European Red List of Bees

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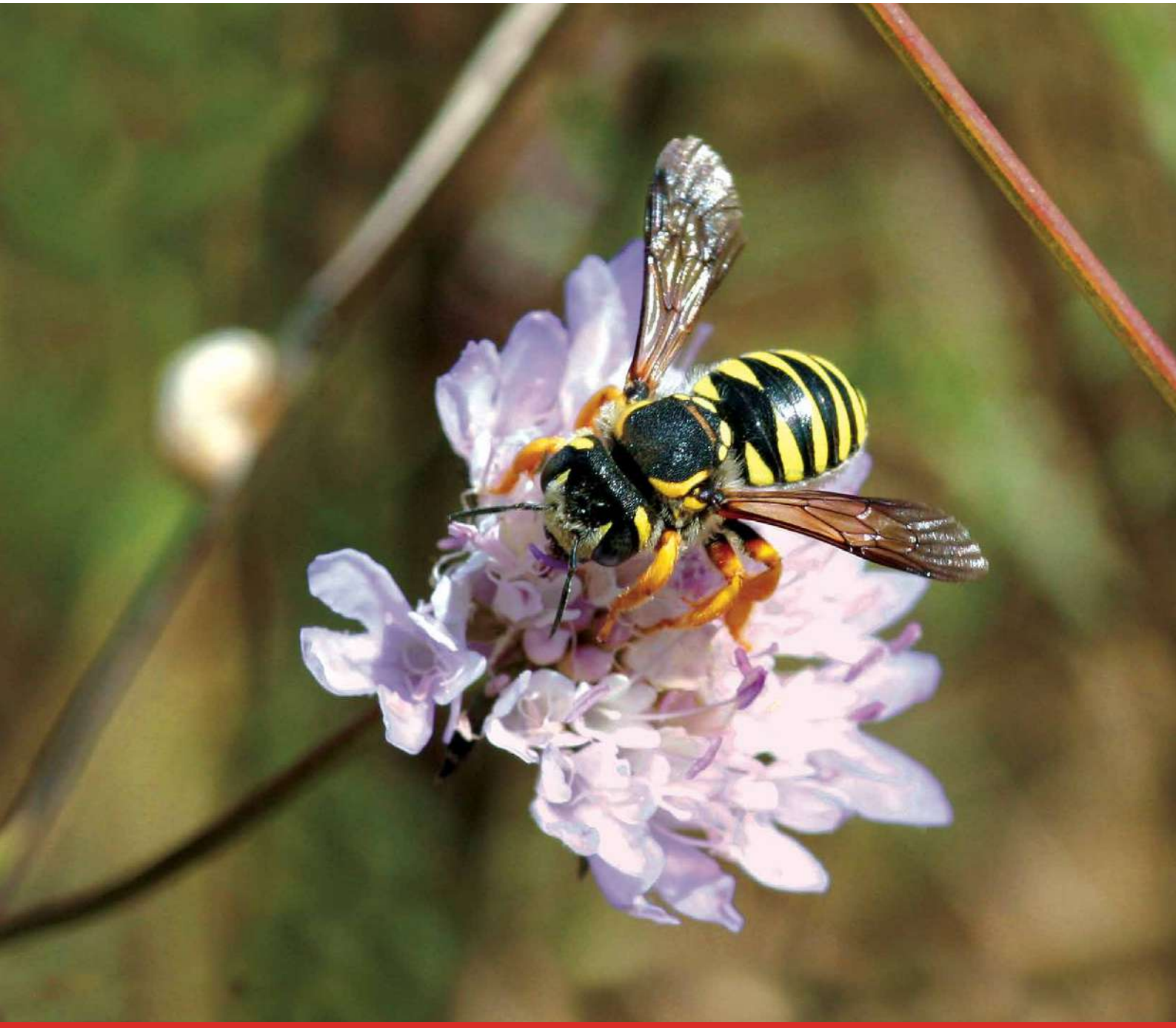

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Foreword

Europe's landscape has been shaped by centuries of diverse farming and forestry traditions. This has resulted in a wide range of agricultural and woodland landscapes and significantly contributed to the continent's biodiversity. In addition, the EU's Outermost Regions and Europe's Overseas Countries and Territories are situated in five biodiversity hotspots, including areas that host over 20% of the world's coral reefs and lagoons, and 70% of the EU's biodiversity.

Biodiversity loss is an enormous challenge in the EU, with Europe's species richness currently highly threatened by human activities. Progress has been made on a number of fronts: certain populations and distributions of wildlife species are showing positive trends, with some species that were once at risk of extinction now stabilising or even increasing. The Birds and Habitats Directives, the cornerstone of the EU's nature policies, have clearly helped bird species and some large carnivore species to recover in Europe, which is encouraging.

However, many of Europe's ecosystems are now so heavily degraded that their ability to deliver valuable ecosystem services has been drastically reduced. The EU Biodiversity Strategy adopted in 2011 is part of a 2050 vision aiming to protect, value and restore biodiversity and the services it provides – its natural capital. This is important not only to protect nature's intrinsic value, but also for its essential contribution to human wellbeing and economic prosperity, and to avert catastrophic changes caused by the loss of biodiversity.

In recent years, the decline of pollinators has garnered increased public attention. Indeed, insect pollination, which is currently under threat in Europe, has an estimated economic value of €15 billion per year in the EU alone. Unfortunately, however, the value of natural capital to our economies and societies, and the interdependencies of nature with other societal objectives, are often not reflected in private and public decisions, indicators and accounting systems in the same way as economic and human capital.

The European Red List of Bees provides, for the first time, factual information on the status of all bees in Europe, nearly 2,000 species. This new assessment shows us that 9% of bees are threatened with extinction in Europe mainly due to habitat loss as a result of agriculture intensification (e.g., changes in agricultural practices including the use of pesticides and fertilisers), urban development, increased frequency of fires and climate change.

To conclude, I must recognize that when undertaking this assessment, I was struck by the very limited number of experts on wild bees in Europe and would strongly call for more investment in this important field of scientific research and also for more engagement of all parts of our society to help strengthen the knowledge needed to reverse these negative trends. We need to ensure far-reaching actions to help boost pollinator populations, which will bring huge benefits not only to wildlife and the countryside, but also to our food producers.

Pia Bucella
Director
Directorate B: Natural Capital
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Expert participants at a Bee Red List training workshop, October 2012, Brussels, Belgium. © IUCN.

