921 (Llangennith)

Bombus distinguendus: Last recorded in 1974 (Leckwith)

Bombus ruderatus: Last recorded in 1956 (Penarth and Porthcawl)

Bombus subterraneus: Last recorded in 1956 (Penarth)

Coelioxys quadridentata: Last recorded in 1935 (Swanbridge)

Osmia parietina: Last recorded in 1936 (Bridgend)

Nomada armata: Last recorded in 1854 (Clyne Wood, Swansea)

Nomada fulvicornis: Last recorded in 1911 (Dinas Powys)

Nomada roberjeotiana: Last recorded in 1927 (Welsh St Donat's)

Sphecodes spinulosus: Last recorded in 1935 (Swanbridge)

Merionethshire (Gwynedd)

Eight target species occur in Merionethshire, but five target species have been lost.

Table 9: Target species in Merionethshire

Species	Most recent record	Notes
<i>Andrena marginata</i>	Tir Stent, Dolgellau 2004 ¹	Only known site in Merionethshire.
<i>Andrena proxima</i>	Morfa Mawddach 2007 ⁴	Only known site in Merionethshire.
<i>Andrena tarsata</i>	Glasdir, Coed y Brenin 2016 ¹ and Caen-y-Coed 2016 ¹	Only two known sites in Merionethshire.
<i>Bombus humilis</i>	Aberdyfi Dunes 2006 ²	Only known modern population in Merionethshire. Few records exist.
<i>Bombus muscorum</i>	Morfa Dyffryn 2006 ³	Only known modern population in Merionethshire. Previously more widespread.
<i>Coelioxys mandibularis</i>	Morfa Harlech 2009 ²	Only known site in Merionethshire.
<i>Colletes cunicularius</i>	Tywyn 2016	Most records are from Morfa Harlech SSSI.
<i>Osmia parietina</i>	Glasdir, Coed y Brenin 2016 ¹	Historically wider distribution in Merionethshire. Few modern records exist.

¹ M. Howe record

² C. Clee record

³ C. Clee & G.T. Knight records

⁴ G. T. Knight record

Species losses from Merionethshire

Andrena hattorfiana: Last recorded in 1899 (Tywyn)

Bombus sylvarum: Last recorded in 1905 (Barmouth)

Nomada ferruginata: Last recorded in 1902

Nomada hirtipes: Last recorded in 1902 (Llanbedr)

Osmia xanthomelana: Last recorded in 1904

Monmouthshire (Blaenau Gwent, Caerphilly, Monmouthshire, Newport, Torfaen)

Ten target species occur in Monmouthshire, but two target species has been lost. Monmouthshire is of national importance for the Shrill carder bee (*Bombus sylvarum*), with the Gwent Levels being among the few remaining population strongholds for this species.

Table 10: Target species in Monmouthshire

Species	Most recent record	Notes
<i>Andrena hattorfiana</i>	RAF Caerwent 2015 ¹	Only known from RAF Caerwent and Brockwell's Meadows in Monmouthshire.
<i>Bombus humilis</i>	Multiple records in 2017	Widespread and locally common across Monmouthshire
<i>Bombus muscorum</i>	RSPB Newport Wetlands 2015 ²	Only modern Monmouthshire record.
<i>Bombus ruderarius</i>	Coed Cwnwr 2014	Distribution is sporadic in Monmouthshire.
<i>Bombus sylvarum</i>	RSPB Newport Wetlands 2017	Most Monmouthshire records are from the Gwent Levels.
<i>Eucera longicornis</i>	Kingcoed Meadow, Raglan 2016 ²	Several recent records. Previously more widespread in Monmouthshire.
<i>Nomada fulvicornis</i>	Whitewall Common, Magor 1991 ³	Only known site in Monmouthshire.
<i>Nomada signata</i>	Abergavenny 1997 ⁴	Two modern records in Monmouthshire, the other from Sugar Loaf (1992) ⁵ .
<i>Sphecodes scabricollis</i>	Abergavenny 1997 ⁴	Only known from Abergavenny area in Monmouthshire.
<i>Stelis phaeoptera</i>	Monmouth garden 2016 ²	Only modern Monmouthshire record. Old record also exists for Raglan (1897).

¹ R. Bacon record

³ M. Edwards record

⁵ R. Paxton record

² R. Ruston record

⁴ G. T. Knight record

Species losses from Monmouthshire

Andrena rosae: Last recorded in 1897 (Raglan)

Bombus distinguendus: Last recorded in 1922 (Trelleck)

Montgomeryshire (Powys)

Six target species occur in Montgomeryshire, but one target species has been lost.

Table 11: Target species in Montgomeryshire

Species	Most recent record	Notes
<i>Andrena tarsata</i>	Hafren Forest 2017 ²	Only known site in Montgomeryshire.
<i>Bombus humilis</i>	Pwll Penarth 2013 ³	Only known site in Montgomeryshire.
<i>Bombus ruderarius</i>	Llwynderw Farm 2014 ²	Only two known sites exist in Montgomeryshire, the other is at Red House, Montgomery (2013).
<i>Nomada hirtipes</i>	Llanymynech Rocks Nature Reserve 2009 ⁴	Also known from Powis Castle and Garden (1996).
<i>Osmia parietina</i>	Powis Castle 1993 ¹	Only known site in Montgomeryshire.
<i>Stelis phaeoptera</i>	Llwynderw Farm 2017 ²	Only known site in Montgomeryshire.

