Northern Ireland Threatened Bee Report

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buglife

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Sandpit blood-bee (*Sphecodes pellucidus*) female © Stephen 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. Northern Ireland is home to nationally rare and threatened bee species and supports the largest population in the UK of *Colletes floralis*.. The Northern Ireland Threatened Bee Report uses available species records to assess the status of threatened bees at a county level across Northern Ireland. 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 Northern Ireland Threatened Bee Report has looked at 21 target bee species considered to be at greatest risk on the island of Ireland, and which are present in Northern Ireland. These species have been selected because they are categorised as being Critically Endangered (CR), Endangered (E) or Vulnerable (V) in the Regional Red List of Irish Bees. Of these 21 target species, ten species are deemed to be a conservation priority on the island of Ireland and two are also nationally scarce species in Britain, *Bombus rupestris* and *Sphecodes ferruginatus*. The remaining 12 bee species identified as being of conservation concern in Northern Ireland were selected either due to their Nationally Threatened (NT) or Data Deficient (DD) status in Ireland or their presence on the Northern Ireland Priority Species List. Worryingly, bee losses are evident across the whole of Northern Ireland and the information gathered in this report has highlighted the need for species records, especially in County Tyrone where the 21 target species have never been recorded.

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 All- Ireland Pollinator Plan in Northern Ireland.

Northern Ireland 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 Regional Red List of Irish Bees[3] and data holdings of the Bees, Wasps and Ants Recording Society (BWARS), National Biodiversity Data Centre (NBDC), the Centre for Environmental Data and Recording (CEDaR), National Biodiversity Network Atlas (NBN Atlas) and consulting individual experts, we have identified 33 bee species recorded from Northern Ireland that are of conservation concern. This report focuses on 21 of these species. The 21 species have been selected because they fall into the following three categories in the Regional Red List of Irish Bees[3]:

- Critically endangered (CR)
- Endangered (EN)
- Vulnerable (VU).

For each target species, we provide the most recent data on its distribution and conservation status in Northern Ireland, alongside information on its ecology and habitat requirements. As there is more information available on the habitat associations of these species from mainland UK, these will be included but whenever possible (if the information is available) we will refer to the typical Irish habitat. We have highlighted the main reasons for decline and proposed management actions for their future conservation [4]. Target species are grouped by the habitat types they primarily associate with and have displayed the flight periods of all the species mentioned. It is hoped that this information will be useful in focusing efforts to conserve the threatened bees of Northern Ireland.

The remaining 12 bee species identified as being of conservation concern in Northern Ireland were selected either due to their Near Threatened (NT) or Data Deficient (DD) status in Ireland or their presence on the Northern Ireland Priority Species List[5]. They are mentioned in the "Other bees of conservation concern in Northern Ireland" section. Information on ecology and conservation statuses of these species at the County and national level is included.

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 Northern Ireland in the following ways:

1. Raise awareness of threatened bee species in Northern Ireland.
2. Raise awareness of the importance of Northern Ireland in conserving threatened and declining bee species at a UK level.
3. Examine historical distribution data to identify the parts of Northern Ireland that have suffered the greatest species losses
4. Highlight gaps in existing knowledge on the autecology of target species. Understanding their 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 delivery of the All-Ireland Pollinator Plan[6]

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 Northern Ireland's B-Lines Initiative and other conservation initiatives to link isolated populations by creating corridors or stepping stones of suitable habitat. Habitat quality, patch size and connectivity are the most important factors impacting both our threatened pollinators and more widespread and common species.

The Northern Ireland 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 Northern Ireland. This report utilises data holdings of BWARS, NBDC, CEDaR and NBN Atlas to examine the status of target species in Northern Ireland, and draws on previous conservation work largely carried out by Buglife, and the Bumblebee Conservation Trust (BBCT).

Acknowledgements

The author would like to thank the NBDC, CEDaR, NBN and the committee and members of BWARS for access to their data holdings, on which this report was based. Our report was also made possible by the extensive research and conservation work carried out by the BBCT, BWARS, Buglife and others. Thanks are sent to the recorders for use of their species records (A list of these recorders can be found on the last page) Stephen Falk for providing photographs for use in the report. The author would like to thank Brian Nelson, Geoff Newell, Mark Smyth and Andrew Whitehouse for their feedback and comments on this report. The author would also like to thank Hannah Fullerton (Buglife Volunteer) who organised the data for the threatened bee species at a Northern Ireland level. Finally we would like to thank NIEA for funding the production of this report.

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, 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). In Ireland the first verified record was from St Stephen's Green, Dublin in September 2017 and the Tree bumblebee appears to be spreading, moving northwards as a result of climate change. Since its arrival in Southern England it has spread at a rate of over 4,500 square miles a year – this is an area almost the size of Northern Ireland (Anon, 2019).

However, despite a few species expanding their ranges, the majority are suffering declines. Alarmingly, 3 of the UK'S 25 bumblebee species have gone extinct, with a further 8 suffering major range contractions[7]. Biesmeijer et al. (2006) compiled almost 1 million occurrence records from UK and Netherlands 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 Grid[2].

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 Bees[8] 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 Northern Ireland. However, our analysis indicates range contractions for the majority of the 21 target species. This report aims to help fill the gaps in our knowledge of population trends of wild bees in Northern Ireland, to highlight species at risk of extinction in Northern Ireland 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 survival and prosperity. The reproduction of an estimated 85% of all wildflower and flowering crop species depends on, or is enhanced by, pollinating insects[9], and therefore effective pollination is crucial for human nutrition[10] and food security[11].

Insect pollination of crops is of considerable economic importance, estimated at £440 million per annum in the UK[12] and $215 billion per annum globally[13], 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 Northern Ireland, 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 produce[14]. 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 species[15]. 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 wildlife[16]. 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[11, 17].

Bees are believed to be the most efficient pollinators of all insects[18]. 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 fertilisation[19].

Even though honeybees are the most economically-valued pollinators of crop monocultures worldwide, the contribution of wild pollinators to pollination services is of greater 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 tomatoes[20]. 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 types[21]. Some examples of such specialised relationships include: *Andrena hattorfiana/A. marginata* and scabiouses; *Colletes hederae* and Ivy; *Macropsis 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 variation[22]. Higher bee diversity has been linked with higher seed set and flower visits, and is believed to be critical to overall ecosystem stability[21]. 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 agroecosytems that rely on insect pollination[23].

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 isolation. Such threats include:

1. Habitat loss, fragmentation and degradation

Habitat loss is generally thought to be the most important factor driving bee declines[24]. In the UK, up to 98% of wildflower meadows have been lost through agricultural intensification, land development and coastal stabilisation since the 1940s[23]. Decline in many bumblebee species is largely attributable to the loss of unimproved flower-rich grasslands[26]. 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 UK[26]. Similarly, between 1978 and 1998, 76% of bumblebee forage plants experienced declines[27].

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 fragmentation[7]. 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)[28]. 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[29, 30]. 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[31, 32] 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 will not fly across extended areas of cleared vegetation when crossing from one vegetated patch to another[33].

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 fragmentation[28]. To date, there have been few studies on the impact of habitat degradation on the richness and abundance of wild bees[1]. 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 effects[1]. Following the global and UK trend, habitat loss, fragmentation and

degradation is believed to be the key reason for the decline of pollinators in Northern Ireland.

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[34, 35]. 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[36, 37, 38] and solitary bees[37, 39] 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 exposure[40]. 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 performance[28].

3. Climate change

Insect distributions have already been altered by recent anthropogenic climate change[28]. 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, reaching Ireland in 2017. 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 species[28]. European bee richness is generally predicted to decline under climate change[41].

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 plants[42]. Such phenological shifts would reduce the floral resources available to pollinators, the effects of which would be exacerbated in species with narrow diet breadth[42]. 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 plants[41]. 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 reproduction[42]. Climate change also has the potential to affect the spread and virulence of pests and pathogens[44]. 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 observations[28].

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 honeybees[29]. 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[7, 45]. Pathogens and parasitoids are known to be important mortality factors for wild bees[46, 47] and have been implicated in losses in species diversity[48, 49]. By allowing managed and/or imported bees to mix with wild pollinators, there is the potential for disease emergence[48]. 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[48, 51, 52]. 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 facilitation[50]. 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 UK[50].

What is the role of Northern Ireland?

Northern Ireland is home to many nationally rare and threatened bee species and supports the largest population in the UK of *Colletes floralis* a UK BAP species. Ten species included in this report are deemed to be a conservation priority on the island of Ireland and two are nationally scarce species in Britain, *Bombus rupestris* and *Sphecodes ferruginatus*[3]. Northern Ireland is characterised by its extensive areas of grassland, upland and wetland habitats which at a landscape scale result in unique habitat mosaics. There are a wide variety of ecologically diverse

habitats including calcareous grassland, blanket bog, limestone pavement and dry heath. Upland habitats are found mainly within the Antrim Plateau in the North-east, the Mourne Mountains in the south and the Sperrin Mountains in the north-west. A proportion of the remaining bog area in Europe can be found in Northern Ireland and the UK's largest inland lake is also found here, Lough Neagh. There are pockets of biodiverse rich fens, marshes and reedbeds scattered across the country and large areas of ecologically important sand dune systems on the north and east coasts. Northern Ireland has an extensive and varied coastline which is an extremely important habitat for some bee species, as well as for many other invertebrates. The dune heath at Murlough is one of the best examples in the UK, being up to 16% of the UK resource The lowland dry heath found in the Mournes is also an important habitat (B. Nelson, pers comment).

Bees in Northern Ireland are limited by climate. They are mostly southern species that are influenced by plant distribution- for those that are plant specific- but also by wet and cold soil conditions. This forces many species to coastal areas where food/nesting site availability coincides. The climate of Northern Ireland is similar to the rest of the UK, though on average it has less sunshine and more rainfall. There is also a lack of temperature extremes. The max summer temperature here is relatively low. Whilst some upland areas can experience harsh weather, the coasts enjoy more favourable conditions, with some areas in the south-east of Northern Ireland being more sheltered than the rest of the country and so milder (Met Office). Northern Ireland experiences cool summers and relatively mild winters thanks to the moderating effects of the Atlantic Ocean. The hilly nature of the Northern Irish terrain means that the country is cloudier than England (Met Office).

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

1. Eastern and South-eastern County Down including the Mournes, Murlough National Nature Reserve and Killard Point.
2. The North Coast including the Umbra Nature Reserve, Portstewart Strand and White-Park Bay.
3. County Fermanagh, in particular areas of species rich, calcareous grassland and limestone pavement.
4. Belfast Hills including Cave Hill Country Park and Slievenacloy Nature Reserve.
5. Rathlin Island.
6. Forest Parks such as at Rostrevor and Castlewellan.
7. The southern shore of Lough Neagh, in particular the areas of scrub grassland at the Lough Neagh Discovery Centre and the cutover bog sites in areas of peatland e.g. Brackagh Bog.

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

Legislative and Policy context in Northern Ireland

The All- Ireland Pollinator Plan

The All-Ireland Pollinator Plan 2015-2022(AIPP)[6] is a strategy that has been developed by the National Biodiversity Data Centre (NBDC) covering the whole island of Ireland. The plan was launched in 2015 and describes the current situation in Ireland and identifies areas where action is needed. It details a "Vision" for Pollinators in Ireland, and 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 Ireland.

The objectives of the plan are:

- **Objective 1 Making Ireland pollinator friendly:** Achieving a joined-up network of diverse and flower rich habitats to support pollinators across Ireland.
- **Objective 2 Raising awareness of pollinators and how to protect them:** Achieving an increased awareness of the importance of pollinators and the resources they need to survive.
- **Objective 3 Managed pollinators – supporting beekeepers and growers:** Achieving healthy, sustainable populations of managed pollinators that can play a full role in delivering pollination services.
- **Objective 4 Expanding our knowledge on pollinators and pollination service:** Achieving an evidence base that directs us towards the best and most cost-effective ways to protect our pollinators into the future.
- **Objective 5 Collecting evidence to track change and measure success:** Achieving a dynamic Plan that is targeted and effective.

Implementation of the Plan is overseen by key stakeholders from the public, private and voluntary sectors. Actions to deliver the AIPP were recently reviewed. Significant progress has been made with 92% of the 81 actions identified in the Plan either complete or on track for completion.

In the context of Northern Ireland four main outcomes have been identified:

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

Habitats Directive

The Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) is a legislative framework adopted in 1992 that is designed to protect the most vulnerable species and habitat types and sets the standard for nature conservation across the EU. It ensures the conservation of a wide range of rare, threatened or endemic animal and plant species, including invertebrates. The Habitats Directive aims to promote the maintenance of biodiversity, with protection provisions that are designed to ensure that the species listed reach a favourable conservation status within the EU. Article 11 of the Habitats Directive requires member states to undertake surveillance of the conservation status of the natural habitats and species identified by that country, with particular attention being given to priority natural habitat types and priority species.

The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995

These Regulations transpose the Habitats Directive in relation to Northern Ireland, enabling the designation and protection of sites and species listed in the Habitats Directive. The regulations also allow for the adaptation of planning and other controls for the protection of European Sites. The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995.

Wildlife and Natural Environment Act (Northern Ireland) 2011

Under section 1 of the Wildlife and Natural Environment Act (Northern Ireland) 2011 public bodies in Northern Ireland are required to further the conservation of biodiversity, restoring and enhancing populations and habitats. This Duty should mean that Local Authorities make biodiversity an integral part of policy and decision making. Section 3 of the Act also makes provision for a list of flora, fauna and types of habitat that are of principal importance to maintaining and enhancing biodiversity in relation to Northern Ireland and outlines a duty for steps to be taken to further the conservation of the species of flora, fauna and types of habitat included in any list developed. There is also a duty to promote the taking of these steps by others.

Valuing Nature; A Biodiversity Strategy for Northern Ireland to 2020

This is a strategy published in 2015 that sets out how Northern Ireland plans to meet its international obligations and local targets to protect biodiversity, ensuring the sustainability of the environment. The mission of the strategy is "To make progress towards halting overall biodiversity loss, establish an ecosystem approach and help business and society in general have a greater understanding of the benefits that nature can bring to everyday life in Northern Ireland." To ensure the sustainability of pollinators in Northern Ireland the Department will –

- Contribute to the All-Ireland Pollination Plan 2015-2022.
- Liaise with Defra on the National Pollinator Strategy.
- Research, collect and analyse data to reveal trends.
- Work with key partners to deliver landscape-scale outcomes and site-based actions.
- Develop policy to ensure the long-term viability of pollinators.

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 meta-populations and genetic diversity[7]. However for some species, more detailed, targeted actions are also required. In Northern Ireland initiative-Lines mapping has been funded by the Northern Ireland Environment Agency (NIEA). B-Lines have now been mapped across all of Northern Ireland and are a resource to be used by everyone to prioritise and target action on the ground. More information about this initiative can be found here.

National Biodiversity Data Centre (NBDC); Bumblebee Monitoring Scheme

The Bumblebee Monitoring Scheme is a standardised bumblebee-monitoring scheme active across the island of Ireland since 2011, as part of the Irish Pollinator Initiative. In collaboration with the Bumblebee Conservation Trust in Northern Ireland. The scheme protocol involves volunteers walking the same fixed route (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 5m x 5m x 5m 'recording box' in order to standardise between habitats and observers. The scheme is managed by the NBDC and scheme organisers can be contacted here.

Butterfly Conservation Northern Ireland (BCNI); Polli:Nation

This is a UK wide initiative that supported pupils from 260 schools to turn their school grounds and other local walk-to spaces into pollinator friendly habitats. In Northern Ireland 32 schools took part. The aim of the project was to engage and enthuse children and young people to protect pollinating insect species in the UK. An increase in the number and diversity of pollinating insect species in school grounds and local community spaces is an

outcome of this project. Polli:Nation is a partnership project with the following organisations; National Lottery heritage fund. Butterfly Conservation, Buglife, Opal and the Field Studies Council. More information about this initiative can be found here.

Ulster Wildlife Trust;

Magnificent meadows

This project aims to protect and restore some of the remaining fragments of grasslands that exist throughout Fermanagh and Tyrone. Habitats are conserved through a combination of practical work and community and landowner engagement. Ulster Wildlife Trust is working in partnership with Plantlife to deliver this project. More information about this initiative can be found here.

Don't Mow, Let it Grow

This initiative focuses on the conservation of semi-natural grassland, specifically on the management of road verges and amenity grasslands across the Causeway Coast and Glens Borough Council area. The project identifies trial verges and amenity grassland sites in order to:

- Highlight and develop a range of management options
- Assess biodiversity, ecosystem services and cost benefits of this alternative management
- Train land managers and volunteers in management options, grassland selection, species identification, Invasive Alien Species and monitoring
- Promote the benefits to wider public.

This project is led by Causeway Coast and Glens Borough Council, working in partnership with Transport NI and NIEA. More information about the project can be found here.

Bee-licious

This project is led by Antrim and Newtownabbey Borough Council, working in partnership with 7 other Councils across Northern Ireland. Councils will work with local communities to restore native flower-rich habitats where pollinators can find food and shelter. Bee-licious is supported by the National Lottery, through the Heritage Lottery Fund, 'Our Heritage Programme'. More information about the initiative can be found here.

Notes on the text

Species accounts have drawn from expert knowledge, and from a number of published sources including Else and Edward's Handbook of the Bees of the British Isles; Volume 2 (2018) [53], The Field Guide to the Bees of Great Britain and Ireland by Falk (2015)[54], Regional Red List of Irish Bees by Fitzpatrick, Murray, Byrne, Paxton and Brown (2006)[3], NBDC Species Accounts [(various)], BWARS species accounts [(various)], the Northern Ireland Priority Species webpage[5 and various], Steven Falk's Flickr collection[55] and Buglife species management advice sheets. Species distribution maps display records accessed via the NBDC's open access bee database. This database was collated by the NBDC from different sources such as CEDaR and BWARS. Sources are referenced below each map (NBN Atlas occurrence download at https://maps.biodiversityireland.ie/DataSet Accessed 2018). Species distributions within each county are then explored using this data. Species are considered seemingly lost from a County if they have not been recorded since 1990. It should be noted that data extracted from the NBDC and CEDaR can contain unverified and erroneous data.

Abbreviations

BBCT– Bumblebee Conservation Trust
BWARS– UK Bees Wasps and Ants Recording Society
CEDaR– Centre for Environmental Data and Recording, Belfast, Northern Ireland
NBDC– National Biodiversity Data Centre, Waterford, Ireland
NBN Atlas – National Biodiversity Network Atlas
NIEA

2001 IUCN Red List Categories and Criteria: version 3.1

IUCN regional Guidelines were applied to the Regional Red List of Irish Bees[3]. The Categories and Criteria can be found below. The assessment of species of bee mainly considered criteria A, B.