Executive summary

Aim

The European Red List is a review of the status of European species according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the regional level, so that appropriate conservation action can be taken to improve their status. This Red List publication summarises results for all described native European bees.

Scope

All bee species native to Europe or naturalised in Europe before AD 1500 (a total of 1,965 species) have been included in this Red List. The geographical scope is continent-wide, extending from Iceland in the west to the Urals in the east, and from Franz Josef Land in the north to the Canary Islands in the south. The Caucasus region is not included. Red List assessments were made at two regional levels: for geographical Europe, and for the 27 Member States of the European Union.

Status assessment

The status of all species was assessed using the IUCN Red List Criteria (IUCN 2012a), which are the world's most widely accepted system for measuring extinction risk. All assessments followed the Guidelines for Application of IUCN Red List Criteria at Regional Levels (IUCN 2012b).

These assessments were compiled based on the data and knowledge from a network of leading European and national bee experts. The assessments were then completed and reviewed at seven small workshops held in Brussels (Belgium) as well as through email correspondence with relevant experts. More than 40 experts actively participated in the assessment and review process for European bees. Assessments are available on the European Red List website and data portal: http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/initiatives/europe.

Results

Overall, 9.2% of bees are considered threatened in all of Europe, while at the EU 27 level, 9.1% are threatened with extinction. A further 5.2% and 5.4% of bees are considered Near Threatened in Europe and the EU 27, respectively (101 species at both levels). However, for 1,101 species (56.7%) in Europe and 1,048 species (55.6%) at the EU 27, there was not enough scientific information to evaluate their risk of extinction and thus, they were classified as Data Deficient. When more data become available, many of these might prove to be threatened as well.

By comparison, of groups that were comprehensively assessed in Europe, 59% of freshwater molluscs, 40% of freshwater fishes, 23% of amphibians, 20% of reptiles, 17% of mammals, 16% of dragonflies, 13% of birds, 9% of butterflies and 8% of aquatic plants are threatened (IUCN 2011a, BirdLife International 2004). Additional European Red Lists assessing only a selection of species showed that 22% of terrestrial molluscs, 16% of crop wild relatives, 15% of saproxylic beetles and 2% of medicinal plants are also threatened (IUCN 2011a, Allen *et al.* 2014). No other groups have yet been assessed at the European level.

Looking at the population trends of European bee species, 7.7% (150 species) of the species have declining populations, 12.6% (244 species) are more or less stable and 0.7% (13 species) are increasing. The population trends for 1,535 species (79%) remains unknown.

A high proportion of threatened bee species are endemic to either Europe (20.4%, 400 species) or the EU 27 (14.6%, 277 species), highlighting the responsibility that European countries have to protect the global populations of these species. Almost 30% of all the species threatened (Critically Endangered, Endangered, or Vulnerable) at the European level are endemic to Europe (e.g., found nowhere else in the world).

The species richness of bees increases from north to south in Europe, with the highest species richness being found in the Mediterranean climate zone. In particular, the Iberian, Italian and Balkan peninsulas are important

areas of species richness. Regarding the distribution of endemic species, southern Europe shows the highest concentration of endemism. The largest numbers of threatened species are located in south-central Europe and the pattern of distribution of Data Deficient species is primarily concentrated in the Mediterranean region.

The main threat to European bees is habitat loss as a result of agriculture intensification (e.g., changes in agricultural practices including the use of pesticides and fertilisers), urban development, increased frequency of fires and climate change.

Recommendations

Policy recommendations

1. Species conservation

- Identify opportunities under European and Member State Biodiversity Strategies to develop targeted species and habitat specific conservation measures for wild bees, and particularly those species of conservation concern.
- Develop systematic continental and national tools and resources to monitor the diversity and abundance of bees, including rare species as well as wider bee biodiversity. Ensure standardised methods are adopted to allow comparison across and within European countries.
- Build dedicated networks of bee experts to advise local and national authorities on effective conservation actions.
- Develop measures and legislation to reduce the potential for pest and disease transmission between managed and wild bees, particularly in areas where priority bee species are present. International trade in managed pollinators should be regulated, and the local breeding of managed pollinators for pollination services encouraged.

2. Habitat conservation

- Increase the protection of habitats supporting high bee diversity and endemism, and also those that act as source habitats for bees, with particular focus on Mediterranean and montane areas and species-rich grasslands.
- Develop new targets and indicators for priority bee habitats to assess and monitor their contribution to overall landscape quality for bees.
- Enhance cross-policy coordination to strengthen protection and restoration work for existing ecological networks (e.g., Natura 2000), including protected area sites, agri-environment measures and green infrastructure.
- Provide clear guidance to local and national planning authorities on how to implement Green Infrastructure in order to enhance the quality of the built landscape for wild bees, for example, by creating areas of wildflowers on green spaces around new developments.

3. Agri-environment schemes

- Improve the effectiveness of Agri-Environment Schemes (AES) by setting specific long-term objectives, including those for wild bees, at a range of spatial scales, and develop targeted options to support wider bee biodiversity in agro-ecosystems.
- Develop new AES measures which provide forage and, in particular, nesting resources for bees in a range of farming systems.
- Provide "bundles" of bee-friendly measures within AES, which can be deployed together to provide forage, nesting and other resources within local landscapes.
- Encourage industry-led efforts to support the uptake and effective management of AES options that benefit bees.

4. Agricultural production

- Realise opportunities under the Common Agricultural Policy (CAP) Pillar I to promote sustainable agriculture and improve the baseline quality of farmed land for bees by expanding the area required for Ecological Focus Areas (EFA) and encouraging novel land uses such as planting legumes and other cover crops.
- Encourage and support arable farmers to provide more diverse and abundant mass-flowering crops for bees within the farmed landscape.
- Develop additional support for alternative sustainable farming systems such as agroforestry and infield mixed cropping which can have substantial benefits to bees.
- Commit to a sustainable long-term reduction in the use of pesticides, with quantitative targets for the reductions in the total application of all pesticide active ingredients, and encourage the uptake of alternative pest management methods including the use of natural enemies and Integrated Pest Management (IPM).