¹ C. Clee record
² R. Becker record
³ M. Caplin record
⁴ M. Howe record

Species losses from Montgomeryshire

Bombus soroeensis: Last recorded in 1972 (Dylife)

Pembrokeshire

Sixteen target species occur in Pembrokeshire, but two target species have been lost.

Table 12: Target species in Pembrokeshire

Species	Most recent record	Notes
<i>Andrena hattorfiana</i>	Buckspool 2008 ¹⁰ and Linney Head 2008 ^{4,10,11,12}	Only known from the Castlemartin Peninsula in Pembrokeshire.
<i>Andrena marginata</i>	Castlemartin 2016 ¹	Most Pembrokeshire records are from Linney Head.
<i>Andrena rosae</i>	The Bug Farm, St David's 2017 ¹ and Broadhaven Dunes 2017 ¹	Few records but seemingly under-recorded.
<i>Bombus humilis</i>	Recorded from multiple sites in 2017	Widespread across the county. Common at Stackpole Warren NNR and Castlemartin areas in 2016; also seen at Bug Farm, Dowrog Common (S. Falk, pers. comm.).
<i>Bombus muscorum</i>	Castlemartin, Dowrog Common and Stackpole Warren 2016 ¹	Locally abundant on the coast.
<i>Bombus ruderarius</i>	Lydstep Point 2000 ²	Only three known sites exist in Pembrokeshire, the others at Herbrandston (1997) and Whitesands Bay (1997).
<i>Bombus ruderatus</i>	Lydstep Point 2002 ⁶	Only known site in Pembrokeshire.
<i>Bombus soroensis</i>	Castlemartin 2014 ⁷ and St Govan's Head 2014 ⁸	Known from several coastal locations in Pembrokeshire. Could not be refound by S. Falk at Dowrog Common (first recorded in 1988), Castlemartin or St Govan's Head in 2016.
<i>Bombus sylvarum</i>	Castlemartin Range 2017 ⁸	Abundant on the coast.
<i>Coelioxys mandibularis</i>	Stackpole Warren 2010 ⁵	Most records are from Stackpole Warren.
<i>Colletes cunicularius</i>	Freshwater East 2017 ¹³	Only known site in Pembrokeshire.
<i>Eucera longicornis</i>	St Govan's Head 2016 ⁴	Known from the south-west coast of Pembrokeshire.

Species	Most recent record	Notes
<i>Nomada fulvicornis</i>	Marloes Sands 2009	Also known from Stackpole Warren NNR.
<i>Nomada roberjeotiana</i>	Castlemartin Range 2007 ³	Only two known populations in Pembrokeshire, the other at Strumble Head (1998) ³ .
<i>Sphecodes spinulosus</i>	Trelerw Valley, Caer Bwdy Bay 1994 ⁹	Only modern Welsh record.
<i>Stelis ornatula</i>	Castlemartin 2006 ¹¹ ; Linney Burrows 2006 ^{3,11}	Also known from Great Furzenip.

¹ S. Falk records

² B. Stewart record

³ M. Howe record

⁴ J. Hudson record

⁵ D. Boyce record

⁶ A. Poole record

⁷ R. Comont record

⁸ S. Lynch record

⁹ A. Foster record

¹⁰ C. Clee record

¹¹ G. Knight record

¹² B. Haycock record

¹³ C. Flynn & S. Falk record

Species losses from Pembrokeshire

Andrena tarsata: Last recorded in 1988 (Dinas Island)

Osmia parietina: Last recorded in 1979 (Caerfai)

Radnorshire (Powys)

Few records of target species exist for Radnorshire, which could reflect that the county has historically been under-recorded. Three target species occur in Radnorshire, but two target species have been lost.

Table 13: Target species in Radnorshire

Species	Most recent record	Notes
<i>Andrena tarsata</i>	Hirnant Meadow 2013 ¹	Only known site in Radnorshire.
<i>Bombus muscorum</i>	1995	Few records exist in Radnorshire, and no modern populations known.
<i>Eucera longicornis</i>	Gilfach Nature Reserve, Rhayader 2017 ²	Only known site in Radnorshire.

¹ J. Vincett record

² B. Brown record

Species losses from Radnorshire

Bombus ruderarius: Last recorded in 1984 (Llanelwedd)

Bombus sylvarum: Last record in 1970

Key sites for bees in Wales

Current data indicates that the following individual sites are of particular significance for bees in Wales:

Anglesey:

Tywyn Aberffraw, Y Bonc, Parys Mountain, Newborough Warren, Tan-dinas Quarry

Caernarvonshire:

Porth Neigwl, Porth Ceiriad, Morfa Conwy

Cardiganshire:

Cors Fochno, Ynyslas Dunes

Carmarthenshire:

Pembrey Burrows, Pembrey Forest, Laugharne Burrows

Denbighshire:

Borras Quarry, Marford Quarry

Glamorgan:

Horton Cliffs, Merthyr Mawr, Kenfig NNR, Oxwich Burrows, Whiteford Burrows

Merionethshire:

Morfa Dyffryn, Morfa Harlech, Bryn Prydydd

Monmouthshire:

RSPB Newport Wetlands, RAF Caerwent

Montgomeryshire:

Powis Castle, Llanymynech Rocks

Pembrokeshire:

Lydstep Point, Castlemartin Range, St Govan's Head, Stackpole Warren, Linney Head, Freshwater East

Radnorshire:

Gilfach Nature Reserve, Hirnant Meadow

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