CRITICALLY ENDANGERED (CR)

Definition: A species is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

A. Reduction in population size
B. Geographic range in the form of either extent of occurrence or area of occupancy
C. Population size estimated to number fewer than 250 mature individuals
D. Population size estimated to number fewer than 50 mature individuals.
E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

Definition: A species is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

A. Reduction in population size
B. Geographic range in the form of either extent of occurrence or area of occupancy

C. Population size estimated to number fewer than 2500 mature individuals
D. Population size estimated to number fewer than 250 mature individuals.
E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

Definition: A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

A. Reduction in population size
B. Geographic range in the form of either extent of occurrence or area of occupancy
C. Population size estimated to number fewer than 10,000 mature individuals.
D. Population very small or restricted.
E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

Threatened bees in Northern Ireland- Species profiles

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

Target species	Counties in which target species occur	Counties that have lost target species	Conservation Status
Andrena coitana (Small flecked mining bee)	Antrim Armagh and Down	Armagh and Down	Vulnerable
Andrena denticulata (Grey-banded mining bee)	Down	Down	Vulnerable
Andrena fuscipes (Heather mining bee)	Down	Down	Vulnerable
Andrena nigroaenea (Buffish mining bee)	Antrim, Armagh and Down	Armagh and Down	Vulnerable
Andrena praecox (Small sallow mining bee)	Down and Fermanagh	Down	Vulnerable
Andrena semilaevis (Shiny-margined mini-mining Bee)	Antrim and Down	Antrim and Down	Vulnerable (VU B2ab(i,ii,iv))
Bombus (P.) barbutellus (Barbut's cuckoo-bee)	Antrim, Armagh and Down	Armagh and Down	Endangered (EN B2ab(i,ii,iv))
Bombus (P.) campestris (Field cuckoo-bee)	Antrim, Armagh, Down and Fermanagh	Down and Fermanagh	Vulnerable (VU A2bc)

Threatened bees in Northern Ireland- Species profiles

Target species	Vice-counties in which target species occur	Vice-counties that have lost target species	Conservation Status
Bombus (P.) rupestris (Red-tailed cuckoo-bee)	Antrim, Armagh and Down	Antrim and Armagh	Endangered
Bombus ruderarius (Red-shanked carder-bee)	Antrim, Armagh and Down	Antrim, Armagh and Down	Vulnerable
Colletes floralis (Northern colletes)	Antrim and Derry/Londonderry		Vulnerable
Hylaeus brevicornis (Short-horned yellow-face bee)	Down	Down	Endangered
Hylaeus hyalinatus (Hairy yellow-face bee)	Armagh	Armagh	Vulnerable (VU D2)
Lasioglossum nitidiusculum (Tufted furrow-bee)	Antrim, Armagh and Down	Antrim and Armagh	Vulnerable (VU B2ab(ii,iv))
Lasioglossum rufitarse (Rufous-footed furrow bee)	Antrim	Antrim	Vulnerable (VU D2)
Nomada goodeniana (Gooden's nomad bee)	Antrim, Armagh and Down	Armagh	Endangered (EN B2ab(ii,iv))
Nomada obtusifrons (Flat-ridged nomad bee)	Down	Down	Endangered (EN B2ab(ii,iv))

Threatened bees in Northern Ireland- Species profiles

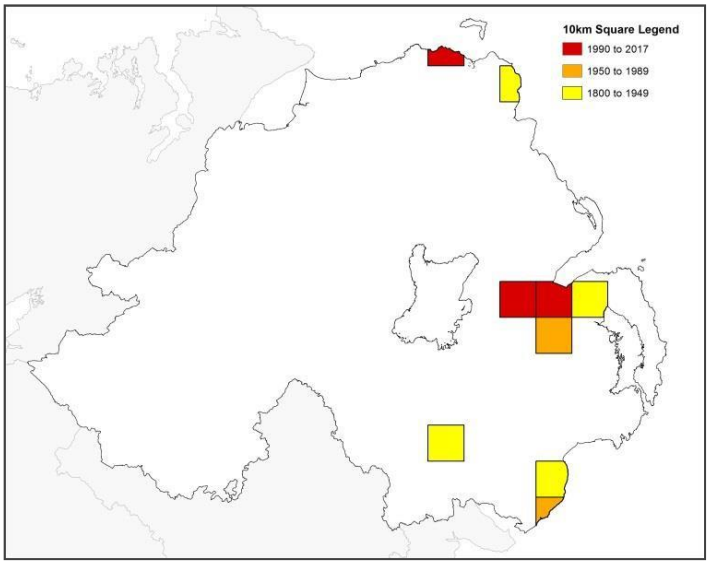
Target species	Vice-counties in which target species occur	Vice-counties that have lost target species	Conservation Status
Nomada striata (Blunt-jawed nomad bee)	Armagh	Armagh	Endangered (EN B2ab(ii,iv))
Sphecodes ferruginatus (Dull-headed blood-bee)	Armagh and Fermanagh	Armagh	Endangered (EN B2ab(ii,iv))
Sphecodes gibbus (Dark-winged blood-bee)	Down		Critically Endangered (CR D1)
Sphecodes hyalinatus (Furry-bellied blood-bee)	Fermanagh		Vulnerable (VU B2ab(ii,iv))

Male *Andrena coitana* © Paddy Saunders.

Andrena coitana (Small flecked mining bee)

Andrena coitana is a small, dark species of mining bee with narrow bands of silver white hairs on its abdomen[54, 66,136]. This species is associated with habitats such as open heathy woodland, coastal grassland, sand pits and other base-poor places, though the habitat must be structurally diverse[3, 53, 54, 55, 136]. *A. coitana* can be seen flying from early June to the end of August[53], foraging from a variety of flowers including buttercups, carnations, mallows, willowherbs and gathering pollen from roses, umbellifers, gentians, bellflowers and daisies[53, 55, 56]. This species is known to nest solitarily[66].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



Andrena coitana recorded distribution in Northern Ireland. Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees A. coitana has been assessed as being Vulnerable and has declined in Ireland, having disappeared from around 68% of its known sites since 1980[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland, *A. coitana* has been recorded

from eleven sites; in Counties Antrim, Armagh and Down. In Co. Antrim the bee was recorded from Glendun Viaduct in 1931 (A.W. Stelfox), Barnett's Park in 1971 and 1972 (R. Nash), White Park Bay in 2007 (M. Telfer) and two locations from Cave Hill in 2012 (G. Newell). The most recent record of *A. coitana* was in 2014 from Slievenacloy in the Belfast Hills (G. Newell). There are multiple locations for this species in the Belfast Hills and Cave Hill area (G. Newell pers. Comment) however this information was not in the database accessed. In Co. Armagh there has been a single record from Poyntzpass in 1921 (W.F. Johnson). In Co. Down the bee has been recorded from Scrabo quarries in 1922 (A.W. Stelfox), Kilkeel in 1931 (A.W. Stelfox), Stormont Estate in 1972 and 1973 (A.G. Irwin) and from the Mourne Coastal Path in 1985 (B. Nelson).

Typical habitat

In Northern Ireland, it appears to be associated with a variety of different habitats, having been recorded from wet grassland, upland semi-improved grassland/heath, scrub (G. Newell) and from a garden (A. Irwin). *A. coitana* has also been recorded from woodland, heath and bog in Ireland[67]. It has been noted that this species has been swept from riverside vegetation (R. Nash) and has been recorded on hogweed (M. Telfer) and bramble (A. W. Stelfox). In Ireland this species is known to nest alongside rivers in dry gravelly flats[57] and other well-drained soils [136]. R. Nash recorded this species from a sandy bank in County Antrim.

Reasons for decline

The threats to this species are not known precisely, but its decline is likely to be due to a loss of habitat, especially areas of rough, uncultivated land with scrub and flower-rich grassland for nesting and foraging [(2)]. Loss of dry gravelly flats[57] and other well-drained soils[136] near rivers due to river maintenance is also a likely threat e.g. dredging and channel widening.

Previous action

Distribution of *A. coitana* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3], though it has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. The Eastern Mournes and Scrabo have been designated as ASSIs, while Slievenacloy is a Nature Reserve[136].

Habitat management recommendations

Maintain known sites and encourage areas of flowering Umbellifers, Roses, Gentians, Daisies and Bellflowers for foraging. Encourage the creation of flower-rich habitats near areas of bare, well-drained soil[136]. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat.

Proposed action

1. Resurvey for *A. coitana* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating and examining habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of umbellifers, roses, gentians, daisies and bellflowers, and ensure these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Andrena denticulata (Grey-banded mining bee)

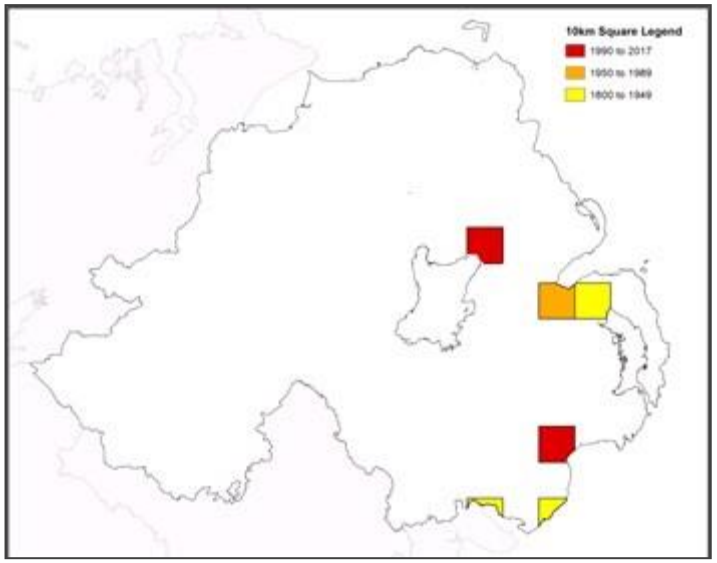
Andrena denticulata is a medium sized species of mining bee with greyish-white bands on its abdomen[54, 68, 137]. This species can use a variety of composite rich-habitats such as open woodland, grasslands, heathland, coastal areas and sandy brownfield sites[53, 54]. *A. denticulata* can be seen flying from late June to early September[53, 54] visiting mainly the flowers of roses, legumes, willowherbs, umbellifers bellflowers and daisies[53], though it has a strong preference for yellow flowers in particular those of the daisy variety[3]. It is known to nest solitarily in sandy areas[68].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Female *Andrena denticulata* © Stephen Falk

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being vulnerable and has undergone a decline in Ireland[3] having disappeared from many areas were in once occurred. It is also a Northern Ireland Priority Species and within the rest of the UK is local and never abundant[5, 53]. Within Northern Ireland, *A. denticulata* has been recorded from one location in Co. Antrim and from five locations in Co. Down. The most recent record of this bee was from Co. Antrim at a site near Antrim Area Hospital in 2017/2018 (M. Smyth). In Co. Down *A. denticulata* has been recorded from Scrabo quarries in Scrabo Country Park in 1922 (A. W. Stelfox) Rostrevor in 1922 (W.F. Johnson), Kilkeel in 1931 (A. W. Stelfox), Stormont Estate in 1972 (A. G. Irwin) and most recently from Newcastle in 2015 (S. Foster).



***Andrena denticulata* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Typical habitat

In Ireland this species has some association with woodland areas but has also been recorded from grasslands, coastal sites, dry heath and rural horticultural gardens[69] and it is

known to nest alongside rivers in dry gravelly flats[57] and other well-drained soils[137].

Reasons for decline

It is likely that a loss of connected flower rich habitats is having a negative impact on this species[137].

Previous action

Distribution of *A. denticulata* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. Two of the Northern Irish sites where this bee has been found have been designated as ASSI's, Carlingford Lough and Scrabo[137].

Habitat management recommendations

Maintain known sites and encourage areas of flowering roses, legumes, willowherbs, umbellifers bellflowers and daisies for foraging. Encourage the creation of flower-rich habitats near areas of bare, well-drained soil[137]. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat.

Proposed action

1. Resurvey for *A. denticulata* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines that include maintaining areas of flower rich habitat flowering roses, legumes, willowherbs, umbellifers bellflowers and daisies for foraging, and ensure these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Andrena fuscipes (Heather mining bee)

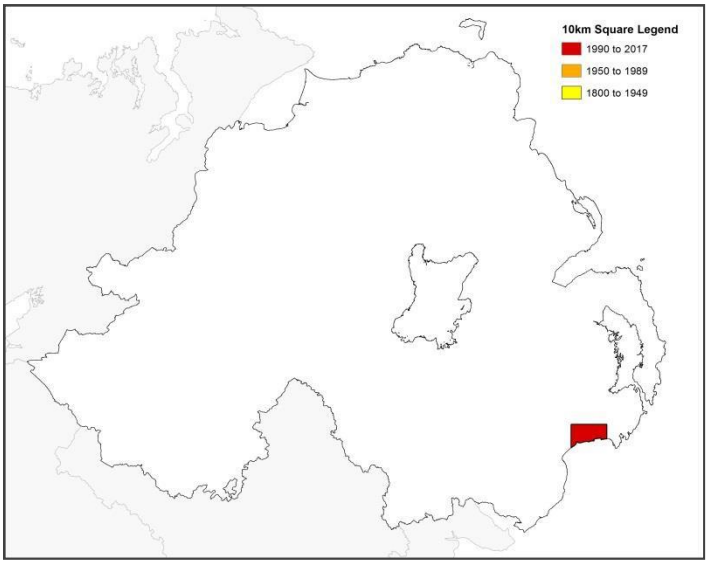
Andrena fuscipes is a heath and moorland specialist[53]. The bee can be seen flying from mid- July to mid- September[53] which coincides with the flowering of Ling heather (*Calluna vulgaris*)[138]. The males of this species can often be seen flying erratically and low over heather[53]. The presence of heather pollen sources are essential for this species[53, 70], however in Europe the bee has been known to feed from legumes, daisies, bellflowers and willowherbs[58]. *A. fuscipes* is a predominantly solitary nesting species that nests in sandy ground[54] however it has been known to nest in larger aggregations[59].

Female *Andrena Fuscipes* © Stephen Falk

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being vulnerable, and is rare in Ireland[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *A. fuscipes* has been recorded from a single site in Murlough Co. Down in 2004 (M. Mc. Allister).



***Andrean fuscipes* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National Biodiversity Network (NBN).

Typical habitat

In Ireland this species can be found in heaths and bogs nesting in dry, sandy soil and foraging from heathers[71].

Reasons for decline

The main reason for the decline of this species is a loss of lowland heath and as a result a loss of nesting and foraging habitat[138].

Previous action

Distribution of *A. fuscipes* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland however it has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. Murlough the site of Northern Ireland's only population of *A. fuscipes* has been designated as an ASSI[138].

Habitat management recommendations

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 heathers for foraging. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. The Mournes has been identified as a potential site for this species. Controlled burning of areas severely overgrown with gorse and bracken may be necessary to enhance the dry heath element of a site.

Proposed action

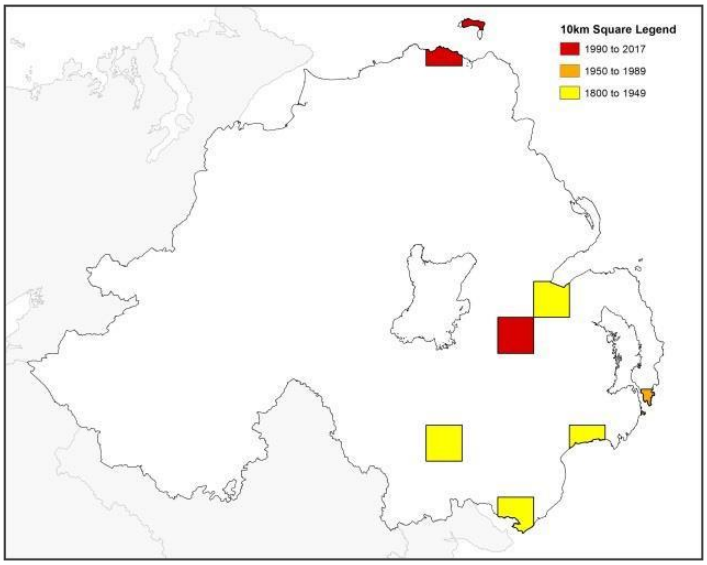
1. Resurvey for *A. fuscipes* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of heathers and enhancing the dry heathland habitat, and ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Andrena nigroaenea (Buffish mining bee)

Andrena nigroaenea is a large noticeably hairy species that emerges in early spring and has no strong preference for any particular habitat, being found in urban areas and in intensively farmed landscapes[54, 55, 72]. This bee can be seen flying from March to late July with a peak in April and May[53, 72]. *A. nigroaenea* feeds from various plants including blossoming spring shrubs and flowers such as willows and fruit trees[54]. This species also visits herbaceous plants such as dandelions and buttercups[54]. Males can often be seen resting on dandelion flowers or flying over areas of bare ground[72]. *A. nigroaenea* has been reported to nest solitarily in bare ground, in short turf[72] and in loamy soil[58, 65], with footpaths, cliffs and the soft mortar of walls also being used as nesting sites [54]. On occasions large nesting aggregations have been found[53].

Female *Andrena Nigroaenea* © Stephen Falk

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



Andrena nigroaena **recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable and has undergone a significant decline in Ireland[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *A. nigroaenea* has been recorded from seven locations in Counties Antrim, Armagh and Down. In Co. Antrim *A. nigroaenea* has been recorded from Belfast in 1902 (J.N. Halbert), Rathlin Island in 2005 (R. Paxton), White Park Bay in 2007 (M. Telfer) and most recently from Lisburn in 2016 (S. Foster). In Co. Armagh the bee has been recorded from a single location at Poyntzpass in 1921 (W.F. Johnson). In Co. Down *A. nigroaenea* has been recorded from Cranfield in 1931 (A.W. Stelfox), Dundrum in 1932 (R.C.L. Perkins) and from Killard

Point at Strangford Lough in 1970 (C.A.M. Reid).

Typical habitat

In Ireland *A. nigroaenea has been recorded* from various habitats including parks and gardens[73].

Reasons for decline

The exact reason for the decline of the *A. nigroaenea* is unclear, as this species can be found in a variety of habitats and forages from a wide variety of plants. It is likely that a loss of permanent flower-rich habitats has had a negative effect on this species[139].

Previous action

Distribution of *A. nigroaenea* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. Rathlin Island- an area where this species has been recorded- has been designated an SAC and has various ASSI'S[139].

Habitat management recommendations

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 plants for foraging. Encourage areas of flowering spring shrubs, willows and fruit trees, as well as herbaceous plants such as dandelions and buttercups. Consider targeted habitat enhancement or creation i.e. bee banks and flower-rich meadows. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat.