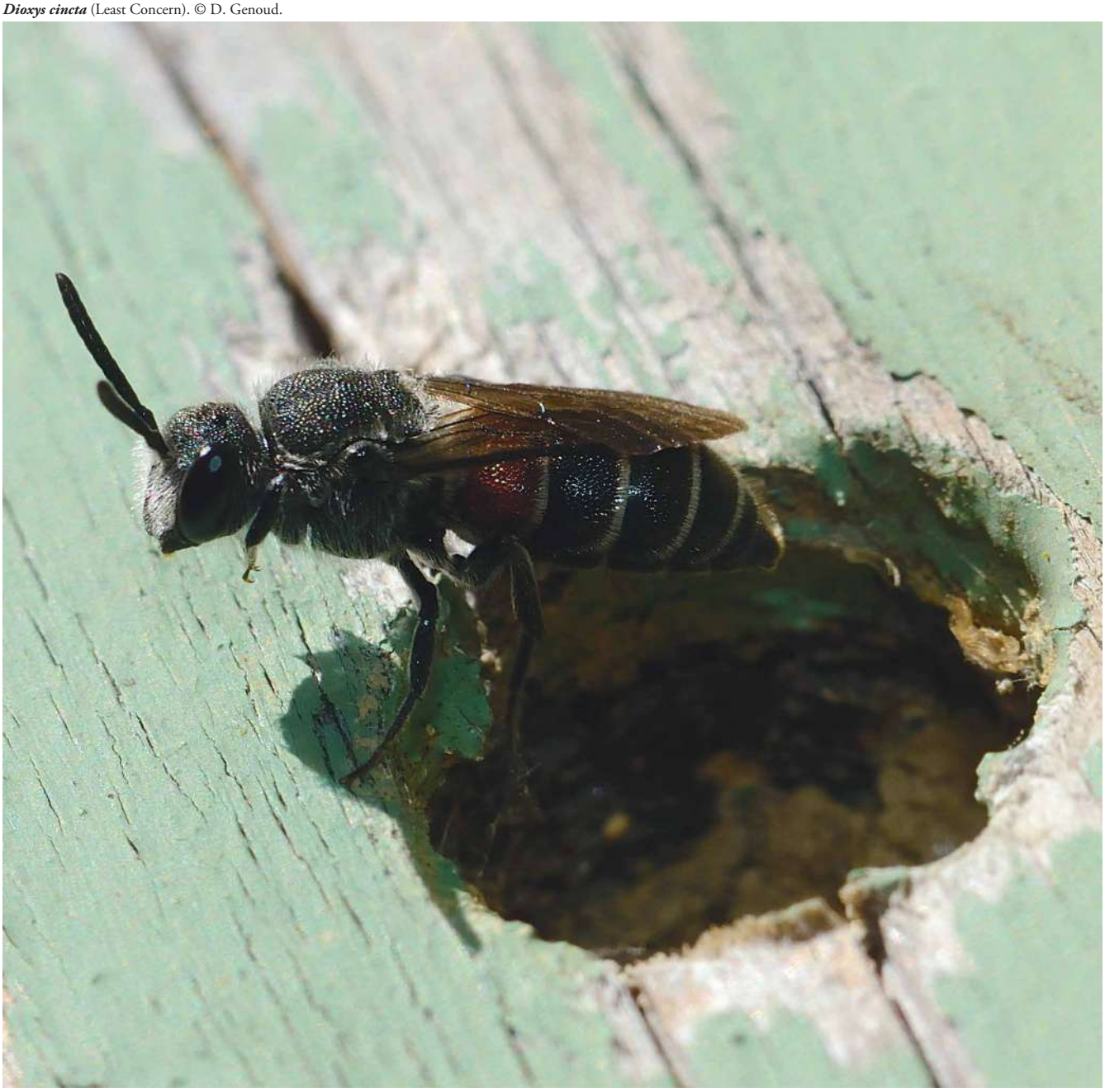
- Improve the advice to farmers, landowners, managers of public and amenity spaces and gardeners on best practices for using insecticides. This should draw upon research evidence to provide guidance which takes into account the diverse life histories of European bees and other pollinators.

Supporting activities

5. Knowledge and networks

- Support further research into the drivers of bee declines at a range of local and national scales and the identification of bees that act as indicators of localised ecosystem health.
- Invest in systematic research to fully characterise bee diversity across Europe.
- Expand the pool of bee experts and tools for bee identification, by facilitating European academic and government organisations to work together to strengthen the pool of taxonomic expertise and individuals able to identify species.
- Digitise national bee collections to make existing data widely available for analysis and to fill knowledge gaps.
- Establish a Europe-wide database of bee species with point data, linking the work of various NGOs and regional initiatives.

Dioxys cincta (Least Concern). © D. Genoud.



1. Background

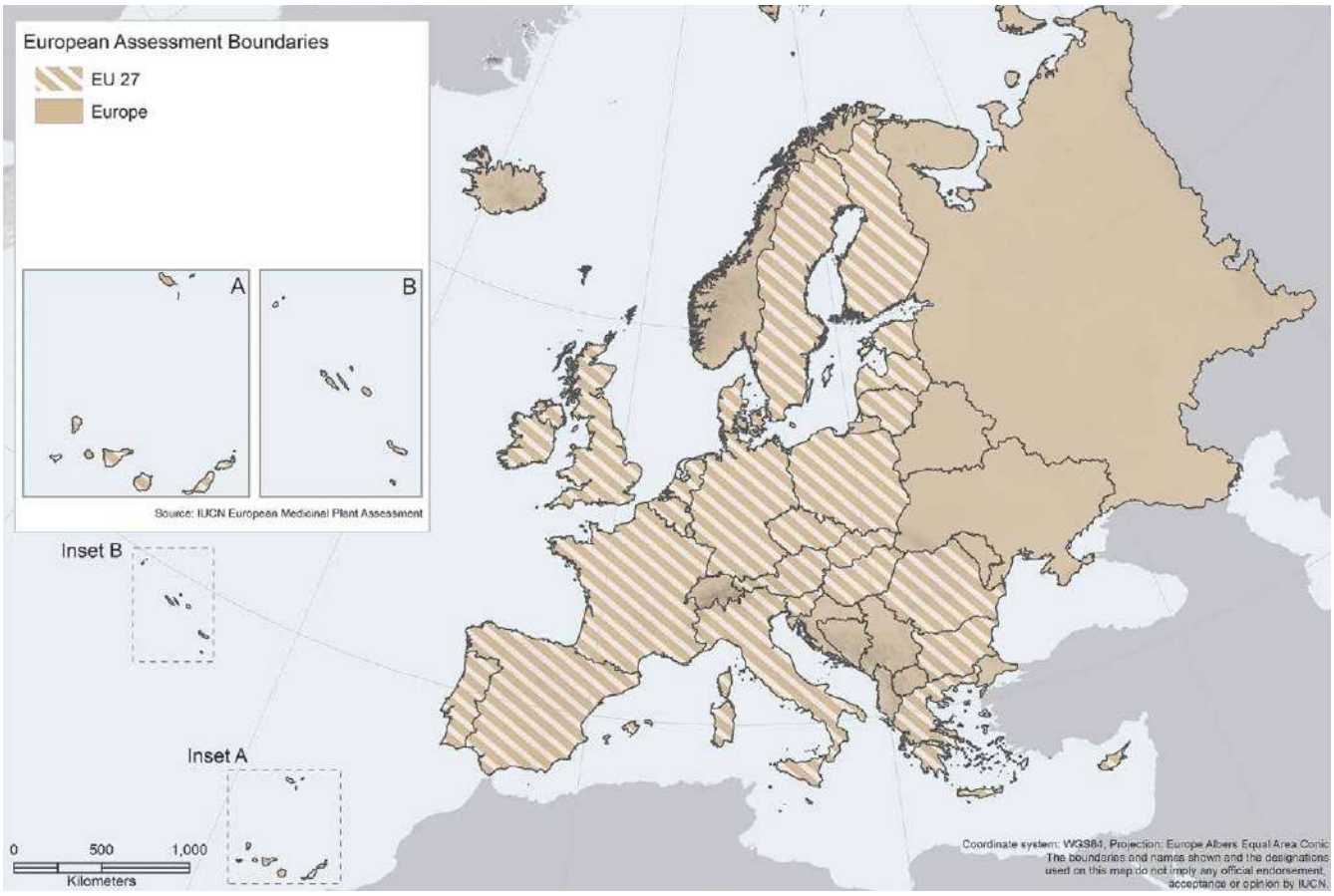
1.1 The European context

Europe is recognised as a continent in the seven continent model of the world, although physically and geologically it is the westernmost peninsula of Eurasia. Europe is bounded to the north by the Arctic Ocean, to the west by the Atlantic Ocean, to the south by the Mediterranean Sea, and to the south-east by the Black Sea and the Caucasus Mountains. In the east, Europe is separated from Asia by the Ural Mountains and by the Caspian Sea (see Figure 1). Europe is the world's second-smallest continent in terms of area, covering approximately 10,400,000 km² or 2% of the Earth's surface. In terms of human population, Europe is the third-largest continent (after Asia and Africa) with a population of some 740 million (UN DESA 2012) – about 11% of the world's population. Europe has the most highly urbanised population and, together with Asia, is the most densely populated continent in the world.

The European Union is Europe's largest political and economic entity. It is the world's largest economic block with an estimated gross domestic product (GDP) in 2013 of 13 trillion Euros for the EU 27 Member States (Eurostat 2014). Per-capita GDP in many EU states is among the highest in the world, and rates of resource consumption and waste production are correspondingly high – the EU 27's "ecological footprint" has been estimated to exceed the region's biological capacity (the total area of cropland, pasture, forest, and fishing grounds available to produce food, fibre and timber, and absorb waste) by 2.6 times (WWF 2007).

Europe includes areas of great diversity of landscapes and habitats and a wealth of flora and fauna. European biodiversity includes more than 520 species of birds (Birdlife 2014), 138 species of dragonflies and damselflies (Kalkman *et al.* 2010), 260 species of mammals (Temple and Terry 2007, 2009), 151 species of reptiles (Cox and

Figure 1. European assessment boundaries*.



* Regional assessments were made for two areas: geographical Europe and the EU 27.

Temple 2009), 85 species of amphibians (Temple and Cox 2009), 546 species of freshwater fishes (Kottelat and Freyhof 2007, Freyhof and Brooks 2011), around 1,200 species of marine fishes (IUCN in prep. 2015), 20-25,000 species of vascular plants (Euro+Med 2006-2011) and well over 100,000 species of invertebrates (Fauna Europaea 2004). The Mediterranean part of Europe, which is especially rich in plant and animal species, has been recognised as a global biodiversity hotspot (Mittermeier *et al.* 2004, Cuttelod *et al.* 2008).

Europe has arguably the most highly fragmented landscapes of all continents, and only a tiny fraction of its land surface can be considered as wilderness. For centuries most of Europe's land has been used by humans to produce food, timber and fuel, and also to provide living space. Currently, in western Europe, more than 80% of land is under some form of direct management (EEA 2007). Consequently European species are to a large extent dependent upon habitats created and maintained by human activity, particularly traditional, non-intensive forms of land management. These habitats are under pressure from agricultural intensification, commercial forestry, urban sprawl, infrastructure development, land abandonment, acidification, eutrophication, and desertification. Many species are directly affected by overexploitation, persecution, and impacts of alien invasive species, and climate change is set to become an increasingly serious threat in the future. Europe is a huge, diverse region and the relative importance of different threats varies widely across its biogeographic regions and countries.

Although considerable efforts have been made to protect and conserve European habitats and species (e.g., see Sections 4.1, 4.2, 4.3) and the Natura 2000 network of protected areas covers almost 18% of the EU territory (IEEP 2011), biodiversity decline and the associated loss of vital ecosystem services (such as water purification, pollination, flood protection, and carbon sequestration) continues to be a major concern in the region.

1.2 European bees: diversity and endemism

Bees constitute a 120 million year old monophyletic group that today includes approximately 20,000 described species worldwide (Michez *et al.* 2012, Danforth *et al.* 2013, Ascher and Pickering 2014). They rely almost exclusively on flowers for protein, lipids, and sugar throughout their life cycle (Michener 2007). Ollerton *et al.* (2011) estimated that 87.5% of all flowering plants (i.e. Angiosperms) are adapted to animal pollination, a large majority of which occurs through bees as they are the main pollinators in most ecosystems. The evolution of bees and flowering plants are therefore intrinsically linked. Bees have been recorded worldwide, in all continents and all habitats, wherever flowering plants are present.

A recent checklist collated by Kuhlmann *et al.* (2014) showed that western Palearctic bee fauna totals about 3,370 species. Based on this checklist, and considering the European Red List boundaries, 1,965 species were assessed at the European level, and 1,900 species were assessed at the EU 27 level for the purposes of the European Red List of bees. These species are divided into six families and two groups:

(i) Apidae and Megachilidae form the group of long-tongued bees;
(ii) Andrenidae, Colletidae, Halictidae and Melittidae represent the short-tongued bees (see Table 1).