Proposed action

1. Resurvey for *A. nigroaenea* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines that include maintaining areas of spring blossoming shrubs and flowers, as well as areas of herbaceous plants such as dandelions and buttercups, and ensure these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Andrena praecox (Small sallow mining bee)

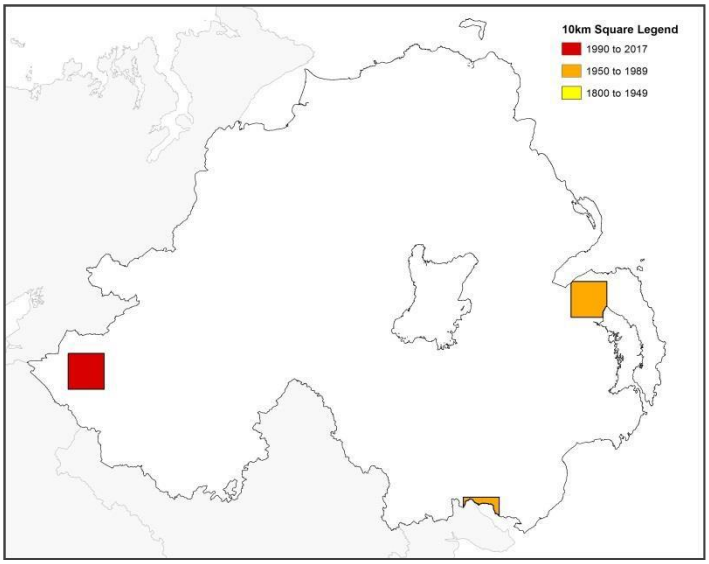
Andrena praecox is a spring species that has a preference for willows (Salix spp.) in particular Grey Willow (*Salix cinerea subsp. cinerea*) and Goat Willow (*Salix caprea*)[54], with a flight period from early March to the beginning of May that coincides with blossoming willows[53]. This species is often seen flying around these blossoms, with the females feeding from catkins[74]. Males are most likely to be spotted flying around near sunlit trees[53]. Large nesting aggregations can be found in light soils on sparsely-vegetated south-facing slopes[54], however it has also been reported to nest solitarily in mainland Europe[65, 133]. This species can be found in open broad-leaved woodland and also at the margins of heathland[53], with old quarries and brownfield sites that are rich in willow also being used[54].

Female *Andrena Praecox* ©Stephen Falk

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable and has declined considerably in Ireland[3]. It is also a Northern Ireland Priority Species[5] and is threatened in other European countries[3]. Within Northern Ireland *A. praecox* has been recorded from three locations in Counties Down and Fermanagh. In Co. Down the bee was recorded from Cairn Wood in Craigantlet in 1974 (A.G. Irwin) and from Rostrevor Forest in 1974 (R. Nash). *A. praecox* was recorded most recently in 2004 from a single location at Monawilkin in Co. Fermanagh (T. Murray).



***Andrena praecox* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Typical habitat

The most recent record of *A. praecox* in Northern Ireland was from an area of calcareous grassland in County Fermanagh. In Ireland this species can be found in a variety of different habitats but the presence of willow is essential[75]. It is known to nest in sandy/loess soils.

Reasons for decline

The exact reason for the decline of *A. praecox* is unknown. A loss of well drained ground for nesting that is in close proximity to willows as a foraging source is a strong possibility[140]. Vegetation succession in areas where willow grows might also be having a negative effect on this species e.g. the landward edges of sand dune systems and woodland margins[140].

Previous action

Distribution of *A. praecox* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. Two of the sites where this bee has been recorded have designations; Rostrevor Wood is an SAC while Craigantlet Woods are an ASSI[140].

Habitat management recommendations

Maintain sites in a reasonably open state with plenty of bare or sparsely vegetated ground in warm, sunny situations for nesting, in particular south-facing slopes. Maintain plenty of flowering willows for foraging. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines.

Proposed action

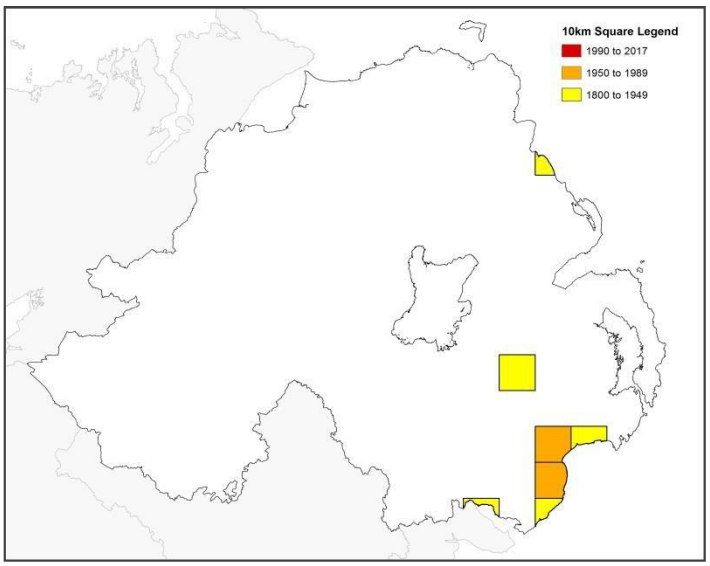
1. Resurvey for *A. praecox* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines that include increasing the abundance of willows in particular Grey Willow and Goat Willow, and ensure these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Andrena semilaevis (Shiny-margined mini-mining Bee)

Andrena semilaevis is a very small dark mining bee with narrow bands of pale hair on the abdomen and is an often overlooked species[76, 141]. It can be found in a variety of open and wooded habitats including calcareous grasslands and river banks[53, 54] and is known to take pollen from umbellifers, daisies and figworts[132]. *A. semilaevis will* visit various other plants including mustards, heathers, roses, and bedstraws, though it has a preference for speedwell and umbellifers, in particular Germander speedwell (*Veronica chamaedrys*)[53, 76]. There is little known about the nesting habits of this species [(52)]. According to Stelfox (1927) nests can be found on sunny slopes or banks, while in Europe it is reported to nest in loamy soil[53, 57 and 58]. *A. semilaevis* can be seen flying from May to August and is possibly double brooded in some areas[53, 54].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Female *Andrena semilaevis* ©Stephen Falk



***Andrena semilaevis* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being vulnerable, and it is a Northern Ireland Priority Species[3, 5]. It is also threatened in other European countries[3]. Within Northern Ireland *A. semilaevis* has been recorded from eight locations in Counties Antrim and Down. In Co. Antrim the bee has been recorded from Glenarm in 1931 (A.W. Stelfox). In Co. Down *A. semilaevis* has been

recorded from Rostrevor in 1922 (W.F. Johnson), Eglantine in 1925 (A.W. Stelfox), Kilkeel in 1931 (A.W. Stelfox), Newcastle in 1926 (W.F. Johnson) and in 1957 (A.W. Stelfox), Tullybrannigan in 1926 (W.F. Johnson) 1959 in 1961 (A.W. Stelfox).

Typical habitat

In Ireland this species is not known from any one particular habitat type, though it can be found nesting in sandy and lime soils[77]. In Eglantine County Down, the bee was recorded on Pignut (*Conopodium denudatum*) and Greater stitchwort (*Stellaria holostea*) (A.W. Stelfox).

Reasons for decline

Despite this species having been recorded from a wide variety of habitats in Ireland the habits of *A. semilaevis* are not well understood[141]. A loss of permanent flower-rich habitat and nesting sites are a likely cause of decline[141].

Previous action

Distribution of *A. semilaevis* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. Two of the sites where this bee has been recorded have designations; The Eastern Mournes is an ASSI and Rostrevor Wood is an SAC [(2)].

Habitat management recommendations

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, speedwells and umbellifers for foraging. Consider targeted habitat enhancement or creation i.e. bee banks and flower-rich meadows. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat.

Proposed action

1. Resurvey for *A. semilaevis* at its last known sites and in surrounding area to determine the status and extent of the current population.

Bombus (P.) barbutellus (Barbut's cuckoo-bee)

Bombus (P.) barbutellus is a large species of cuckoo bumblebee that is a social parasite of the Garden bumblebee (*Bombus hortorum*) in Ireland[3]. *B. barbutellus* can be found in a wide variety of habitats where the host species is present[54, 79]. Clovers, buddleia, thistles and knapweeds are visited by females, while thistles, knapweeds, scabiouses, ragworts and bramble are visited by males[55]. Female *B. barbutellus* can be seen flying from mid-April to September, while males can be seen flying from late May to September[53].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

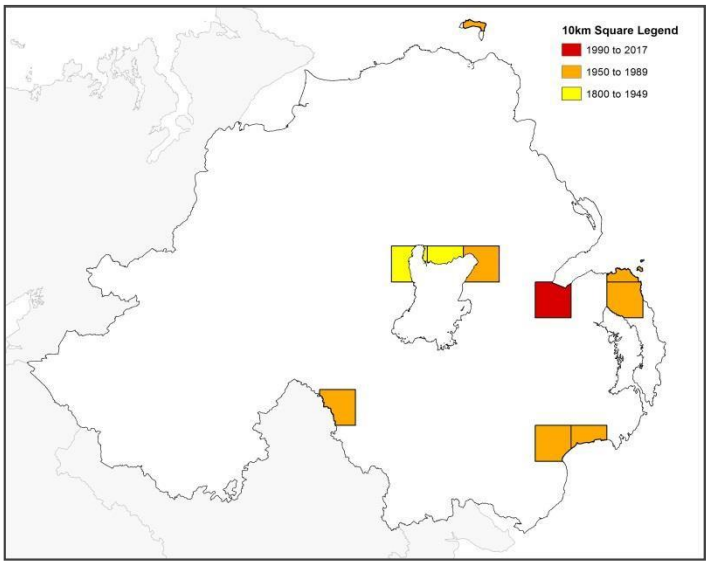
Female *Bombus barbutellus* © Stephen Falk

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being endangered, having declined by 85% since 1980[3] and it is also a Northern Ireland Priority Species[5]. Within Northern Ireland *B. barbutellus* has been recorded from 10 locations in counties Antrim, Armagh and Down. In Co. Antrim the bee has been recorded from Rathlin Island in 1973 (R. Nash), Belfast in 1975, 1976 and 1995 (J.P. Duff) and most recently from Rea's Wood at Antrim Bay in 1986 (B. Nelson). In Co. Armagh *B. barbutellus* has been recorded from Newry in 1903 (W.F. Johnson), Richhill in 1911 (H.L. Orr) and Lemnagore Wood in 1974 (V. Faulkner). In Co. Down the bee has been recorded from Dundrum in 1896 (P. Freke), Millisle in 1925 (A.W. Stelfox), Bangor in 1970 (C. Reid) and from Castlewellan in 1975 (J.P. Duff).

Typical habitat

In Northern Ireland this species was recently recorded from a railway line in Belfast (J.P. Duff). Although this species can be found in many different habitats, in Ireland it is mainly associated



Bombus barbutellus **recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

with coastal areas[53], feeding from a variety of plants[80].

Reasons for decline

As a parasite, the survival of *B. barbutellus* is dependent on the presence of a large population of its host. The host species (*B. hortorum*) is still common and widespread in Ireland, so its rarity and the decline in its population are not fully understood[142]. It appears that there is some other factor influencing the rarity of this species, perhaps a change in climate; though this needs to be investigated. It is likely that a loss of nesting and foraging habitat has negatively impacted *B. barbutellus*[142].

Previous action

Distribution of *B. barbutellus* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland, however it has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. Bumblebees are recorded through the Bumblebee Monitoring Scheme.

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. Maintain known sites and encourage areas with a good variety of flowers including dandelions, clovers, Ground ivy knapweed, devils bit scabious, thistles, brambles and shrubs such as hawthorn for foraging. Enhance populations of its host at these sites. Avoid cutting or grazing habitats during the flight period (Mid- April to 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 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. Retain isolated bushes and patches of coarse vegetation for nesting. However, oppose excessive scrub encroachment, preferably using rotational management.

Increase the abundance of host species by increasing the amount and connectivity of wildflower-rich habitats at a landscape scale – for example via B-Lines.

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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. wildflower meadows, areas of

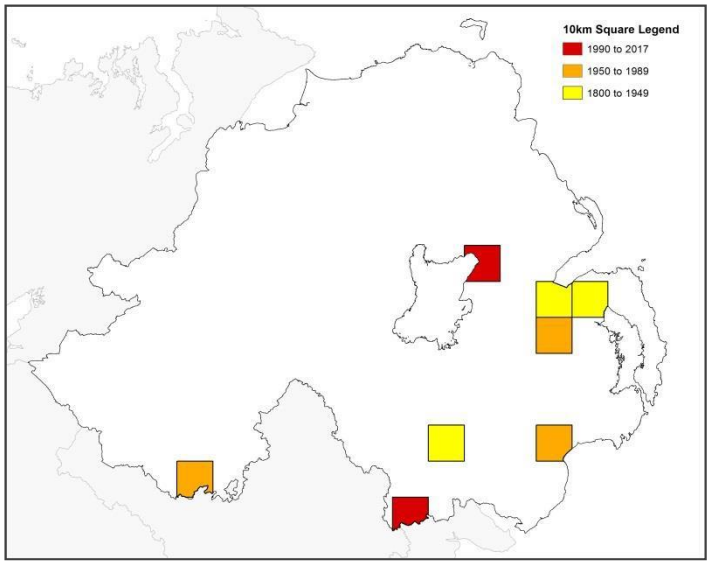
Proposed action

1. Resurvey for *B. barbutellus* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating why the ecologically similar *B. hortorum* is common whereas *B. barbutellus* is declining, by examining the foraging range and queen dispersal distance of the latter; competition for nesting sites; fragmentation of suitable nesting habitat may prevent males finding new queens; and examining habitat requirements. Study of the foraging and nesting behaviour is urgently needed.
4. Develop habitat management guidelines and include in management plans e.g. creation and restoration of grassland and suitable grazing regimes, encouraging late flowering.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI'S or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Bombus (P.) campestris (Field cuckoo-bee)

Bombus (P.) campestris is a small cuckoo bumblebee that is very variable in appearance and is a social parasite of carder bumblebees[54, 55, 80]; In Ireland the main host species is the Common carder bumblebee (*Bombus pascorum*)[3]. Female *B. campestris* can usually be seen flying from mid or late May to mid-September, while males can be seen from July to October[53]. Spring females feed from dandelions, clovers, Ground ivy (*Glechoma hederacea*) and shrubs such as hawthorn, while summer females and males feed from knapweed, devils bit scabious, thistles and brambles[54]. *B. campestris* can be found in a wide variety of habitats where the host species is present including rural and urban areas, wooded and open habitats[53, 54].

Male *Bombus campestris* © Stephen Falk



***Bombus campestris* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National Biodiversity Network (NBN).

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable, having declined by 66% since 1980[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *B. campestris* has been recorded from 9 sites in counties Antrim, Armagh, Down, and Fermanagh. In Co. Antrim the bee has been recorded from Killead in 1909 (H.L. Orr) and 1923 (W.F. Johnson), Barnett's Park in 1989 (R. Nash) and most recently from Antrim Castle Gardens in 2013 (R. Wilson). In Co. Armagh the bee has been recorded from Poyntzpass in 1921 (W.F. Johnson) and from Clonalig Lough in 1997 (B. Nelson). In Co. Down the bee has been recorded

from Belmont in 1909 (H.L. Orr), Scrabo quarries in 1922 (A.W. Stelfox) and Castlewellan in 1975 (J.P. Duff). In Co. Fermanagh *B. campestris* has been recorded from Derrybeg on the west shore of Upper Lough Erne (North of Crom) in 1987 (B. Nelson).

Typical habitat

In Antrim Castle Gardens the bee was found in flower beds and borders (R. Wilson) while at Derrybeg it was recorded from an area of damp meadow on a thistle, which was near deciduous woodland (B. Nelson) In Ireland this species can be found in a variety of different habitats, breeding in the nests of *B. pascuorum*. It is likely that the nests of *B. muscorum*, *B. ruderarius* and *B. sylvarum* are also used[81].

Reasons for decline

As a parasite, the survival of *B. campestris* is dependent on the presence of a large population of its host. The host species (*B. pascuorum*) is still common and widespread in Ireland, so its rarity and the decline in its population are not fully understood[143]. It appears that there is some other factor influencing the rarity of this species, perhaps a change in climate; though this needs to be investigated. It is likely that a loss of nesting and foraging habitat has negatively impacted *B. campestris*[143].

Previous action

Distribution of *B. campestris* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3], though Bumblebees are recorded through the Bumblebee Monitoring Scheme.

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. Maintain known sites and encourage areas with a good variety of flowers including dandelions, clovers, Ground ivy knapweed, devils bit scabious, thistles, brambles and shrubs such as hawthorn for foraging. Enhance populations of its host at these sites. Avoid cutting or grazing habitats during the flight period (Mid- April to September).

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. 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat – for example via B-Lines. Consider targeted habitat enhancement or creation i.e. wildflower meadows, areas of rough grassland at field

Proposed action

1. Resurvey for *B. campestris* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in ecological knowledge, which includes investigating why the ecologically similar *B. pascuorum* is common whereas *B. campestris* is declining, by examining the foraging range and queen dispersal distance of the latter; competition for nesting sites; fragmentation of suitable nesting habitat may prevent males finding new queens; and examining habitat requirements. Study of the foraging and nesting behaviour is urgently needed.
3. Develop habitat management guidelines and include in management plans e.g. creation and restoration of grassland and suitable grazing regimes, encouraging late flowering.
4. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.

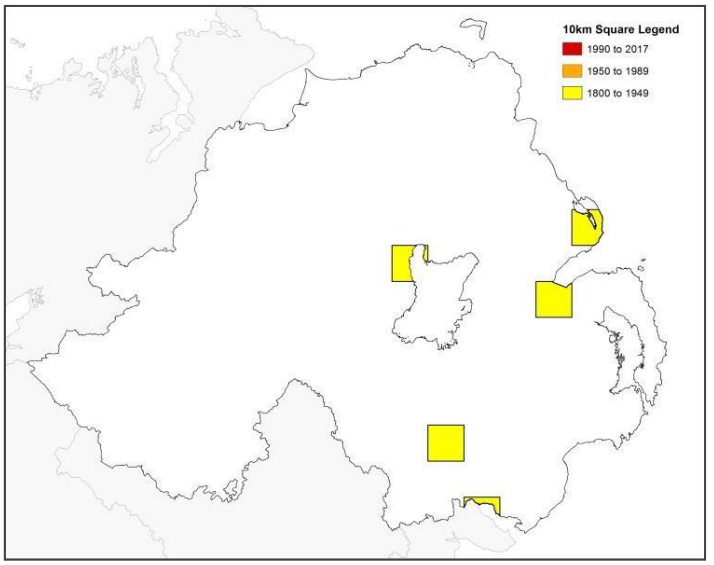
5. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat.
6. Consider notifying sites supporting key populations as ASSI'S or equivalent.
7. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
8. Ensure that this species is represented on all relevant LBAPS.