As there are approximately 20,000 species worldwide, Europe hosts about 10% of worldwide bee diversity, although the continent only represents 7% of global terrestrial habitats. The most prominent and diverse family of bees is the Apidae (561 species), which includes the Honey bee and the bumblebees *(Bombus spp.)*, while the least diverse family is the Melittidae with only 37 species.

The relatively high species diversity in Europe is partially explained by the presence of areas with a Mediterranean climate as this climate provides the optimal conditions for bee diversity (Michener 1979). Moreover, taxonomic research on bees in Europe has a very rich and well documented history and may skew the known diversity of bees, as many species have yet to be described in several other areas of the world. European authors, such as Linnaeus (1707-1778), Kirby (1759-1850), Latreille (1762-1833) and Lepeletier (1770-1845) were some of the first taxonomists to describe bees. Their type material, or original specimens, are still well conserved and available for study in European academic institutions.

The mapping of bee diversity in Europe (Figure 7) highlights a general north-south positive gradient, with diversity increasing towards the Mediterranean area. Two

features explain this pattern across Europe: (i) the more favourable energy/water balance of the Mediterranean areas which has resulted in extremely high floral diversity (Patiny *et al.* 2009); and (ii) the likely role of these areas as refuges during the Quaternary glaciations (Reinig 1937, De Lattin 1967).

There are 400 species (20.4%) that are endemic to Europe and 277 species (14.6%) that are endemic to the EU 27 (see Table 1). At the European level, the family with the highest percentage of endemism is the Melittidae with 35.1%, and the family with the lowest endemicity are the Megachilidae with only 16.7% (Table 1). At the EU 27 level, the family with the highest percentage of endemism is the Colletidae with 21% and the family with the lowest endemicity are the Apidae and the Megachilidae with 13.5% (Table 1).

Many of the European endemic species are predominantly found on restricted montane habitats (Alps: *Osmia steinmanni* Müller 2002; Sierra Nevada: *Bombus reinigiellus* Rasmont 1983), islands such as the Canary Islands (e.g., *Melecta canariensis* Hohmann *et al.* 1993), and the Mediterranean islands of the Balearics (*Anthophora balearica* Friese 1896), Corsica (e.g., *Bombus pereziellus* Rasmont and Adamski 1996), Crete (e.g., *Ceratina teunisseni* Terzo and Rasmont 1997), Cyprus (e.g., *Chelostoma comosum* Müller 2012), and Sicily (e.g., *Chelostoma siciliae* Müller 2012). The Mediterranean peninsulas of Spain, Italy and Greece also show a higher percentage of endemic species.

1.3 Bee ecology

Bee ecology can be characterised based on food, sociality and nesting requirements.

Bees can collect various resources from plants such as pollen, nectar, and less commonly, oil or perfumes; some materials used for nesting like resin, soil, and pieces of leaves and petals are also collected (Wcilso and Cane 1996, Michener 2007). Various foraging strategies have been described for bees mainly based upon the range of pollen collection from host plant(s). Bees collect pollen as a food source for their larvae and, in doing so, help pollinate the flowers of the plants upon which they forage. Some taxa display floral specificity, restricting their flower visits to closely related plant taxa (pollen specialists) while other bee species are more opportunistic, exploiting a wide range of different flowers (pollen generalists) (Dötterl and Vereecken 2010). Terms have been developed to describe the continuum in bee foraging strategies, from extreme specialisation to extreme generalisation: (i) monolecty (one host plant species); (ii) oligolecty (one host plant family) and (iii) polylecty (more than one host-plant family) (Cane and Sipes 2006, Müller and Kuhlmann 2008). Moreover, quantitative pollen requirement is relatively high for bees as they forage only on pollen for protein resources while other pollinators like syrphid flies or butterflies feed on alternative resources in the larval stage. Depending on both bee species and plant resources, from seven to 1,100 flowers or from 0.9 to 4.5 inflorescences are needed to rear a single larva (Müller *et al.* 2006).

Table 1. Diversity and endemism in bee families in Europe*.

			Europe		EU 27	
Class	**Order**	**Family**	**Number of species**	**Number of endemic species (% endemic)**	**Number of species**	**Number of endemic species (% endemic)**
Insecta	Hymenoptera	Andrenidae	465	96 (20.6%)	443	62 (14%)
		Apidae	561	107 (19.1%)	535	72 (13.5%)
		Colletidae	146	40 (27.4%)	143	30 (21%)
		Halictidae	314	70 (22.3%)	306	47 (15.4%)
		Megachilidae	442	74 (16.7%)	436	59 (13.5%)
		Melittidae	37	13 (35.1%)	37	7 (18.9%)
Total			**1,965**	**400 (20.4%)**	**1,900**	**277 (14.6%)**

* This table includes species that were native or naturalised since before AD 1500; species introduced after this date are not included. Species of marginal occurrence in Europe or the EU 27 are included. For the EU 27 level assessment the Not Evaluated species (species which do not occur in the EU and that represent a total of 65 species) are excluded.

Species representing one of the genera from the six families of European bees.

Family Apidae, *Nomada ruficornis* (Least Concern). © S. Falk

Family Colletidae, *Colletes hylaeiformis* (Least Concern). © B. Jacobi

Family Halictidae, *Sphecodes niger* (Least Concern) ©. E. Phillips

Family Megachilidae, *Anthidium oblongatum* (Least Concern). © D. Genoud

Family Andrenidae, *Andrena coitana* (Data Deficient). © R. Williams

Family Melittidae, *Dasypoda visnaga* (Least Concern). © J. Devalez

Pollen is not the only food source for bees. Vascular plants produce substances such as nectar and oils. The extraction and gathering of such substances can require morphological adaptations. The morphological feature used for nectar collection is the labiomaxillary complex (i.e. the proboscis or tongue) that may be differentially shortened or elongated to reach nectar (Wcislo and Cane 1996). Another non-pollen resource for bees is the plant itself, especially its tissues. Bees use resins, masticated leaves, cut petals, trichomes or other plant materials, sometimes along with mud and saliva, to construct nests in cavities or in the soil (Müller 2011). Females can also use circular excisions of leaves and petals to line their brood cells (e.g., some *Megachile* s.l. species, some Osmiini species) or masticated leaves to hide the nest (e.g., some *Osmia* species, Rozen *et al*. 2010).