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 moss[61]. It mostly flies between April and September.

Queen *Bombus ruderarius* © Stephen Falk

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets and Steven Falk's Flickr collection



***Bombus ruderarius* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being endangered, having declined by 59% since 1980[3]. It is also a Northern Ireland Priority Species and is nationally scarce in Britain[5]. Within Northern Ireland *B. ruderarius* has been recorded from three sites in Counties Armagh and Down. In County Antrim the bee has been recorded from Whitehead in 1900 (C.W. Buckle) and Cave Hill 1909 (H.L. Orr). In County Armagh *B. ruderarius* has been recorded from Richhill 1909 (H.L. Orr) and Poyntzpass in 1897 and 1921 (W.F. Johnson).

In County Down *B. ruderarius* has been recorded from Rostrevor in 1909 (H.L. Orr), and most recently from Eglantine in 1925 (A.W. Stelfox). This species is likely extinct in Northern Ireland as there are no post-1950 records.

Typical habitat

B. ruderarius can be found in a wide variety of habitats though in Ireland it is mainly associated with flower-rich grasslands[53, 83].

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' pasture[61]. 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 of *B. ruderarius* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3], though Bumblebees are recorded through the Bumblebee Monitoring Scheme. 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 effective[62].

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 habitat[63]. 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.

Proposed action

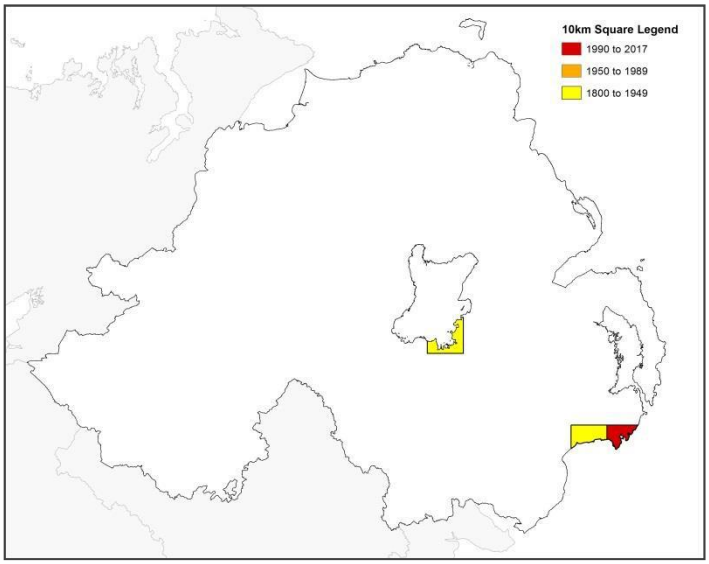
1. Resurvey for *B. ruderarius* at its last known sites and in surrounding area to determine the status and extent of the current population. If refound then put together a conservation plan.

Brownfield habitat in Belfast.

Female *Bombus (P.) rupestris* © Stephen Falk.

Bombus (P.) rupestris (Red-tailed cuckoo-bee)

Bombus (P.) rupestris is a social parasite of the Red-tailed Bumblebee (*Bombus lapidarius*), a Nationally threatened species in Ireland[3]. On average the female of this species is the largest cuckoo bumblebee in the British Isles and they also are the only female bumblebee with dark brown wings[53, 55]. Spring females feed from a variety of flowers including Kidney Vetch (*Anthyllis vulneraria*), Oil-seed Rape (*Brassica napus*), Oxeye Daisy (*Leucanthemum vulgare*), comfreys and dandelions. New queens and males feed from thistles, ragworts, brambles, Teasel, Devils bit scabious (*Succisa pratensis*) and various garden plants such as Lavender[54]. *B. rupestris* can be found in a wide variety of habitats where the host species is present[53]. Females can be seen flying from late May and June, while males and new queens can be seen from July to September[53].



Its recorded distribution in Northern Ireland. Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National Biodiversity Network (NBN).

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being endangered, having declined by 59% since 1980[3]. It is also a Northern Ireland Priority Species and is nationally scarce in Britain[3, 5]. Within Northern Ireland *B. rupestris* has been recorded from three locations in Counties Armagh and Down. In Co. Armagh the bee was recorded from the shore of Lough Neagh at Kinnegoe in 1922 (A.W. Stelfox). In Co. Down *B. rupestris* has been recorded from Dundrum in 1911 (H.L. Orr) and most recently from Killough in 2015 (R. Anderson).

Typical habitat

In Ireland *B. rupestris* can be found from many different habitats though it is mainly associated with dry, unimproved, flower-rich grassland and coastal areas[85, 145]. In Northern Ireland the most recent record of the bee was from Killough, a coastal site (R. Anderson). *B. lapidarius* can be found in a wide variety of habitats but is mainly associated with coastal dunes and unimproved grassland in Ireland[3, 55]. Workers forage from a wide variety of plants though they are particularly fond of yellow composites, thistles, knapweeds and legumes such as White Clover for foraging[55].

Reasons for decline

As a parasite, the survival of *B. rupestris* is dependent on the presence of a large population of its host[145]. The host species, like many bumblebee species, appears to have declined in Northern Ireland as its habitat has been lost; it is likely that the loss of extensive areas of flower-rich grassland for nesting and foraging has had a negative impact on *B. rupestris*[145].

Previous action

Distribution of *B. rupestris* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3], though Bumblebees are recorded through the Bumblebee Monitoring Scheme. Murlough is a National Nature Reserve owned and managed by the National Trust. It is also designated as a SAC and ASSI. *B. rupestris* has been identified as a conservation priority in the Regional Red List of Irish Bees[3].

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. Maintain known sites and encourage areas with a good variety of flowers including Kidney Vetch, Oil-seed Rape, Oxeye Daisy, comfreys, dandelions, thistles, ragworts, brambles, Teasel, Devils bit scabious for foraging. Enhance populations of its host at these sites. Avoid cutting or grazing habitats during the flight period (Late- May to 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 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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. wildflower meadows, areas of rough grassland at field margins etc.

Proposed action

1. Resurvey for *B. rupestris* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in autecological knowledge, which includes investigating the habitat requirements and ecology of its host *B. lapidaries*. Study of the foraging and nesting behaviour is urgently needed.
4. 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).
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.

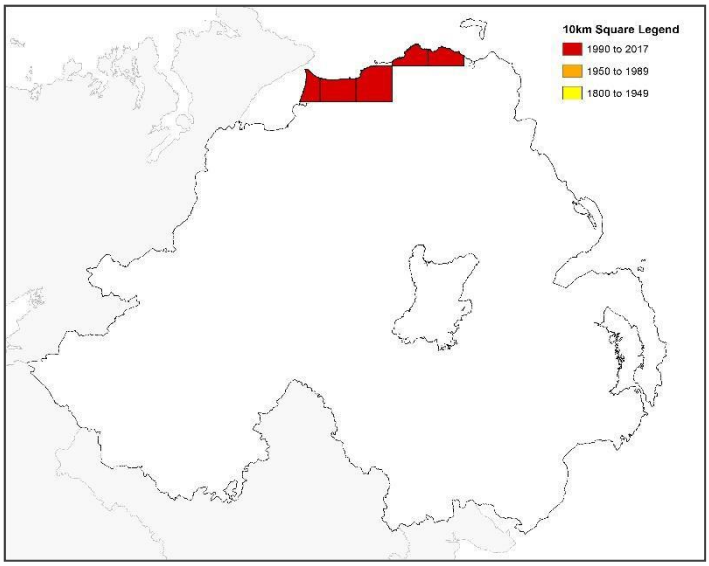
6. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat, and improve connectivity to other nearby sites supporting suitable habitat. Identify. Identify opportunities within the B-Lines network where appropriate.
7. Consider notifying sites supporting key populations as ASSI's 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.
10. Ensure representation on all relevant LBAPs or Nature Partnerships.

Colletes floralis at Portstewart Strand.

Colletes floralis (Northern colletes)

Colletes floralis is the only species of bee that is more widespread in Ireland than in Great Britain[3]. This species is restricted to sandy grasslands, machair grassland and herb rich sand dune systems[53]; In Ireland it is confined to the coast[3]. Its nesting burrows can usually be found on sheltered south-facing slopes and banks in firm sand that is either bare or very sparsely vegetated[86] but can also occur occasionally in the soft mortar of walls[53, 54, 55]. This species forages from a variety of plants including wild thyme, Lady's bedstraw, legumes, buttercups, brambles, crucifers and composites, though has a preference for umbellifers such as Hemlock Water-dropwort and Wild carrot[156]. *C. floralis* can be seen flying from early June to early August[53].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



***Colletes floralis* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being vulnerable, with Ireland holding up to 90% of the remaining populations of the bee in the Atlantic Zone with the species having being subject to a severe decline in northern Europe[3]. It is also a Northern Ireland Priority Species and a UK Priority Species[3, 5] with the UK and Ireland populations representing about 50% of the world population (JNCC, 2010). Within Northern Ireland *C. floralis* has been recorded from five locations in Counties Antrim and Derry/Londonderry. In Co. Antrim the bee was recorded from Runkerry (Bushfoot) Dunes in in 2003 (J. Hunter), 2008 (E. Davis) and in 2012 (R. Anderson) and from White Park Bay ASSI in 2003 (J. Hunter), 2007 (M. Telfer), 2008 (E. Davis) and most recently in 2015 (P. Barton). In Co. Derry/Londonderry *C. floralis has been recorded from* Magilligan in 2009 (E. Davis), from Ballymaclary NNR in 2003 (J. Hunter) and in 2009 (E. Davis), from the Umbra in 2004 (R. Paxton) and in 2008 (E. Davis) and from Portstewart Dunes and Bann Estuary in 2003 (J. Hunter), 2008 (E. Davis; M. Telfer), 2010 (D. Allen) and in 2014 (P. Mc Erlean).

Typical habitat

C. floralis is strongly associated with flower rich habitat in coastal sand dune systems in Ireland, nesting in sandy soils[87]. At White Park Bay an aggregation consisting mainly of males was recorded but there was no sign of nesting (M. Telfer), while at Runkerry (Bushfoot) Dunes burrows were found on a sandy profile above rabbit burrows (R. Anderson). *B. lapidarius* can be found in a wide variety of habitats but is mainly associated with coastal dunes and unimproved grassland in Ireland[3, 55]. This species forages from a wide variety of plants though is particularly fond of umbellifers[54]. In Northern Ireland it has been recorded on yellow-composites (M. Telfer), on Ragwort (*Senecio jacobaea*) (R. Anderson), on Mother-of-Thyme (*Thymus praecox*) (R. Paxton) and on Hemlock water-dropwort (*Oenanthe crocata*) (M. Telfer).

Reasons for decline

The principal threats to this species are from loss of forage areas and nesting sites. These must be in close proximity (<500m)[146]. Irish sand dune systems are at increased risk from destruction by coastal development and it is likely that the loss of extensive areas of flower-rich grassland for nesting and foraging has had a negative impact on *C. floralis*[146].

Previous action

Distribution of *C. floralis* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. In 1999 a UK Species Action Plan was published for this species. Implementation of the Northern Ireland Habitat Action Plan for Coastal Sand Dunes. *C. floralis* has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. All the known sites are within NNRs or ASSIs, apart from Bushfoot dunes. Ballymaclary and the Umbra are part of a SAC

Habitat management recommendations

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. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. bee banks, wildflower meadows etc. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards the overall character and stability of a site, and holds back succession. Extensive grazing, particularly if heavy and prolonged, should be avoided as this will significant 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.

Proposed action

1. Continue and expand on-going monitoring of known *C. floralis* populations.
2. Survey the surrounding area to determine the status and extent of the current populations.
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of early successional flower-rich dune habitat and ensure that this is included in management plans.
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 – for example via B-Lines.
6. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
7. 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.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

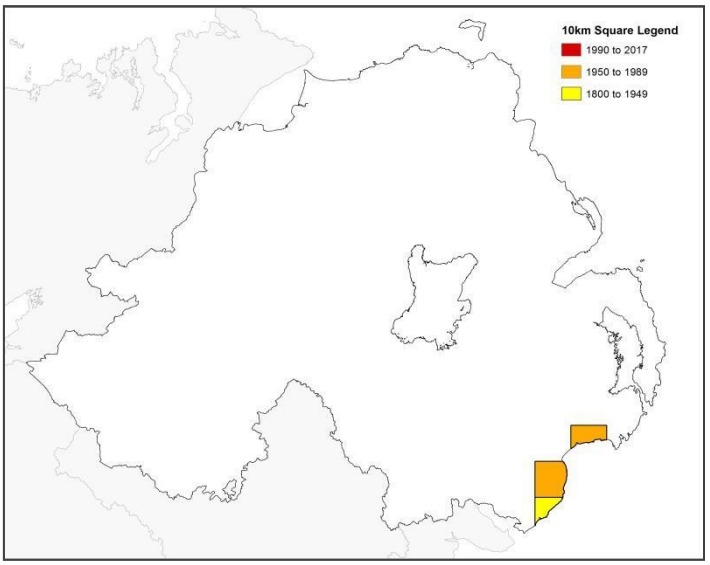
Coastal sand dune habitat at Portstewart Strand.

Male *Hylaeus brevicornis* © Ian Tew. Accessed via BWARS.

Hylaeus brevicornis (Short-horned yellow-face bee)

Hylaeus brevicornis is the smallest species of yellow-faced bee (*Hylaeus*) found in Ireland, with a wing length not exceeding 4mm[55, 147]. It nests in hollow plant stems in particular those of bramble[54, 88]. This species can be found in a variety of habitats, in particular areas of scrub and bramble patches where there is early successional flowery habitat nearby[54]. The flowers of Sheep's-bit (*Jasione Montana*) and Angelica (*Angelica sylvestris*) are said to be favoured by adults[147], though flowers of thistles, umbellifers, ragworts, thymes, stonecrops, mignonettes, hawk's-beards and Sea Spurge (*Euphorbia paralias*) are also visited[54]. *H. brevicornis* can be seen flying from late May to mid-September[53].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



***Hylaeus brevicornis* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being endangered and is a rare and declining species in Ireland[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *H. brevicornis* has been recorded from three sites in County Down. From Kilkeel in 1931 (A.W. Stelfox), Glassdrumman in 1956 (A.W. Stelfox) Murlough House; Dunes in 1954 (A.W. Stelfox), and most recently from in Murlough National Nature Reserve 1973 (R. Nash) 1975 A.G. Irwin.

Typical habitat

The precise habitat associations of this species are unclear, however *H. brevicornis* has most frequently been recorded from coastal and woodland sites in Ireland[89, 147]. It is assumed that the presence of scrub in particular bramble is essential for nesting[147].

Reasons for decline

Although the precise threats to this species are not known, a loss of habitat is likely to be having a negative impact, in particular areas of scrub and flower-rich grassland[147]. The removal of scrub including bramble from coastal sites might be conflicting with the conservation needed for this species.

Previous action

Distribution of *H. brevicornis* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. The latest record for the bee *H. brevicornis* was at Murlough National Nature Reserve, a designated SAC and ASSI that is owned and managed by the National Trust.

Habitat management recommendations

Maintain areas of early successional habitat at known sites and encourage areas of flowering Sheep's-bit and umbellifers, in particular Wild Angelica for foraging. Safeguard areas of scrub and bramble on these sites to ensure nesting locations. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. wildflower meadows, bundles of dead bramble etc.

Proposed action

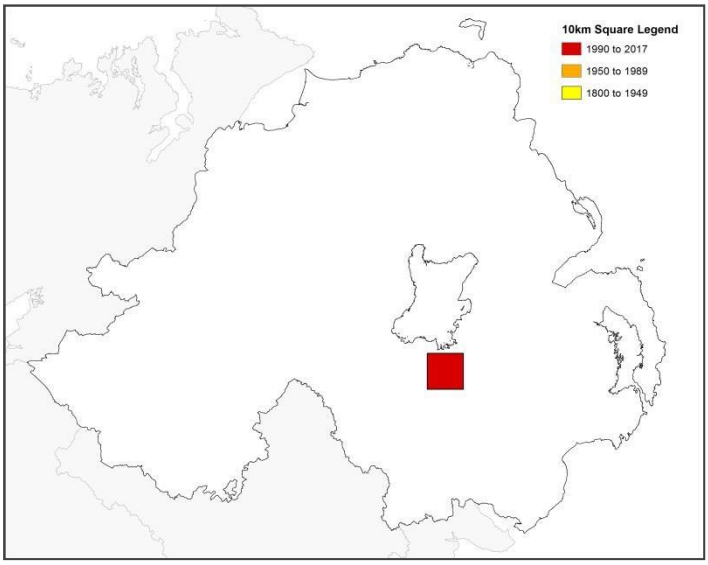
1. Resurvey for *H. brevicornis* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines that include maintaining areas of scrub and bramble patches and early successional flowery habitats and encourage the presence of Sheep's-bit, Angelica, thistles, umbellifers, ragworts, thymes, stonecrops, mignonettes, hawk's-beards and Sea Spurge. Ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Hylaeus hyalinatus (Hairy yellow-face bee)

Hylaeus hyalinatus is a small unobtrusive species that is difficult to see in the field, with identification also being difficult[148]. Male *H. hyalinatus* have a hairy face which distinguishes them from other species in this group[55]. This species can be found in a variety of habitats, though appears to have a preference for areas where light sparsely vegetated soils are present[54] such as at the bases of cliffs and shingle forelands[53]. Although this species visits a wide variety of flowers it is frequently found on umbellifers and thistles[54]. *H. hyalinatus* has been known to nest in many different kinds of suitable cavities[53] including the soft mortar of walls, in soft cliff walls and in bramble stems[53, 54, 134]. This species can be seen flying from late May to the beginning of September[53].

Female *Hylaeus hyalinatus* (c) Stephen Falk.

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



Hylaeus hyalinatus **recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being vulnerable and is rare species which is threatened in Ireland[3]. It is also a Northern Ireland Priority Species[5]. In Northern Ireland *H. hyalinatus* has been recorded from a single site in County Armagh at Brackagh Bog National Nature Reserve in 1992 (B. Nelson).

Typical habitat

In Ireland it is known from a variety of different habitats, though is most commonly associated with coastal areas[91, 148]. In Northern Ireland the bee was recorded from cutover bog on the flowers of Tormentil (*Potentilla erecta*) (B. Nelson). The bee is thought to nest in plant stems, sandy banks and dry walls and it has been recommended that surveys for adult bees should include searching sunny clumps of brambles[148].

Reasons for decline

Although the precise threats to this species are not known, a loss of habitat is likely to be having a negative impact, in particular areas of scrub and flower-rich grassland[148]. The main threats to bogs are afforestation, peat cutting for horticulture, drainage for agriculture, overgrazing and fires.

Previous action

Distribution of *H. hyalinatus* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. The only Northern Irish site where this species has been recorded Brackagh Bog is a designated National Nature Reserve[148].

Habitat management recommendations

Maintain areas of early successional habitat and areas where light sparsely vegetated soils are present at known sites and encourage areas of flowering thistles and umbellifers for foraging. Safeguard areas of scrub and bramble on these sites to ensure nesting locations. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. wildflower meadows, bundles of dead bramble etc.

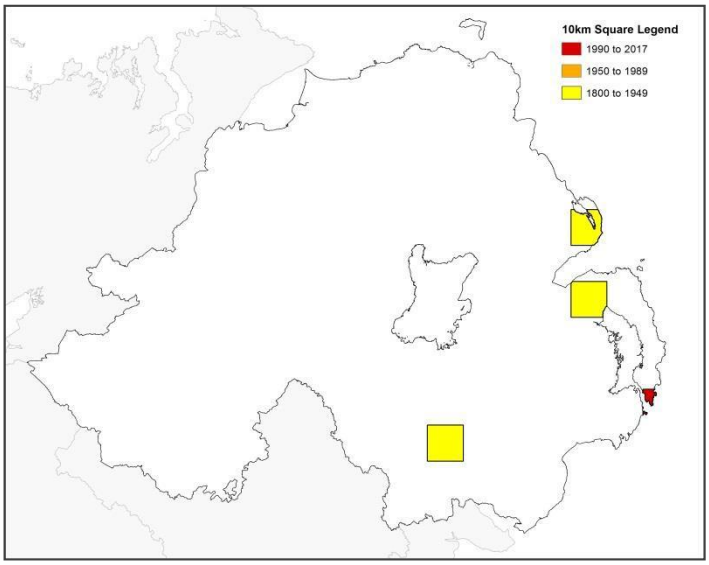
Proposed action

1. Resurvey for *H. hyalinatus* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines that include maintaining areas of scrub and bramble patches and early successional flowery habitats and encourage the presence of flowering thistles and umbellifers for foraging. Ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Lasioglossum nitidiusculum (Tufted furrow-bee)

Lasioglossum nitidiusculum is a small, solitary base-banded furrow bee (Lasioglossum) that is associated with sandy soils and can be found in a variety of different habitats including soft rock cliffs, sand pits, heathland, brownfield sites, coastal dunes and grasslands[53, 54, 55, 92]. This species feeds and gathers pollen from various plants including buttercups, spurges, umbellifers, figworts, borages, mustards, willows and daisies[132]. It is mostly associated with yellow composites such as Cat's ear (*Hypochaeris radicata*) and Smooth hawksbeard (*Crepis capillaris*), having a preference for yellow-flowered daisies[54, 55,92]. *L. nitidiusculum* is known to nest in steep south facing slopes and cliffs and although large aggregations were recorded in the early twentieth century[57] it is now rare to find even small aggregations[53]. Females can be seen flying from mid-March to October while males can be seen flying from mid-June to mid-September[53].

Female *Lasioglossum nitidiusculum* © Stephen Falk.



***Lasioglossum nitidiusculum* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable and has greatly declined in Ireland and Britain[92, 3]. It is also a Northern Ireland Priority Species. Within Northern Ireland *L. nitidiusculum* has been recorded from counties Armagh and Down. In Co. Armagh the bee was recorded from a single location at Poyntzpass in 1910 (W.F. Johnson). In Co. Down *L. nitidiusculum* has been

recorded from two sites in Newtownards in 1922 (A.W. Stelfox) and most recently from Killard Point at Strangford Lough in 2004 (R. Paxton).

Typical habitat

In Ireland this is an unobtrusive species that is associated with dry heath, nesting in bare, well-drained soils that are in close proximity to flower-rich habitats. It forages from umbellifers, Wild carrot, knapweeds, Dandelion, hawkbits, catsears, mustard plants and speedwells[93, 149].

Reasons for decline

The threats to this species and its habits are not well known in Ireland, but its decline is likely to be due to the loss of permanent flower-rich habitats and nesting sites[149]. It is likely that a loss of lowland heath is also having a negative effect on this species

Previous action

Distribution of *L. nitidiusculum* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for *L. nitidiusculum* in Ireland, however it has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. The Northern Irish site where this species was most recently recorded, Killard is a designated ASSI that is part of the Strangford Lough SAC[149].

Habitat management recommendations

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 plants for foraging. Enhance populations of its host at these sites. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. At inland sites, continue any established management (e.g. grazing or cutting) or disturbance that contributes towards 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.

Proposed action

1. Resurvey for *L. nitidiusculum* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of yellow composites such as Cats ear, Smooth hawk's beard and yellow-flowered daisies, as well as buttercups, spurges, umbellifers, figworts, borages, mustards, willows and daisies for foraging. Ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Lasioglossum rufitarse (Rufous-footed furrow Bee)

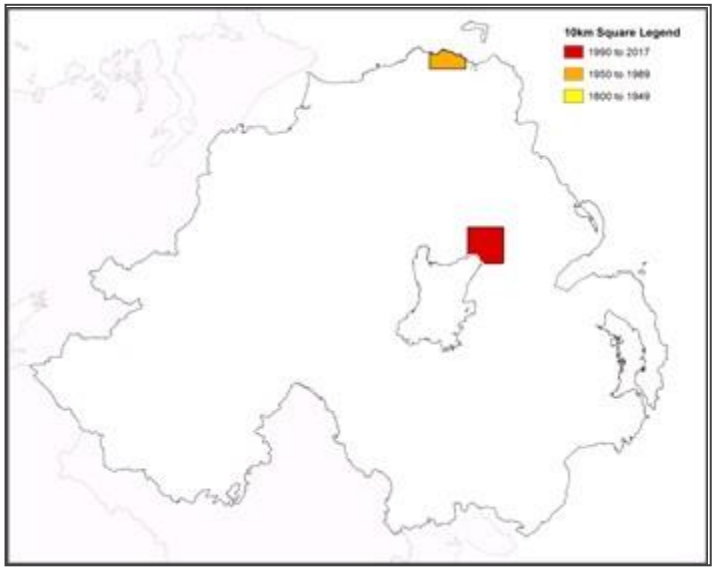
Lasioglossum rufitarse is a small dark base-banded furrow bee (*Lasioglossum*) that is described as "the most woodland loving" species of this group[54, 55]. Although *L. rufitarse* is predominantly recorded from open woodland, it can be found in a variety of other habitats such as abandoned sandstone quarries, partially wooded brownfield sites and heathland[53, 54]. It visits an assortment of different flowers including Grey willow (*Salix cinerea*) and hawkish composites though it appears to have a preference for bramble and ragwort[53, 54]. *L. rufitarse* has been known to gather pollen from daisies, heathers, buttercups and roses[132]. It nests in a variety of different earth exposures including the banks at the sides of ditches[135] and the exposed soils on upturned root-plates[53, 54, and 94]. Females can be seen flying from early April to the beginning of October while males can be seen flying from mid July to late August[53].

Female *Lasioglossum rufitarse* (c) Ian Tew. Accessed via BWARS.

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable and is rare in Ireland[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *L. rufitarse* it has been recorded from two locations in Co. Antrim. From White Park Bay in 1985 (B. Nelson) and most recently from a site near Antrim Area Hospital in 2017/2018 (M. Smyth).



***Lasioglossum rufitarse* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

(M. Smyth) however this was not in the database used and so has not been included.

Typical habitat

The habitat requirements of his species in Ireland are not fully understood[95]. The only Northern Irish site where a nesting aggregation was discovered consisted of a dry bank in coastal grassland by a small stream[150]. This species is possibly a host of the Fabricius' Nomad Bee (*Nomada fabriciana*) and the Dull-Headed Blood Bee (*Sphecodes ferruginatus*); a species that in the Regional Red List of Irish Bees has been assessed as being Endangered[3, 53, 54(see pg.53)].

Reasons for decline

It is likely that *L. rufitarse* has declined as a result of a loss and degradation of habitat both for foraging and nesting. Inappropriate management such as over-grazing or under-grazing of livestock in areas of species rich grassland particularly at the coast could be negatively impacting on this species. Inappropriate management of forests could also be having a negative effect e.g. planting trees too close to each other results in a lack of open spaces with foraging potential and the removal of fallen trees with exposed root plates will remove potential nest sites. This species requires its foraging areas to be in close proximity to nesting sites, which makes the threat from habitat loss and degradation greater[150].

Previous action

Distribution of *L. rufitarse* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for *L. rufitarse* in Ireland[3]. The only Northern Irish site where this species has been recorded, White Park Bay, is a designated ASSI that is owned by the National Trust and is part of the North Antrim coast SAC[150].

Habitat management recommendations

Maintain site in a reasonably open state with plenty of bare or sparsely vegetated ground in warm, sunny situations for nesting, and plenty of flowering plants including daisies, heathers, buttercups and roses for foraging. Continue any established management (e.g. grazing or cutting) or disturbance that contributes towards the overall character and stability of a site, and holds back succession. Prevent/reduce the removal of scrub that contains bramble and ragwort. Consider targeted habitat enhancement or creation i.e. bee banks. Oppose any activities which may significantly reduce or accelerate the natural rates of erosion, and retain any adjacent areas of unimproved grassland. In woodland areas, encourage habitat

Proposed action

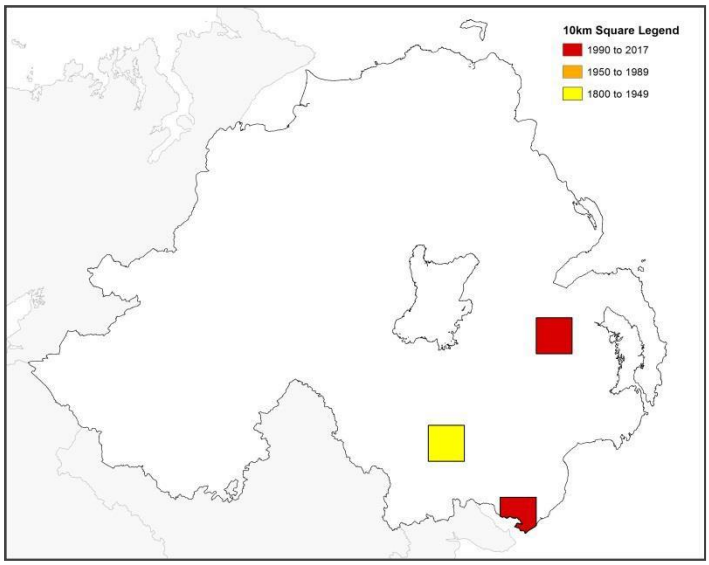
1. Resurvey for *L. rufitarse* at its last known sites and in surrounding area to determine the status and extent of the current population.

Nomada goodeniana (Gooden's nomad bee)

Nomada goodeniana is a large, very bright, black and yellow nomad bee (Nomada)[55, 96] that visits a variety of flowers including cow parsley, forget-me-nots, Greater stitchwort (*Stellaria holostea*), yellow composites such as dandelions and spring flowering blossoms[53, 54]. In Ireland it parasitises nests of the Buffish mining bee (*Andrena nigroaenea*) (see pg. 20), and possibly the Chocolate mining bee (*Andrena scotica*) [55]. *N. goodeniana* can be found wherever its host species is established, in many different types of habitats including flower rich meadows, open deciduous woodland and coastal cliffs;[53]. It can be seen flying from April to June[54], often in sunny places flying low over short vegetation and bare ground[96]. *A. nigroaenea* nests in well- drained soil and has no strong preference for any particular habitat[54].

Female *Nomada goodeniana* © Stephen Falk.

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



Nomada goodeniana **recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being endangered and has declined in Ireland[3], though it should be noted that recent efforts have pointed to this species being under-recorded (NBDC, species account). It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *N. goodeniana* has been recorded from four sites in Counties Antrim, Armagh and Down. In Co. Antrim the bee has been recorded from Moreland's Meadow, in Lagan Valley Regional Park in 2012 (J. O'Boyle) In Co. Armagh *N. goodeniana* was recorded from a single

location at Poyntzpass in 1919 (W.F. Johnson). In Co. Down the bee has been recorded from Cranfield Point 2012 (J. O'Boyle) and most recently from Lady Dixon Park in 2013 (G. Newell).

Typical habitat

In Northern Ireland *N. goodeniana* has been recorded from a meadow (J. O'Boyle), flowerbeds and borders and a sandy bank (G. Newell). In Ireland it can be found in a wide variety of habitats wherever its host is present, visiting various plant species including Dandelions and willows[97].

Reasons for decline

The host species *A. nigroaenea* is Vulnerable (V) in Ireland and it is likely that any decline in this species will have a knock on effect on *N. goodeniana*[3, 151] (see pg.19). A loss of foraging and nesting sites, in particular areas of permanent flower-rich habitats as a result of agricultural intensification and development is likely the main threat to both species.

Previous action

Distribution of *N. goodeniana* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland, though it has been identified as a conservation priority in the Regional Red List of Irish Bees[3].

Habitat management recommendations

Encourage the creation of flower-rich habitats near areas of bare, well-drained soil[151]. Maintain known sites and encourage areas of flower-rich habitats for foraging. Enhance populations of its host at these. 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 spring shrubs and flowers such as willows and fruit trees, as well as dandelions and buttercups [54]. Therefore a variety of successional stages are required. 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.

Proposed action

1. Resurvey for *N. goodeniana* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in ecological knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of cow parsley, forget-me-nots, Greater stitchwort, yellow composites such as dandelions and spring flowering blossoms for foraging. For its host develop habitat management guidelines to include increasing the abundance and enhancing areas of bare, well-drained soil and of flower-rich habitats that include legumes such as bird's-foot trefoils and vetches. Ensure these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
6. 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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Nomada obtusifrons (Flat-ridged nomad bee)

Nomada obtusifrons is a small species of cuckoo bee[55, 98] that in Ireland parasitises the nests of the Small flecked mining bee (*Andrena coitana*)(see pg. 14). This species can use a variety of habitats including open woodlands, the edge of heathland and scrubby grassland; being found in areas where its host species is established[53, 54]. *N. obtusifrons* visits various flowers including bramble, tormentil and yellow composites such as dandelions[54]. It mostly flies from June to August, but sometimes can be seen into September[53].

Female *Nomada obtusifrons* © Paddy Saunders.

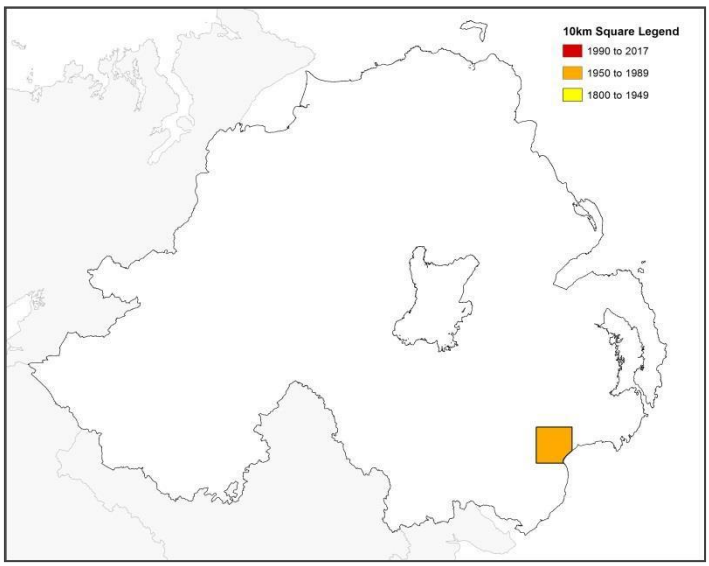
Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets and Steven Falk's Flickr collection.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Endangered, having declined both in Ireland and Britain[3]. Within Northern Ireland *N. obtusifrons* has been recorded from a single location in 1957, at Tullybrannigan in County Down (A.W. Stelfox).

Typical habitat

In Ireland *N. obtusifrons* has mainly been recorded from woodland sites[99]. The host species requires a structurally diverse habitat and is usually found in heathy woodland and on the edge of woodlands[3]. It nests alongside rivers in dry gravelly flats[57] and other well-drained soils[136]. *N. obtusifrons* has been known to feed from a variety of plant species including heathers thymes, thistles, hawkweeds and Sheep's bit[133].



***Nomada obtusifrons* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Reasons for decline

The host species *A. coitana* is Vulnerable (V) in Ireland and it is likely that any decline in this species will have a knock on effect on *N. obtusifrons* [3, 153 (see pg. 14)]. A loss of foraging and nesting habitat, especially areas of rough, uncultivated land with scrub and flower-rich grassland, as a result of agricultural intensification, development and commercial forestry is likely the main threat to both species. Loss of dry gravelly flats[57] and other well-drained soils[136] near rivers due to river maintenance is also a likely threat e.g. dredging and channel widening.

Previous action

Distribution of *N. obtusifrons* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland, though it has been identified as a conservation priority in the Regional Red List of Irish Bees[3].

Habitat management recommendations

Maintain known sites and encourage areas of flower-rich habitats for host foraging near areas of bare, well-drained soil; Umbellifers, Roses, Gentians, Daisies and Bellflowers are particularly important [(2 and 55)]. Enhance populations of its host at these. Prevent the shading out of open rides and clearings, maintain sunny areas suitable for host nesting, flower-rich areas and spring-flowering shrubs. 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. Maintain any management (e.g. grazing, cutting), or disturbance, that contributes to the overall character and stability of the site and holds back succession. Crucial to hosts in the spring are blossoming spring shrubs and flowers such as willows and fruit trees, as well as dandelions and buttercups[54]. Therefore a variety of successional stages are required.

Proposed action

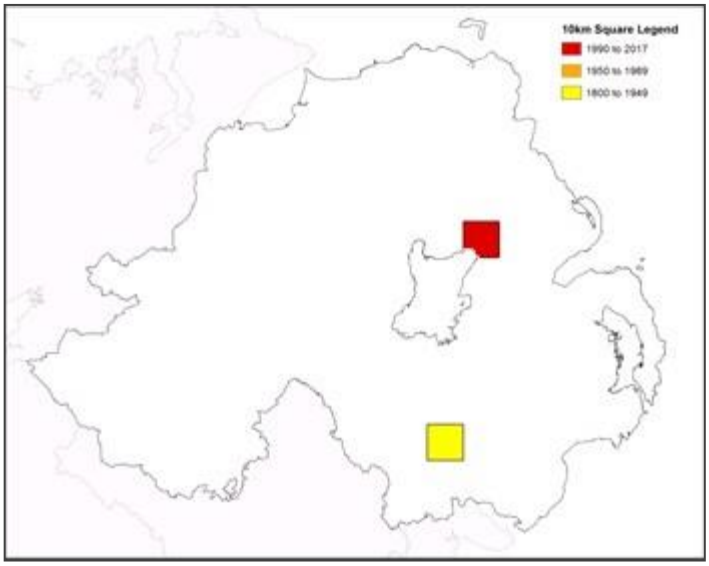
1. Resurvey for *N. obtusifrons* at its last known sites and in surrounding area to determine the status and extent of the current population.