Sociality is very variable among bees. Species can be solitary, social or kleptoparasitic, although the majority of the species are solitary. In strictly solitary species, each female builds a nest by herself, prepares the nest for her larvae and then dies without ever having contact with either her offspring or with her conspecifics, except of course for mating. The social species include the most familiar species such as the Honey Bee and the bumblebees, yet at world scale they represent only 6% of the bee species diversity (Danforth 2007) and are restricted to two families (Apidae and Halictidae). The social species are made up of colonial family groups, with reproductive division of labour, cooperative brood care and overlapping generations (Michener 1974). These colonies typically show a bias in the degree of reproduction where only a small number of individuals lay the majority of eggs; the other individuals are sterile, or lay unfertilised male eggs and mainly care for the offspring (Brady *et al.* 2006, Holmes *et al.* 2014). The last category includes bees that do not collect pollen but are parasites of other bee species. Parasitic, cuckoo or kleptoparasitic bees make up approximately 20% of described species globally (Danforth *et al.* 2013). In Europe, three out of the six families of wild bees include at least one genus of species with exclusively parasitic ways of life (Apidae, Halictidae and Megachilidae). Cuckoo bees can be very variable in their host spectrum; some are exclusively linked to one host-bee species, while others have two to numerous hosts and are then considered generalists. Host generalist cuckoo bees are host specialised at the individual level (Bogusch *et al.* 2006), while host specialists can switch among the hosts without considerable change to their specialised strategy during their evolution (Habermannová *et al.* 2013).

Concerning the nesting behaviour of bees, a distinction can first be made between the ground-nesting digger species and the ones that nest away from the ground or in existing underground cavities. The ground-nesting digger species account for over half of all the species in the world (Michener 2007). In these taxa, the ground texture, sun exposure and degree of slope can be important factors in determining nest sites (Potts *et al.* 2005). Some species such as *Dasypoda hirtipes* (Melittidae), *Andrena fuscipes* (Andrenidae) and *Panurgus calcaratus* (Andrenidae), have a preference for well-exposed sandy sites. Other species, such as *Colletes cunicularius* (Colletidae) and *Andrena vaga* (Andrenidae), are strictly dependent on sandy ground (psammophilous species) (Vereecken *et al.* 2006). Among the non-digging species, some excavate their galleries in plants (e.g., stems), while others do so in rock crevices, soil or abandoned nests. Other species build potter nests in mud, or in plant resin or fibres. For example, *Megachile parietina* builds cells with dried mud on rock sides or walls. In *Icteranthidium* and *Anthidiellum*, the females harvest resin from conifers to build brood cells and attach them to a support they made of mineral or plant materials. Finally, many long-tongued bees (Apidae and Megachilidae) nest in a variety of existing holes, either naturally made or created by another organism. Some species even nest exclusively in empty snail (Helicidae) shells (e.g., *Osmia bicolor* and *Osmia aurulenta*). A number of species of the genus *Bombus* nest in much larger cavities. *Bombus terrestris*, for example, can set up home underground in abandoned rodent galleries. *B. hypnorum* often nest in old bird nests installed in tree hollows. The carder bees, *Bombus pascuorum* and *Bombus muscorum,* for example, nest in accumulations of dried grassland plant litter on the ground surface.

Megachile parietina (Least Concern). © Andrej Gogala.

1.4 Importance of bees in pollination

By collecting floral resources (i.e., pollen, nectar) for feeding, bees carry pollen on their bodies and transfer it from flower to flower. They can fertilise plants this way through pollination, allowing the plants to reproduce sexually. The ubiquity of bees and their tight association with flowering plants makes their role in pollination a global keystone in wild and agricultural ecosystem dynamics.

In terms of global agricultural production volumes, 35% comes from crops that depend (to a greater or lesser extent) on pollinators, mainly insects (i.e. one third of human food is mainly from plants pollinated by insects). Out of the 124 main crops grown for global human consumption, 87 (70%) require insect pollination for seed production (e.g., carrots, onions, garlic) and to enhance product quality and yields (e.g., coffee, nuts, many fruits) (Klein *et al.* 2007). Bees provide an ecosystem service in the form of crop pollination estimated to be 153 billion Euros a year worldwide (Gallai *et al.* 2008) and 22 billion Euros a year in Europe (Gallai *et al.* 2008).

Enhanced bee pollination can lead to benefits such as increased production, better crop quality and shelf life, yield stability and higher commercial value for many entomophilous crops (e.g., strawberries, (Klatt *et al.* 2014) and apples, (Garrat *et al.* 2014, Garibaldi *et al.* 2011)). Bee species diversity is also important as recent studies show that wild bees are responsible for a greater proportion of the pollination service previously attributed to domesticated honey bees (*Apis mellifera*) (Garibaldi *et al.* 2013). In addition, some crop plants can only be pollinated by a restricted number of species (Klein *et al.* 2007) hence the loss of bee biodiversity can lead to loss of plant diversity.

Osmia apicata (Least Concern). © Andrej Gogala.

1.5 Assessment of species extinction risk

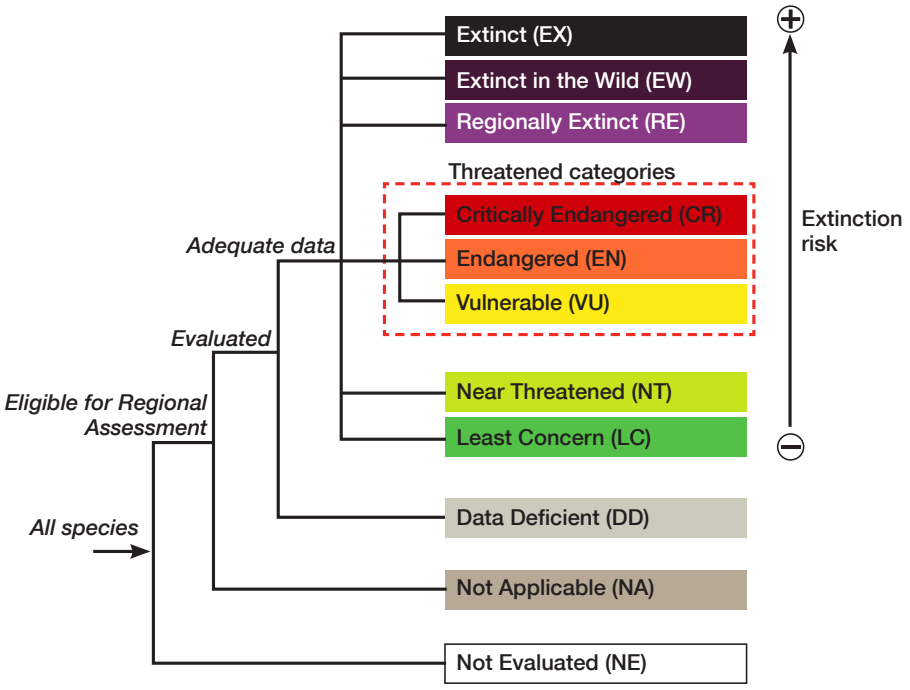
The conservation status of plants and animals is one of the most widely used indicators for assessing the condition of ecosystems and their biodiversity. It is intended to be policy-relevant, and it can be used to inform conservation planning and priority setting processes, but it is not intended to be policy-prescriptive, and it is not in itself a system for setting biodiversity conservation priorities.