Nomada striata (Blunt-jawed nomad bee)

Nomada striata is a medium-sized, predominantly red cuckoo bee[55, 100] that parasitizes the nest of Wilke's mining bee (*Andrena wilkella*), a locally distributed species that is data deficient in Ireland[3]. *N. striata* can usually be found in areas of flower rich grassland where the host species is present, though it has also been found in other habitats including heathlands and open woodlands on clay soils[53]. It feeds from wide range of plant species including White bryony (*Bryonia alba*), raspberry, Wood avens (*Geum urbanum*), Bird's-foot trefoil (*Lotus corniculatus*), Wood spurge (*Euphorbia amygdaloides*), Germander speedwell (*Veronica chamaedrys*), ragwort, dandelion, buttercups and yellow composites[54, 100]. *A. wilkella* has a preference for bird's foot trefoils and clovers, favouring sites were these plants are plentiful[54]. *N. striata* can mostly be seen flying from mid May to July, sometimes in to August[53, 54].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Female *Nomada striata* (c) Stephen Falk



Nomada striata recorded distribution in Northern Ireland. Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Endangered and it is a Northern Ireland Priority Species[3, 5]. *N. striata* has been recorded from two locations in counties Antrim and Armagh. Most recently the bee was recorded from a site near Antrim Area Hospital in Co. Antrim in 2017/2018 (M. Smyth). In Co Armagh it was recorded from a single location at Poyntzpass Hill in 1919 (W.F. Johnson) and has not been found since[153].

Typical habitat

In Ireland *N. striata* has been recorded most often from woodland sites[101]. The host species is mainly associated with unimproved grasslands but can be found in a variety of different habitats including open woodland and gardens[53, 101]. *N. striata* has been known to feed from a variety of plant species including Willows, Brambles, sweet clovers, speedwells and Sheep's bit (*Jasione montana*) [133].

Reasons for decline

The host species *A. wilkella* is Data deficient (DD) in Ireland and it is likely that any decline in this species will have a knock on effect on *N. striata*[3, (see pg. 62)]. A loss of foraging and nesting habitat due to agricultural intensification, development and commercial forestry is likely the main threat to both species.

Previous action

Distribution of *N. striata* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3].

Habitat management recommendations

Maintain known sites and encourage areas of flower-rich habitats for foraging *N. striata* as well as for its host; bird's foot trefoils and clovers are particularly important[53, 153]. Enhance populations of its host. Prevent the shading out of open rides and clearings, maintain sunny areas suitable for host nesting, flower-rich areas and spring-flowering shrubs. 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. Maintain any management (e.g. grazing, cutting), or disturbance, that contributes to the overall character and stability of the site and holds back succession. Identify opportunities for habitat creation or enhancement to expand the amount of available habitat based on where it is found, and improve connectivity to other nearby sites supporting suitable habitat. Consider targeted habitat enhancement or creation i.e. wildflower meadows, areas of rough grassland at field margins etc.

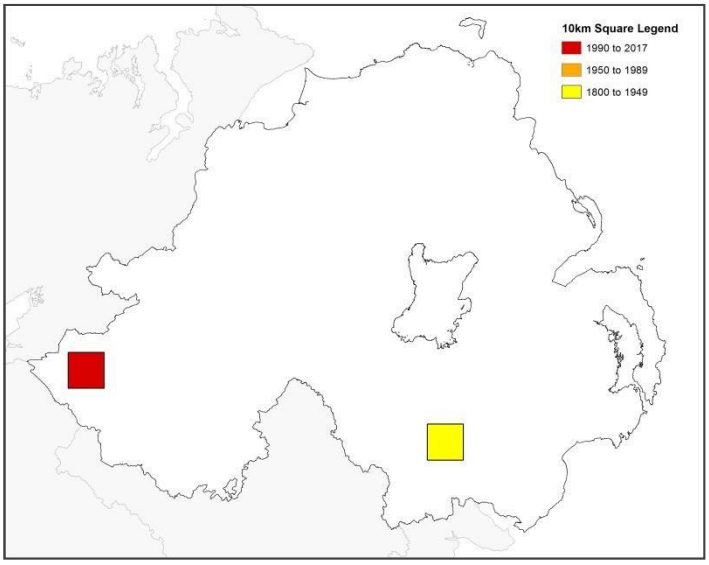
Proposed action

1. Resurvey for *N. striata* at its last known sites and in surrounding area to determine the status and extent of the current population.

Sphecodes ferruginatus (Dull-headed blood-bee)

Sphecodes ferruginatus is a small species that parasitizes the nests of base-banded furrow bees (Lasioglossum)[55], with the Common furrow bee (*Lasioglossum calceatum*) and Bloomed furrow bee (*Lasioglossum albipes*) being the likely host species in Ireland[3, 153]. *S. ferruginatus* is mainly associated with chalk and limestone habitats such as calcareous grassland and limestone quarries, but it can also be found in open deciduous woodland and the edges of moorland[53, 54, 102], wherever its host species are present[53, 54] . The hosts are also associated with urban green spaces, woodland clearings and coastal cliffs[53, 54] and are known to nest in small aggregations in light soils[54]. *S. ferruginatus* feeds from a variety of plants including umbellifers, Fennel (*Foeniculum vulgare*), Wild carrot (*Daucus carota*), roses and cinquefoils[53]. Females can be seen flying from late May to mid-August, while males can be seen from mid-July to the end of August[53].

Pinned female *Sphecodes ferruginatus* © Stephen Falk



***Sphecodes ferruginatus* recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Endangered (EN) and is rare in Ireland[3]. It is also a Northern Ireland Priority Species[5]. This species has been listed as Nationally Scarce (NS (b)). Within Northern Ireland *S. ferruginatus* has been recorded from two locations in Counties Armagh and Fermanagh. In Co. Armagh the bee was recorded from Poyntzpass in 1921 (W.F. Johnson), while in Co. Fermanagh it has been recorded most recently from Monawilkin in 2004 (T. Murray).

Typical habitat

In Ireland the specific habitats associated with this species are unknown, though it is known to feed from Heather (*Calluna*) and Cow Parsnip (*Heracleum*) [103, 132]. In Northern Ireland the bee was recorded from calcareous grassland at Monawilkin, with 2 males being found on Oxeye daisy (*Leucanthemum vulgare*) and one on Yarrow (*Achillea millefolium*) (T. Murray).

Reasons for decline

As a parasite, the survival of *S. ferruginatus* is dependent on the presence of a large population of its hosts. The host species are still common and widespread in Ireland, so the rarity of this Blood bee and the decline in its population are not fully understood[153]. It appears that there is some other factor influencing the rarity of this species. This urgently needs investigated. Some of its decline can likely be attributed 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. Anything that results in a loss of nesting and foraging habitat for *H. rubicundus* will negatively impact *S. ferruginatus*[153].

Previous action

Distribution of *S. ferruginatus* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3], though it has been identified as a conservation priority in the Regional Red List of Irish Bees[3]. One of the sites where this species has been recorded in Northern Ireland, Monawilkin, is a designated ASSI[154].

Habitat management recommendations

Ensure that there are plenty of flowering umbellifers, roses, cinquefoils, Fennel and Wild carrot available for foraging. Maintain sites in a reasonably open state with plenty of bare or sparsely vegetated ground in warm, sunny situations for host nesting, and good expanses of flower-rich situations for host foraging. Areas of light, bare soil 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. Consider targeted habitat enhancement or creation i.e. bee banks, species-rich meadows etc. 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

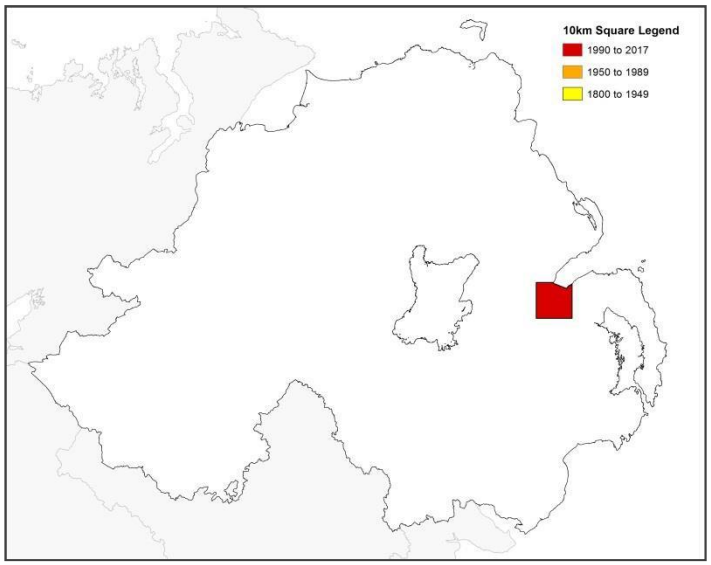
1. Resurvey for *S. ferruginatus* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations.
3. Address gaps in autecological knowledge, which includes investigating why the host species are common whereas *S. ferruginatus* is rare. Study of the foraging and nesting behaviour is urgently needed.
4. Develop habitat management guidelines to include increasing the abundance of umbellifers, roses, cinquefoils, Fennel and Wild carrot for foraging and areas of flower-rich habitat with some bare ground for host nesting, in particular south-facing slopes with light soils. Ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

A female *Sphecodes gibbus* © Stephen Falk.

Sphecodes gibbus (Dark-winged blood-bee)

Sphecodes gibbus is a large species of blood-bee that is a nest parasite of the Orange-legged furrow-bee (*Halictus rubicundus*) in Ireland[55, 104]. Female *S. gibbus* can be distinguished by their large size, dark-tinted wings and broad head[55]. This species can be found in various open flowery habitats where its host is found, with the host favouring light soils for nesting[53, 54]. *S. gibbus* is often found searching for host nest sites by flying over areas of exposed bare ground[104]. The bee feeds from a variety of plants but has a preference for mayweeds, thistles and umbellifers[54]. Females can be seen flying from late April to mid-September, while males are on the wing from mid- July to mid-September[53]. Its host has a preference for umbellifers for feeding and composites such as ragworts, mayweeds and thistles for gathering pollen[54].

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.



Sphecodes gibbus recorded distribution in Northern Ireland. Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Critically Endangered (CR) and is rare in Ireland[3]. It is also a Northern Ireland Priority Species[5]. Within Northern Ireland *S. gibbus* has been recorded from only one

known site at Lagan Meadows in Co. Down in 2004 (R. Paxton).

Typical habitat

The rarity of this species in Ireland has meant that its life cycle and specific habitat requirements are not fully understood[105, 154]. It is known to feed from a wide variety of plants including Ground Elder, Wild carrot, Cow parsley, Plume thistles and Sweet clovers and many more[132]. In Northern Ireland no specific habitat was mentioned though Lagan meadows consists of flower-rich grasslands and wooded areas.

Reasons for decline

As a parasite, the survival of *S. gibbus* is dependent on the presence of a large population of its host. The host species *H. rubicundus* is still common and widespread in Ireland, so the rarity of this Blood bee and the decline in its population are not fully understood[154]. It appears that there is some other factor influencing the rarity of this species. This urgently needs investigated. Some of its decline can likely be attributed 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. Anything that results in a loss of nesting and foraging habitat for *H. rubicundus* will negatively impact *S. gibbus*[154].

Previous action

Distribution of *S. gibbus* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. The only Northern Irish site where this species has been recorded, Lagan Meadows, is a local nature reserve[154].

Habitat management recommendations

Ensure that there are plenty of flowering mayweeds, thistles and umbellifers for foraging. Maintain sites in a reasonably open state with plenty of bare or sparsely vegetated ground in warm, sunny situations for host nesting, and good expanses of flower-rich situations with umbellifers, ragworts, mayweeds and thistles 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. Consider targeted habitat enhancement or creation i.e. bee banks, species-rich meadows etc. 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.

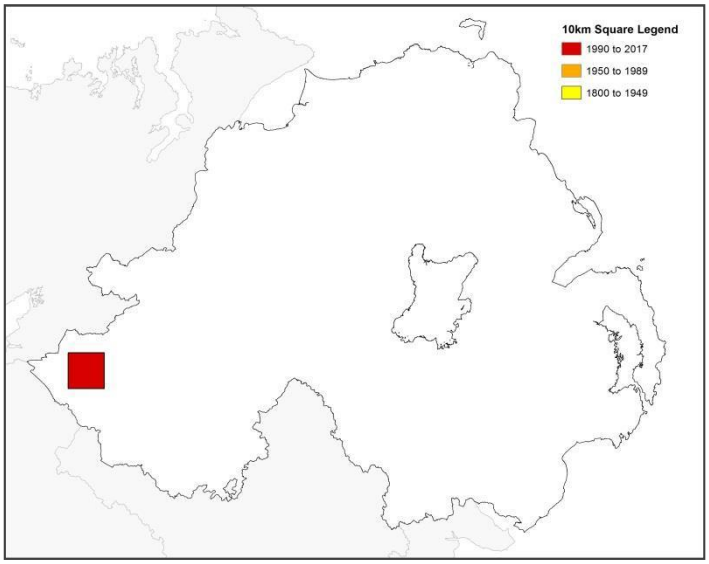
Proposed action

1. Resurvey for *S. gibbus* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in autecological knowledge, which includes investigating why the host species is common whereas *S. gibbus* is rare; Study of the foraging and nesting behaviour is urgently needed.
4. Develop habitat management guidelines to include increasing the abundance of mayweeds, thistles umbellifers for foraging and areas of bare ground in particular south-facing slopes with light soils for host nesting. Ensure that 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.
6. On-going monitoring of known populations and resurvey historic sites to identify new populations.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Sphecodes hyalinatus (Furry-bellied blood bee)

Sphecodes hyalinatus is a small cuckoo bee that in Ireland parasitises the nest of the Smooth-faced furrow-bee (*Lasioglossum fratellum*), which is a widely distributed species[3, 55]. It can be found in a variety of open habitats such as calcareous grassland and sometimes in woodland rides and clearings[53, 54], with its host mainly being associated with heathland, moorland and acid woodland[54]. *L. fratellum* visits the flowers of many different species including heathers, Devils-bit scabious (*Succisa pratensis*) and bilberry and prefers south-facing banks and slopes for nesting[54]. Like its host, *S. hyalinatus* visits a variety of flowers but has a preference for hawkish composites- including thistles- and umbellifers[53, 54]. Female S. hyalinatus can be seen flying from late April to late September, while males can be seen from early July to the end of September[53].

Male *Sphecodes hyalinatus* (c) Jeremy Early. Accessed via BWARS.



Sphecodes hyalinatus **recorded distribution in Northern Ireland.** Red squares show distribution between 1980 and 2017; orange squares between 1950 and 1979; yellow squares between 1800 and 1949. The most recent (top most) dates overlay the earlier dates (lower ones).

Data accessed via the National Biodiversity Data Centre's (NBDC) open access bee database. This database was collated by the NBDC from different sources including the Centre for Environmental Data and Recording (CEDaR), the Bees, Wasps and Ants Recording Society (BWARS) and National

Further information can be found here: Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2, Falk and Lewington (2015) Field Guide to the Bees of Great Britain and Ireland, Ú. Fitzpatrick, T.E. Murray, A. Byrne, R.J. Paxton and M.J.F. Brown (2006) Regional Red List of Irish Bees, NBDC species account, BWARS species account, BWARS information sheets, Steven Falk's Flickr collection and Habitas Priority Species webpage.

Distribution and status

In the Regional Red List of Irish Bees this species has been assessed as being Vulnerable and is declining in Ireland[3]. Within Northern Ireland the *S. hyalinatus* has been recorded from two sites in 2004 at Monawilkin in Co. Fermanagh (T. Murray).

Typical habitat

In Northern Ireland *S. hyalinatus* has been recorded from two areas of calcareous grassland at Monawilkin, with one male found on Oxeye daisy (*Leucanthemum vulgare*). Two other Irish sites are dry calcareous grasslands though it is known from a number of other habitats[3]. It has been known to forage from a variety of different plants including yarrows, speedwells, hawkbits, thistles, stonecrops, strawberries, morning-glories and umbellifers such as cow parsley and cow parsnip[132].

Reasons for decline

As a parasite, the survival of *S. hyalinatus* is dependent on the presence of a large population of its host. The host species *L. fratellum* still common and widespread in Ireland, so the rarity of this Blood bee and the decline in its population are not fully understood[154]. It appears that there is some other factor influencing the rarity of this species. This urgently needs investigated. Some of its decline can likely be attributed 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. Anything that results in a loss of nesting and foraging habitat for *L. fratellum* will negatively impact *S. hyalinatus* [154].

Previous action

Distribution of *S. hyalinatus* has been monitored by environmental recorders and BWARS members, and by the production of BWARS Atlases. There is currently no conservation action in place for this species in Ireland[3]. The only Northern Irish site where this species has been recorded, Monawilkin, is a designated ASSI.

Habitat management recommendations

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. Ensure that there are plenty of flowering umbellifers, thistles and hawkish composites for foraging. 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. Consider targeted habitat enhancement or creation i.e. bee banks. 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. Resurvey for *S. hyalinatus* at its last known sites and in surrounding area to determine the status and extent of the current population.
2. Encourage on-going monitoring of known populations
3. Address gaps in autecological l knowledge, which includes investigating and examining its habitat requirements.
4. Develop habitat management guidelines to include increasing the abundance of umbellifers, thistles and hawkish composites for foraging and areas of bare ground in particular south-facing slopes for host nesting. Ensure that these are included in management plans.
5. Secure appropriate long-term management agreements for key regional sites to maintain its range and promote its spread.
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. Identify opportunities within the B-Lines network where appropriate.
7. Consider notifying sites supporting key populations as ASSI's or equivalent.
8. Advise landowners and managers, and members of agri-environment consultation groups of the presence of this species and the importance of beneficial management for its conservation.
9. Ensure that this species is represented on all relevant LBAPS.

Other bees of conservation concern in Northern Ireland

In addition to the 21 bee species covered in the species profiles above, a further 12 species of conservation concern are found in Northern Ireland. Information on the habitats and distribution of these species in Northern Ireland can be found in the table below.

Species	Conservation Status	Comment
Andrena barbilabris (Sandpit mining bee)	Nationally Threatened (A3c)	*A. barbilabris* is a medium sized mining bee that is strongly associated with loose, sandy soils in which it usually forms small nesting aggregations[108]. It is found in a variety of habitats where these soils are present, including heathland, acid grassland, coastal dunes, soft rock cliffs, heathy woodland, sandy brownfield and sandpits[53, 54, 108]. In Ireland it is mainly associated with coastal areas[109]. *A. barbilabris* is a spring species that can be seen flying from April to mid-June, sometimes to mid-July foraging from a variety of herbaceous species such as dandelion and spring-flowering shrubs[53 and 108]. Within Northern Ireland it has been recorded from counties Antrim, Derry/Londonderry and Down, with the most recent record being from a site near Antrim Area Hospital in Co. Antrim in 2017/2018 (M. Smyth). This species has declined by 54% in Ireland since 1980 and further declines are expected[3].
Andrena fucata (Painted mining bee)	Nationally Threatened (A3c)	*A. fucata* can be found in a variety of habitats including gardens, woodland, heathland and coastal dunes, though most often recorded from broad-leaved woodland clearings[53, 54, and 111]. It visits various flowers including hawthorn, bilberry and umbellifers, though appears to have a preference for the flowers of Wood spurge (*Euphorbia amygdaloides*) [53, 55, 110]. *A. fucata* is rarely abundant and is most often found nesting solitarily in sandy or lime soil[110,111]. It can be seen flying from mid-May to mid-July, sometimes into early August [(52)]. Within Northern Ireland it has been recorded from all six counties, with the most recent record being from a site near Antrim Area Hospital in Co. Antrim in 2017/2018 (M. Smyth). This species has declined by 50% in Ireland since 1980, though the exact reason for its decline is unknown[3].
Bombus (P.) bohemicus (Gypsy cuckoo bumblebee)	Nationally Threatened (A3c)	*B. bohemicus* is a social parasite of the White-tailed bumblebee (*Bombus lucorum*) in Ireland[3]. It can be found in a range of habitats where the host species is present, in particular upland sites such as heathland, open pine woodland and the edge of moorlands[53, 54]. Flowering shrubs, bilberry and dandelions are visited by spring females, while brambles, heathers, thistles and Devils bit scabious (*Succisa pratensis*) are visited by males and summer females[55]. Female *B. bohemicus* can be seen flying from mid-April to mid or late September, while males are flying from late June to late September[53]. Within Northern Ireland it has been recorded from all six counties, the most recent record being from Co. Armagh at Edenderry, Portadown in 2014 (J. O'Neill, C. Bertrand)). This species has declined by 18% in Ireland since 1980[3]. The survival of *B. bohemicus* is dependent on the presence of a large population of its host, which is an extremely common species in Ireland. The rarity of this cuckoo bumblebee and the decline in its population are not fully understood[3] with climatic change perhaps influencing its distribution[112].

Species	Conservation Status	Comment
Bombus lapidarius (Red-tailed bumblebee)	Nationally Threatened (A3c)	*B. lapidarius* can be found in a wide variety of habitats but is mainly associated with coastal dunes and unimproved grassland in Ireland[3, 55]. Unfortunately as both of these habitats are in decline it is expected that *B. lapidarius* will continue to decline as well[3]. Queen *B. lapidarius* that have overwintered emerge and are active from late April, while workers can be seen flying from mid-May to early October. Males and new Queens can be seen from mid-July to October[53]. Old mammal nests are often used as nesting sites, as this species nests underground in burrows and other cavities, with a large population of up to 300 workers residing there[55, 114]. Workers forage from a wide variety of plants though they are particularly fond of yellow composites, thistles, knapweeds and legumes such as White Clover (*Trifolium repens*) for foraging[55]. Within Northern Ireland it has been recorded from all six counties, with the most recent record being from Co. Down at Downpatrick in 2018 (A. Magowan).
Bombus muscorum (Moss carder bumblebee)	Nationally Threatened (A3c)	In Ireland *B. muscorum* is a declining species that can be found in areas of flower-rich habitat though has a preference for damper areas[3, 117]. Continued habitat loss will result in future declines of this species[3]. Queen *B. muscorum* emerge in the Spring from late May (sometimes mid-April) to mid- June while workers can be seen flying from mid-June to late August. Males are on the wing from late June to the end of August[53]. Workers forage from a variety of different plants but appear to have a preference for legumes such as Meadow Vetchling (*Lathyrus pratensis*) and bird's-foot-trefoils while males can be found feeding from various plants such as ragworts, scabiouses and knapweeds[55]. Nesting occurs above ground at the base of dense vegetation with moss and dry grass[55, 116]. Within Northern Ireland it has been recorded from Counties Antrim, Armagh, Derry/Londonderry, Down and Fermanagh. The most recent record was from Co. Derry/Londonderry at Banagher Glen Nature Reserve in 2016 (T. Platt). In Britain this species is declining and is in a SRP (species recovery programme, English Nature).
Colletes similis (Bare-saddled colletes)	Nationally Threatened (B2b(iii))	In Ireland *C. similis* is strongly associated with coastal areas[57]. As Irish sand dune systems are under threat and this species is restricted to coastal sites it is likely that it will suffer further declines in the future[3]. This species forages from various flowers including composites, mayweeds, tansy, chamomiles and umbellifers, though it has a preference for daisies such as Oxeye daisy (*Leucanthemum vulgare*) [53, 55, 132]. This species can be found in a variety of habitats including soft rock cliffs, chalk grassland, open deciduous woodland, heathland, coastal dunes and vegetated shingle[53, 54, 55]. In some areas it has been found on brownfield sites[55]. Unlike other colletes that are restricted to mainly sandy soils, *C. similis* can be found nesting in a wide range of different soil types, usually in small aggregations[53, 54, 55]. It can be seen flying from mid-June to September[53]. Within Northern Ireland it is known from only one location in County Down, recorded from the Donard Demesne in 1942 (A.W. Stelfox).

Species	Conservation Status	Comment
Megachile centuncularis (Patchwork leaf-cutter)	Nationally Threatened (D2)	Although *M. centuncularis* can be found from a variety of habitats and is the most frequent species of leafcutter bee to be recorded from gardens[54, 121], it has declined in Ireland[3]. This species forages from various flowers including knapweeds, Fleabane (Erigeron), Cat's-ear (*Hypochaeris radicata*), bird's-foot trefoils, bramble and thistles[55, 120]. Nesting occurs in existing cavities such as burrows in dead wood, hollow stems (e.g. bramble), under stones, cavities in masonry and bee hotels[53, 55]. The cell walls of the nests of this species are constructed from leaf discs that are cut from plants such as Shrubby St. John's Wort (*Hypericum androsaemum*), roses and Enchanter's-nightshade (*Circaea lutetiana*)[53, G.M Spooner, pers comm]. *M. centuncularis* can be seen flying from late May or early June to the end of August[53]. Within Northern Ireland it has been recorded from a single location in County Armagh at Portadown in 2016 (P. Ennis).
Megachile willughbiella (Willughby's leafcutter bee)	Nationally Threatened (D2)	*M. willughbiella* has a paler-haired colour form that is unique to Ireland[3]. A variety of habitats are used including gardens, parks, brownfield sites, agricultural areas and dry calcareous grassland[3, 55, 122, 123]. Foraging occurs from various plants including Bird's-foot trefoil *(Lotus corniculatus)*, thistles, knapweeds, brambles and bellflowers[55, 125]. *M. willughbiella* is a versatile nester, with nesting occurring in existing cavities such as the borings in rotten tree stumps, logs, posts, door locks, the gaps around windows and in the dry soil of neglected plant pots; one nest was recorded from a rubber water hose[53, 54, 55, 122]. The cell walls of the nests of this species are constructed from leaf discs that are cut from plants such as Shrubby St. John's Wort (*Hypericum androsaemum*), tutsan, roses and Beech (Fagus) [53, 122]. *M. willughbiella* can be seen flying from the end of May to late August[53]. Within Northern Ireland it has been recorded from two locations at from Portrush in County Antrim in 2003 (R. Paxton) and most recently from Antrim in 2017 (M. Smyth).
Nomada panzeri (Panzer's nomad bee)	Nationally Threatened (A3c)	*N. panzeri* is a medium sized red, yellow and black nomad bee that parasitizes the nests of spring-flying mining bees such as the Painted mining bee (*Andrena fucata*), Tawny mining bee (*Andrena fulva*) and Bilberry mining Bee (*Andrena lapponica*)[55, 124, 125]. It is one of the more frequently encountered nomad bees and the range of host species means that it can be found in a variety of habitats; including open broad-leaved woodland, heathland and the edge of moorland[53, 54, 124]. It is most strongly associated with woodland and has a preference for woodland clearings with plenty of Wood spurge (*Euphorbia amygdaloides*) [53, 54, 55]. The bee visits various flowers including Greater stitchwort (*Stellaria holostea*), cow parsley (*Anthriscus sylvestris*) and dandelions[54 and 124]. It can be seen flying from mid-April to late June or early July, though in Ireland it has been known to fly into August or September[53, 57]. Within Northern Ireland *N. panzeri* has been recorded from counties Antrim, Armagh and Down. Most recently the bee was recorded from Leads Mines in Conlig, Co Down in 2013 (G. Newell). This species has declined in Ireland though it is uncertain what is causing this decline[3].

Species	Conservation Status	Comment
Sphecodes pellucidus (Sandpit blood-bee)	Data Deficient	*S. pellucidus* is a medium-sized hairy blood bee[55] that parasitizes the nests of the Sandpit mining Bee (*Andrena barbilabris*) a Nationally Threatened species in Ireland[3]. *A. barbilabris* is strongly associated with habitats that have sandy soils such as coastal areas and heathland and *S. pellucidus* should in theory be found wherever its host is present, however its habitat requirements in Ireland are not fully understood[53, 54, 55, 126, 127]. *S. pellucidus* feeds from a variety of flowers including thistles, mayweeds and heather, though is particularly fond of composites such as dandelions and Cat's-ear (*Hypochaeris radicata*)[53, 54]. Female *S. pellucidus* can be seen flying from early May (sometimes April) to mid October, while males can be seen from mid July to early October[53]. Within Ireland this is a rare species that has been recorded from only one location at Murlough in County Down in 1973 (A.G. Irwin) and has not been seen since[3, 127]. A dedicated search for its host is needed to confirm the distribution of *S. pellucidus* in Northern Ireland[3].
Coelioxys inermis (Shiny-vented sharp-tail bee)	Data Deficient	*C. inermis* is rare in Ireland and is a cleptoparasite of the Coast leaf-cutter bee (*Megachile maritima*), the Patchwork leaf-cutter bee (*Megachile centuncularis*) and in Northern Ireland it has also been recorded breeding from a nest of Brown-footed leaf-cutter bees (*Megachile versicolor*) [54, 55, 129]. In the UK *C. inermis* is associated with various habitats where its hosts are found including heathland, woodland, coastal sites and it is the most likely Sharp-tailed bee (Coelioxys) to be found in gardens[53, 54, 128]. The habitat requirements of this species in Ireland are not fully understood[129]. It is known to visit a variety of flowers including Birds-foot trefoil (*Lotus corniculatus*), clovers, Cross-leaved heath (*Erica tetralix*), scabious, brambles and Sheep's-bit (*Jasione montana*) [54, 128]. This species can be seen flying from late May or early June to the beginning of September[53]. Within Northern Ireland it has been recorded from two locations in Counties Armagh and Down; from Poyntzpass in Co. Armagh in 1896 (W.F. Johnson) and most recently from Hillsborough in Co. Down in 1924 (N.H. Foster). In Ireland there are a very small number of confirmed sites for this species[3].
Andrena wilkella (Wilke's mining bee)	Data Deficient	*A. wilkella* can be found in a variety of legume-rich habitats including open grassland, heathland, brownfield sites, chalk grassland, soft rock cliffs, coastal grassland and sometimes from gardens[53, 54, 55]. In Ireland this species is strongly associated with unimproved grasslands[131]. It forages from various plants but has a preference for legumes such as Bird's-foot trefoil *(Lotus corniculatus*) and vetches[53, 54, 55]. Female *A. wilkella* can nest in a range of soils, even quite heavy clays[54], and either solitarily[56] or in huge, compact aggregations[59]. This species can be seen flying from mid-April to June, though sometimes July and August[53]. Within Northern Ireland it has been recorded from two locations in County Down; from Eglantine in 1925 (A.W. Stelfox) and most recently from Glassdrumman in 1959 (A.W. Stelfox). Sites previously identified with *A. wilkella* will have to be re-examined as a very similar species the Small Gorse mining bee (*Andrena ovatula*) has been added and misidentification is possible[3]. The cleptoparasite Blunt-Jawed Nomad Bee (*Nomada striata*) targets this species[130].

Species Associations

Below are examples of habitats and the species likely to occur within these habitats.

Brownfield sites, quarries and sand pits:

Andrena barbilabris (Sandpit mining bee)

Andrena denticulata (Grey-banded mining bee)

Andrena nigroaenea (Buffish mining bee)

Andrena praecox (Small sallow mining bee)

Andrena wilkella (Wilke's mining bee)

Bombus ruderarius (Red-shanked carder bee)

Colletes similis (Bare-saddled colletes)

Lasioglossum nitidiusculum (Tufted furrow-bee)

Lasioglossum rufitarse (Rufous-footed furrow bee)

Megachile willughbiella (Willughby's leafcutter)

Sphecodes ferruginatus (Dull-headed blood-Bee)

Sphecodes pellucidus (Sandpit blood-bee)

Tonnagh Quarry ASSI (DAERA).

Calcareous grassland and flower-rich meadows:

Andrena coitana (Small flecked mining bee)

Andrena denticulata (Grey-banded mining bee)

Andrena wilkella (Wilke's mining bee)

Bombus (P.) campestris (Field cuckoo-bee)

Bombus muscorum (Moss carder bumblebee)

Bombus ruderarius (Red-shanked carder-bee)

Bombus (P.) rupestris (Red-tailed cuckoo-bee)

Nomada goodeniana (Gooden's nomad bee)

Calcareous grassland at West Fermanagh Scarplands SAC (DAERA)

Nomada obtusifrons (Flat-ridged nomad bee)

Sphecodes ferruginatus (Dull-headed blood-bee)

Sphecodes hyalinatus (Furry-bellied blood bee)

Coastal dunes and grassland:

Andrena coitana (Small flecked mining bee)

Andrena barbilabris (Sandpit mining bee)

*Andrena denticulata (*Grey-banded mining bee)

Andrena fucata (Painted mining bee)

Bombus ruderarius (Red-shanked carder bee)

Bombus (P.) rupestris (Red-tailed cuckoo-bee)

Coelioxys inermis (Shiny-vented sharp-tail)

Colletes floralis (Northern colletes)

Colletes similis (Bare-saddled colletes)

Lasioglossum nitidiusculum (Tufted furrow-bee)

Lasioglossum rufitarse (Rufous-footed furrow bee)

Coastal grassland and sand dunes at Portstewart Strand.

Fen and Bogs:

Andrena coitana (Small flecked mining bee)

Andrena fuscipes (Heather mining bee)

Hylaeus hyalinatus (Hairy yellow-face bee)

Brackagh Bog ASSI (DAERA).

Gardens and parkland:

Andrena denticulata (Grey-banded mining bee)

Andrena fucata (Painted mining bee)

Andrena nigroaenea (Buffish mining bee)

Andrena wilkella (Wilke's mining bee)

Bombus (P.) campestris (Field cuckoo-bee)

Bombus lapidarius (Red-tailed bumblebee)

Bombus muscorum (Moss carder bumblebee)

Megachile centuncularis (Patchwork leaf-cutter)

Megachile willughbiella (Willughby's leafcutter)

Nomada striata (Blunt-jawed nomad)

Nomada goodeniana (Gooden's nomad)

Parkland at Belvoir ASSI (DAERA).

Heath and moorland:

(Including species found at the edge of heath)

Andrena barbilabris (Sandpit mining Bee)

Andrena coitana (Small flecked mining bee)

Andrena denticulata (Grey-banded mining bee)

Andrena fucata (Painted mining bee)

Andrena fuscipes (Heather mining bee)

Andrena praecox (Small Sallow mining bee)

Andrena wilkella (Wilke's mining bee)

Colletes similis (Bare-saddled colletes)

Lasioglossum nitidiusculum (Tufted furrow-bee)

Lasioglossum rufitarse (Rufous-footed furrow bee)

Heath and moorland at Clermont and Anglesey Mountain ASSI (DAERA).

Sphecodes hyalinatus (Furry-bellied blood bee)

Sphecodes ferruginatus (Dull-headed blood-bee)

Sphecodes pellucidus (Sandpit blood-bee)

Nomada striata (Blunt-jawed nomad)

Nomada obtusifrons (Flat-ridged nomad bee)

Nomada panzeri (Panzer's nomad)

Maritime cliff, slopes and vegetated shingle:

Andrena wilkella (Wilke's mining bee)

Nomada goodeniana (Gooden's nomad)

*Colletes floralis (*Northern colletes)

Colletes similis (Bare-saddled colletes)

Hylaeus hyalinatus (Hairy yellow-face bee)

Lasioglossum nitidiusculum (Tufted furrow-bee)

Sheepland Coast ASSI.