At the global scale, the primary source of information on the conservation status of plants and animals is the IUCN Red List of Threatened Species™ (www.iucnredlist.org). The IUCN Red List Categories and Criteria are designed to determine a taxon's relative risk of extinction, with the main purpose of cataloguing and highlighting those taxa that are facing a higher risk of extinction. The Red List provides taxonomic, distribution, ecological, threat and conservation status information on taxa that have been evaluated using the IUCN Red List Categories and Criteria (IUCN 2012a).

The IUCN Red List Categories (Figure 2) are based on a set of quantitative criteria linked to population trends, population size and structure, and geographic range. There are nine Categories, and species classified as Vulnerable (VU), Endangered (EN) and Critically Endangered (CR) are considered as 'threatened'. When conducting regional or national assessments, the IUCN Red List Regional Guidelines (IUCN 2012b) are applied, and two additional categories are used: Regionally Extinct, and Not Applicable (see Figure 2).

As the extinction risk of a species can be assessed at global, regional or national levels, one species can have a different Red List Category in the Global Red List and in a Regional Red List. For example, a species that is common worldwide and classed as Least Concern (LC) in the Global Red List could face a high level of threat and fit the Endangered Category (EN) in a particular region. Logically, an endemic species should have the same category at regional and global levels, as it is not present in any other part of the world.

Figure 2. The IUCN Red List Categories at the regional scale.



1.6 Objectives of the assessment

The European regional assessment has four main objectives:

- To contribute to regional conservation planning through provision of a baseline dataset reporting the status of European bee species.
- To identify those priority geographic areas and habitats needing to be conserved to prevent extinctions and to ensure that European bees reach and maintain a favourable conservation status.
- To identify the major threats and to propose potential mitigating measures and conservation actions to address them.
- To strengthen the network of experts focused on bee conservation in Europe, so that the assessment information can be kept current, and expertise can be targeted to address the highest conservation priorities.

The assessment provides three main outputs:

- This summary reports on the status of all 1,965 European bee species.
- A freely available database holding the baseline data for monitoring the status and distribution of European bees.

A website and data portal (http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/initiatives/europe) showcasing this data in the form of species factsheets for all European bees included in this study, along with background and other interpretative material.

The data presented in this report provides a snapshot based on the knowledge available at the time of writing. The database will continue to be updated and made freely and widely available. IUCN will ensure wide dissemination of this data to relevant decision makers, NGOs, scientists and practitioners to inform the implementation of conservation actions on the ground.

2. Assessment methodology

2.1 Geographic scope

The geographical scope is continent-wide, extending from Iceland in the west to the Urals in the east (including European parts of the Russian Federation), and from Franz Josef Land in the north to the Mediterranean in the south (see Figure 1). The Canary Islands, Madeira and the Azores were also included. In the southeast, where definitions of Europe are most variable, the Caucasus region was not included.

Red List assessments were made at two regional levels: 1) for geographical Europe (limits described above); and 2) for the area of the 27 Member States of the European Union.

2.2 Taxonomic scope

The European Red List of bees has assessed the status of all native bee species to Europe or naturalised before AD 1500, a total of 1,965 bee species. Species introduced to Europe by man after AD 1500 were not considered in the assessment. Species that are of marginal occurrence in Europe were classed as Not Applicable (NA).

The initial species list was based on Kuhlmann *et al.* (2014). The taxonomy of the genus *Andrena* largely follows Gusenleitner and Schwarz (2002).

2.3 Assessment protocol

For all the bee species assessments, the following data were compiled:

- Taxonomic classification
- Geographic range and list of countries of occurrence (including a distribution map)
- Population information and overall population trend
- Habitat preferences and primary ecological requirements
- Major threats
- Conservation measures (in place, and needed)
- Species utilisation
- Other general information
- Red List Category and Criteria
- Key literature references

The task of collecting the initial data was divided up taxonomically, by family, sub-family or genera. Experts collected information (see acknowledgement section) about each species based on published and unpublished data and their expert opinion. The IUCN Species Information Service (SIS) was used to enter and stored all the species data.

Seven workshops were held throughout the three-year lifespan of the project to review and discuss a selection of species assessments and maps, add new information and agree on the final IUCN Red List Category and Criteria (both at the European and EU 27 levels).

All the species from the family Melittidae, most species of the family Andrenidae (all species from the genera *Camptopoeum, Clavipanurgus, Flavipanurgus, Melitturga, Panurginus, Panurgus* and *Simpanurgus*, and a selection of *Andrena* species), the species of the genera *Halictus, Nomiapis* and *Lasioglossum* (family Halictidae) and the species of the genera *Xylocopa, Ceratina* and *Bombus* (family Apidae) were assessed at small workshops organised in Brussels and attended by key experts and IUCN staff. The remaining species were reviewed and discussed by email correspondence with relevant experts.

Following the workshops, the data were edited, and outstanding questions were resolved through communications with the experts. Consistency in the use of IUCN Criteria was checked by IUCN staff. The resulting finalised IUCN Red List assessments are a product of scientific consensus concerning species status and are backed by relevant literature and data sources.

2.4. Species mapping

Bee species maps were created using distribution data available from the published literature, internet sources, and the Atlas Hymenoptera (Rasmont and Haubruge 2014). The data available varied immensely in terms of quality; for some species, distributions were available as either point location data (latitude/longitude) or in grid cell format and were therefore spatially precise. Where point or grid data were available, data were projected in a Geographical Information System (GIS) (ESRI ArcMap) and polygons drawn manually, clustering occurrence data where appropriate and selecting sub-country units or an entire country for species known to be present or

Hoplitis cristatula (Least Concern). © D. Genoud.

extinct, but with no localised occurrence data. For some species, it was only possible to assign presence at the country level, and therefore the distribution was mapped for the whole country.