Woodland:

(Including woodland rides and clearings)

Andrena barbilabris (Sandpit mining bee)

Andrena coitana (Small flecked mining bee)

Andrena denticulata (Grey-banded mining bee)

Andrena fucata (Painted mining bee)

*Andrena praecox (*Small Sallow mining bee*)*

*Andrena nigroaenea (*Buffish mining bee*)*

Andrena wilkella (Wilke's mining bee)

Bombus lapidarius (Red-tailed bumblebee)

Colletes similis (Bare-saddled colletes)

Lasioglossum rufitarse (Rufous-footed furrow bee)

Nomada goodeniana (Gooden's nomad)

Nomada obtusifrons (Flat-ridged nomad bee)

Nomada panzeri (Panzer's nomad)

Nomada striata (Blunt-jawed nomad)

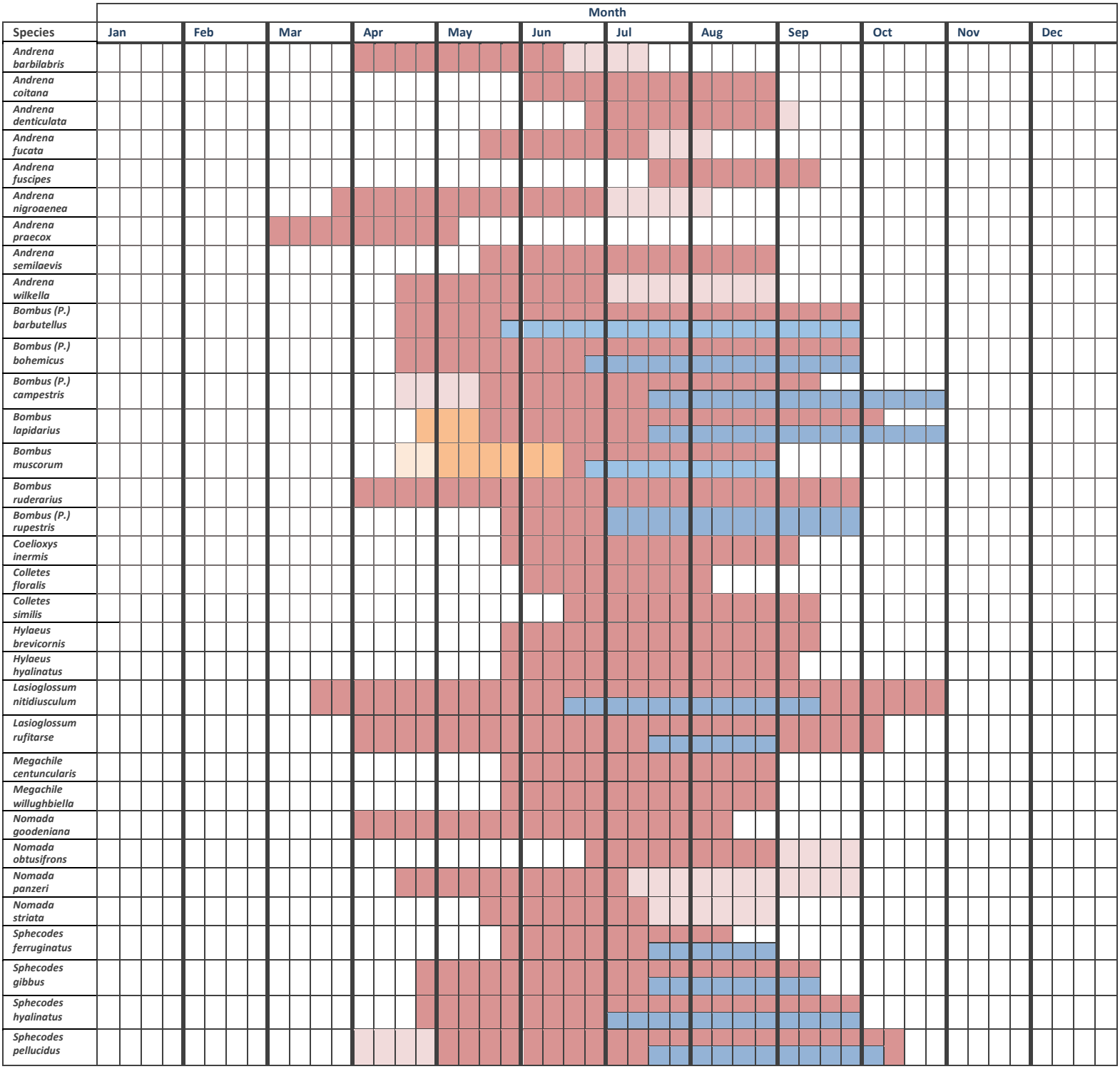
Sphecodes ferruginatus (Dull-headed blood-bee)

Sphecodes hyalinatus (Furry-bellied blood bee)

Woodland at Bonds Glen ASSI (DAERA)

Flight Periods

The table below shows the flight period (shaded) of the threatened bees recorded in this report by month. This information was taken from Else and Edwards (2018) Handbook of the Bees of the British Isles Volume 2. Areas in red indicate the flight period of a species. Paler sections highlight possible flight period i.e. a species may fly from May to the end of June, though sometimes to the end of August. Areas in blue highlight the flight times of males, if these are specific, while areas in orange indicate queen bumblebee activity.



County Summaries

What follows are summaries of the distribution of target bee species at a county level. For the purpose of this report "Lost species" are defined as species that have not occurred or have been recorded since 1990.

Antrim

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

Table 1: Target species in Antrim

Species	Most Recent Record	Notes
Andrena coitana	Slievenacloy in the Belfast Hills 2014[5]	Most modern records originate from the Belfast Hills area Two locations from Cave Hill in 2012[5] Slievenacloy in 2014[5]. The bee was recorded from Barnett's Park in Belfast in 1971 and 1972[3] White Park Bay 2007[4]. Was previously recorded from Glendun Viaduct 1931[1] but may now be extinct there.
Andrena denticulata	Antrim 2017/2018[2]	The most recent record of this species was from a site near Antrim Area Hospital[2].
Andrena nigroaenea	Lisburn 2016[8]	Both the most recent record (Lisburn 2016[8]) and the earliest record (Belfast in 1902[6]) of this species can be found in the Belfast and wider Belfast area. It was recently recorded from Rathlin Island in 2005[7] and White Park Bay in 2007[4].
Andrena semilaevis	Glenarm 1931[1]	It was recorded at Glenarm 1931[1] but has not been recorded here since and so may be extinct at this location.
Bombus (P.) barbutellus	Belfast in 1995[9]	The bee was also recorded from Belfast in 1975 and 1976[9] It was recorded relatively recently from Rea's Wood at Antrim Bay in 1986[10]. The earliest record of this species in Co. Antrim was from Rathlin Island in 1973[3].
Bombus (P.) campestris	Antrim Castle Gardens 2013[13]	The earliest records of this species are from Killead in 1909[11] and in 1923[12]. The bee was recorded relatively recently from Barnett's Park in 1989[3], though hasn't been recorded since.
Bombus ruderarius	Cave Hill 1909[11]	The only records of this species are both over 100 years old (Cave Hill 1909[11] and Whitehead 1900[14]). It is likely extinct in these areas.

Species	Most Recent Record	Notes
Colletes floralis	White Park Bay ASSI in 2015[17]	Known from several coastal locations along the North Coast. In Co. Antrim it has been recorded from Runkerry (Bushfoot) Dunes in 1933[1], 2003[16], 2008[17] and 2012[19]. At its most recent location at White Park Bay ASSI, the bee was also recorded in 2003[16], 2007[4] and 2008[17].
Lasioglossum rufitarse	Antrim 2017/2018[2]	Known from two locations at White Park Bay ASSI on the North Coast and from a site near Antrim Area Hospital, which is the most recent record of this species in Northern Ireland[2].
Nomada goodeniana	Moreland's Meadow, in Lagan Valley Regional Park 2012[15]	Known from a single location at Moreland's Meadow, in Lagan Valley Regional Park in 2012[15].
Nomada striata	Antrim 2017/2018[2]	The most recent record of this species in Northern Ireland was from a site near Antrim Area Hospital[2].

[1]A.W. Stelfox records
[2]M. Smyth records
[3]R. Nash records
[4]M. Telfer records
[5]G. Newell records
[6]N. Halbert record
[7]R. Paxton record
[8]S. Foster record
[9]J.P. Duff record
[10]B. Nelson records
[11]H.L. Orr records
[12]W.F. Johnson record
[13]R. Wilson record
[14]C.W. Buckle record
[15]J. O'Boyle record
[16]J. Hunter
[17]E. Davis
[18]P. Barton
[19]R. Anderson

Species losses from Antrim

Andrena semilaevis: Last recorded in 1931 (Glenarm)

Bombus ruderarius: Last recorded in 1909 (Cave Hill)

Armagh

Eleven target species occur in Co. Armagh, but nine target species have been lost.

Table 1: Target species in Armagh

Species	Most Recent Record	Notes
Andrena coitana	Poyntzpass 1921[1]	Known from a single location at Poyntzpass and has not been recorded here since. It is likely extinct at this location.
Andrena nigroaenea	Poyntzpass 1921[1]	Known from a single location at Poyntzpass and has not been recorded here since. It is likely extinct at this location.
Bombus (P.) barbutellus	Lemnagore Wood 1974[3]	The earliest records of this species are both over 100 years old. It was recorded from Newry in 1903[1] and Richhill in 1911[2] and has not been recorded here since. It is likely extinct at these locations.
Bombus (P.) campestris	Clonalig Lough 1997[4]	It has also been recorded from Poyntzpass in 1921[1] and has not been recorded here since. It is likely extinct at this location.
Bombus ruderarius	Poyntzpass 1921[1]	Poyntzpass in 1897[1] and Richhill in 1909[2]
Bombus (P.) rupestris	the shore of Lough Neagh at Kinnegoe in 1922[5]	Known from a single location at Kinnegoe in 1922[5]. It has not been recorded here since and is likely extinct at this location
Hylaeus hyalinatus	Brackagh Bog National Nature Reserve 1992[4]	In Northern Ireland recorded from a single location in County Armagh
Lasioglossum nitidiusculum	Poyntzpass 1910[1]	Known from a single location at Poyntzpass and has not been recorded here since. It is likely extinct at this location.
Nomada goodeniana	Poyntzpass 1919[1]	Known from a single location at Poyntzpass and has not been recorded here since. It is likely extinct at this location.
Nomada striata	Poyntzpass Hill 1919[1]	Known from a single location at Poyntzpass and has not been recorded here since. It is likely extinct at this location.
Sphecodes ferruginatus	Poyntzpass in 1921[1]	Known from a single location at Poyntzpass. It has not been recorded here since and so is likely extinct.

[1] W.F. Johnson records (Rev WF Johnson lived at Poyntzpass)
[2] H.L. Orr records
[3] V. Faulkner record
[4] B. Nelson records
[5] A.W. Stelfox record

Species losses from Armagh

Andrena coitana: Last recorded in 1921 (Poyntzpass)
Andrena nigroaenea: Last recorded in 1921 (Poyntzpass)
Bombus (P.) barbutellus: Last recorded in 1974 (Lemnagore Wood)
Bombus ruderarius: Last recorded in 1921 (Poyntzpass)
Bombus (P.) rupestris: Last recorded 1922 (Kinnegoe)
Lasioglossum nitidiusculum: Last recorded in 1910 (Poyntzpass)
Nomada goodeniana: Last recorded 1919 (Poyntzpass)
Nomada striata: Last recorded in 1919 (Poyntzpass Hill)
Sphecodes ferruginatus: Last recorded in 1921(Poyntzpass)

Derry/Londonderry

One target species occurs in Co. Derry/Londonderry.

Table 1: Target species in Derry/Londonderry

Species	Most Recent Record	Notes
Colletes floralis	Portstewart 2014[5]	Known from several coastal locations along the North Coast of Northern Ireland. In Co. Derry/Londonderry it has been recorded from three areas with all relatively recent records (within the last 20 years). It was recorded from Ballymaclary NNR/ Magilligan 2003[1], 2009[2] and from the Umbra in 2004[6] and 2008[2]. It was also recorded from Portstewart in 2003[1], 2008[1 and 3] and in 2010[4].

[1]J. Hunter records
[2]E. Davis records
[3]M. Telfer records
[4]D. Allen records
[5]P. Mc Erlean records
[6]R. Paxton records

Species losses from Derry/Londonderry

There are no species losses.

Down

Fifteen target species occur in Co. Down, but eleven target species have been lost.

Table 1: Target species in Down

Species	Most Recent Record	Notes
Andrena coitana	Mourne Coastal Path 1985[3]	Known from Scrabo quarries in 1922[1] and Kilkeel in 1931[1]; it is likely extinct at these locations as there have been no recent records. It was recorded from Stormont Estate in 1972[2] and 1973[2] but has not been recorded since and is possibly extinct. It is also possibly extinct from the Mourne Coastal Path, as it has not been recorded here since 1985[3].
Andrena denticulata	Newcastle 2015[5]	The earliest records of this species are from Scrabo quarries in Scrabo Country Park in 1922[1] and Rostrevor in 1922[4]. It was also recorded from Kilkeel in 1931[1]. It is likely extinct at these locations as there have been no recent records. The bee was recorded from Stormont Estate in 1972[2] and as there have been no further records it is possibly extinct
Andrena fuscipes	Murlough 2004[6]	Known from a single coastal location in Co. Down.
Andrena nigroaenea	Killard Point at Strangford Lough 1970[8]	Known from several coastal locations. The earliest records of this species are from Cranfield in 1931[1] and Dundrum in 1932[7] while the most recent record is from Killard Point at Strangford Lough in 1970[8]. It may now be extinct from all of these locations.
Andrena praecox	Cairn Wood in Craigantlet 1974[2] Rostrevor Forest 1974[9]	The most recent records of this species are from two forest locations from Cairn Wood in Craigantlet in 1974[2] and from Rostrevor Forest in 1974[9]. It may now be extinct at these locations.
Andrena semilaevis	Tullybrannigan 1961[1]	The earliest records of this species were from Rostrevor in 1922[4], Eglantine in 1925[1] and Kilkeel in 1931[1]. It was also recorded from Newcastle in 1926[4] and 1957[1]. It is likely extinct in these areas as there have been no recent records. The bee was recorded from Tullybrannigan in 1926[4], 1959[1] and 1961[1]. It is possibly extinct at this location has it has not been recorded since.

Species	Most Recent Record	Notes
Bombus (P.) barbutellus	Castlewellan 1975[12]	The earliest records of this species were from Dundrum in 1896[10] and later from Millisle in 1925[1]. It is likely extinct at these locations as it has not been recorded since. Known from Bangor in 1970[11] and Castlewellan 1975[12], it is possibly extinct at these locations as there have been no further records.
Bombus (P.) campestris	Castlewellan 1975[12]	Known from Belmont in 1909[13] and Scrabo quarries in 1922[1]. It is likely extinct at these locations as there have been no further records. The most recent record was from Castlewellan in 1975[12] and it is possibly extinct here as it has not been recorded since.
Bombus ruderarius	Eglantine in 1925[1]	The earliest record of this species was from Rostrevor in 1909[13] (over 100 years ago) and so it is likely extinct at this location. It is also likely extinct at the location of the most recent record from Eglantine in 1925[1].
Bombus (P.) rupestris	Killough 2015[14]	Known from coastal sites. The bee was also recorded from Dundrum in 1911[13] but is likely extinct here as there have been no recent records at this location.
Hylaeus brevicornis	Murlough National Nature Reserve 1975[2]	This bee has been recorded from several coastal locations the most recent record being from Murlough National Nature Reserve in 1975[2]. The bee was also recorded at the Nature Reserve in 1973[9] and from Murlough House; Dunes in 1954[1]. It was also known from two other locations Kilkeel in 1931[1] and Glassdrumman in 1956[1]. As it has not been recorded since it is likely extinct at these locations.
Lasioglossum nitidiusculum	Killard Point at Strangford Lough 2004[15]	Known from two locations in Newtownards in 1922[1] but has not been recorded since and so is likely extinct.
Nomada goodeniana	Lady Dixon Park 2013[17]	This species was also recently recorded from Cranfield Point in 2012[16].
Nomada obtusifrons	Tullybrannigan 1957[1]	Known from a single forest location at Tullybrannigan in 1957[1]. There have been no further records and so it is possibly extinct.
Sphecodes gibbus	Lagan Meadows 2004[15]	Known from a single location from Belfast at Lagan Meadows in 2004[15].

[1]A.W. Stelfox records (Stelfox lived at Tullybrannigan)
[2]A.G. Irwin records
[3] B. Nelson record
[4]W.F. Johnson records
[5] S. Foster record
[6]M. Mc. Allister record
[7]R.C.L. Perkins records
[8]C.A.M. Reid record
[9]R. Nash records
[10]P. Freke record
[11]C. Reid record
[12]J.P. Duff records
[13]H.L. Orr records
[14]R. Anderson record
[15]R. Paxton records
[16]J. O'Boyle record
[17]G. Newell records

Species losses from Down

Andrena coitana: Last recorded in 1921 (Poyntzpass)
Andrena nigroaenea: Last recorded in 1970 (Killard Point at Strangford Lough)
Andrena praecox: Last recorded in 1974 (Cairn Wood in Craigantlet)
Andrena semilaevis: Last recorded in 1961 (Tullybrannigan)
Bombus (P.) barbutellus: Last recorded in 1975 (Castlewellan)
Bombus (P.) campestris: Last recorded in 1975 (Castlewellan)
Bombus ruderarius: Last recorded in 1925 (Eglantine)
Hylaeus hyalinatus: Last recorded in 1975 (Murlough National Nature Reserve)
Nomada obtusifrons: Last recorded in 1957 (Tullybrannigan)

Fermanagh

Four target species occur in Co. Fermanagh.

Table 1: Target species in Fermanagh

Species	Most Recent Record	Notes
Andrena praecox	Monawilkin 2004[1]	Known from a single location at Monawilkin in 2004[1]
Bombus (P.) campestris	Derrybeg on the west shore of Upper Lough Erne (North of Crom) 1987[2]	This species was recorded from Derrybeg in 1987[2] but has not been recorded since.
Sphecodes hyalinatus	Two sites at Monawilkin 2004[1]	Known from a two sites at Monawilkin in 2004[1]
Sphecodes ferruginatus	Monawilkin 2004[1]	Known from a single location at Monawilkin in 2004[1]

[1] T. Murray records
[2] B. Nelson records

Species losses from Fermanagh

Bombus (P.) campestris: Last recorded in 1987 (Derrybeg)

Tyrone

None of the 21 target species were found in Co. Tyrone. This county has historically been under-recorded and it is entirely possible that several of the threatened target species do occur here. Of the twelve other species of conservation concern 3 have records from this county. *Bombus lapidarius* has been recorded at two locations from Dungannon in 2014 (M. Edgar) and from Benburb in 2016 (S. Mc Collum). *Bombus bohemicus* has been recorded from a single location from Meenoughter in 2013 (A. Fenner). *Andrena fucata* was recorded at three locations from Fintona in 1973 (A.G. Irwin), Moy in 1985 (M.Boston) and Baronscourt in 2006 (K.N.A. Alexander). Surveys should be carried out at potentially suitable locations and an effort made to encourage recording in this county.

Key sites for bees in Northern Ireland

The data represented in this report indicates that the following individual sites are of particular significance for bees in Northern Ireland:

Antrim:

Barnett's Park, Belfast Hills, Cave Hill, Rathlin Island and White-Park Bay

Armagh:

Brackagh Bog National Nature Reserve, Clonalig Lough and Lemnagore Wood. Although there has been no recent records from Poyntzpass, the fact that eight of the target species have occurred there in the past would suggest that this is an area to resurvey. It is highly likely that the site for these species records is no longer suitable due to the long time period from when the records were made (most over 100 years ago) so for this reason it is recommended that an area close to that location is targeted e.g. Newry Canal.

Derry/Londonderry:

Ballymaclary Nature Reserve, Magilligan, Umbra Nature Reserve and Portstewart Strand & Dunes ASSI

Down:

Castlewellan, Cranfield Point, Kilkeel, Killard Point, Lagan Meadows, Murlough National Nature Reserve, Rostrevor Forest Park, Stormont Estate, Scrabo quarries and Tullybrannigan. Although there has been no recent records from Kilkeel or Scrabo quarries the fact that many of the target species have occurred at these sites in the past would suggest that these are areas to resurvey. Tullybrannigan is included as this is the only known site in Northern Ireland for *Nomada obtusifrons.* Likewise, Lagan Meadows is included as it is the only known site in Northern Ireland where *Sphecodes gibbus* occurs.

Fermanagh:

Monawilkin and Derrybeg.

Tyrone:

None of the 21 target species were recorded from this county. There should be a focus on encouraging surveys and recording in Co Tyrone.

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