The spatial analyses presented in this publication (see section 3.3) were analysed using a geodesic discrete global grid system, defined on an icosahedron and projected to the sphere using the inverse Icosahedral Snyder Equal Area (ISEA) Projection (S39). This corresponds to a hexagonal grid composed of individual units (cells) that retain their shape and area (864 km²) throughout the globe. These are more suitable for a range of ecological applications than the most commonly used rectangular grids (S40).

The extant (resident) and possibly extant (resident) distributions (the occurrence information can be found in IUCN (2014)) of each species was converted to the hexagonal grid for analysis purposes. Coastal cells were clipped to the coastline. Patterns of species richness (1,965 species) (Figure 7) were mapped by counting the number of species in each cell (or cell section, for species with a coastal distribution). Patterns of endemic species richness (400 species) were mapped by counting the number of species in each cell (or cell section for coastal species) that were flagged as being endemic to geographic Europe as defined in this project (Figure 8). Patterns of threatened species richness (Categories CR, EN, VU at the European regional level - 77 species) (Figure 9) were mapped by counting the number of threatened species in each cell or cell section. Finally, an analysis of the distribution patterns of Data Deficient species (1,101 species) was performed by counting the number of Data Deficient species within each cell (Figure 10).

3. Results

3.1 Threat status

The status of bees was assessed at two regional levels: geographical Europe and the EU 27.

9.2% and 9.1% of the species are considered threatened at the European and EU 27 levels, respectively. However, the proportion of threatened bee species is uncertain given the high number of Data Deficient species, and could lie between 4% (if all DD species are not threatened) and 60.7% (if all DD species are threatened) for Europe, and 4% and 59.7% for the EU 27 (IUCN 2011b, Table 2). Thus, the mid-point figures provide the best estimation of the proportion of threatened species (IUCN 2011b).

Figure 3 and 4 show the percentage of species in each IUCN Red List Category. In Europe, 0.4% of the species are Critically Endangered, 2.4% are Endangered, and 1.2% Vulnerable. A further 5.2% are classified as Near Threatened. In the EU 27, 0.3% of the species are Critically Endangered, 2.4% are Endangered, and 1.3% are Vulnerable. A further 5.4% are classified as Near Threatened.

For more than half of the species in Europe (56.7%) and in the EU 27 (55.6%) (Figure 3 and 4), there was not enough data to evaluate their risk of extinction and so they were classified as Data Deficient. As more data becomes available, it is possible that many of these species may also prove to be threatened.

By comparison, 59% of freshwater molluscs, 40% of freshwater fishes, 23% of amphibians, 20% of reptiles, 17% of mammals, 16% of dragonflies, 13% of birds, 9% of butterflies and 8% of aquatic plants are threatened, groups that were comprehensively assessed in Europe (IUCN 2011a, BirdLife International 2004). Additional European Red Lists assessing only a selection of species showed that 22% of terrestrial molluscs, 16% of crop

Table 2. Proportion of threatened species in Europe and EU 27.

	Europe % threat	EU 27 % threat
Lower bound (CR+EN+VU) / (assessed – EX)	4%	4%
Mid-point (CR+EN+VU) / (assessed – EX – DD)	9.2%	9.1%
Upper bound (CR+EN+VU+DD) / (assessed – EX)	60.7%	59.7%

Table 3. Summary of numbers of bee species within each category of threat.

IUCN Red List Categories	No. species Europe (no. endemic species)	No. species EU 27 (no. endemic species)
Extinct (EX)	0	0
Extinct in the Wild (EW)	0	0
Regionally Extinct (RE)	0	0
Critically Endangered (CR)	7 (3)	6 (2)
Endangered (EN)	46 (12)	46 (5)
Vulnerable (VU)	24 (7)	24 (6)
Near Threatened (NT)	101 (17)	101 (5)
Least Concern (LC)	663 (68)	659 (32)
Data Deficient (DD)	1,101 (293)	1,048 (227)
Total number of species assessed*	**1,942 (400)**	**1,884 (277)**

*This table does not include the Not Applicable species in Europe (23 species) and/or the EU 27 (16 species) (species introduced after AD 1500 or species of marginal occurrence). For the EU 27 assessment the Not Evaluated species (species which do not occur in the EU 27) are also excluded.

wild relatives, 15% of saproxylic beetles and 2% of medicinal plants are also threatened (IUCN 2011a, Allen *et al.* 2014). No other groups have yet been assessed at the European level. Bee species classed as threatened (Critically Endangered, Endangered, and Vulnerable) at the European and EU 27 levels are listed in Table 4.

Figure 3. IUCN Red List status of bees in Europe.

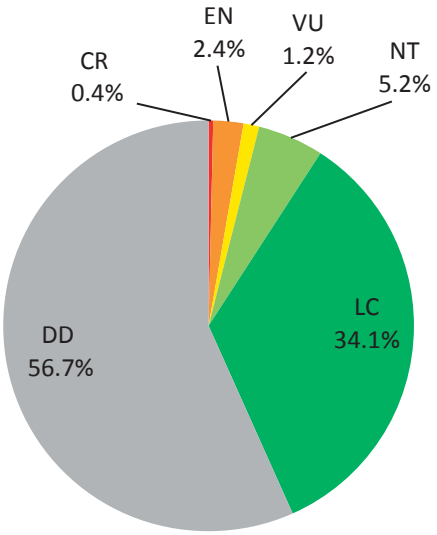


Figure 4. IUCN Red List status of bees in the EU 27.

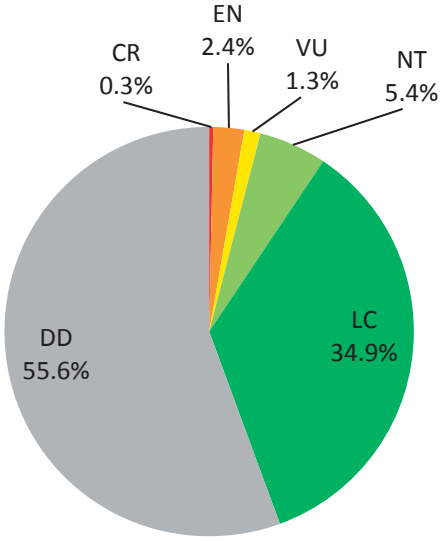


Table 4. Threatened bee species at the European and EU 27 level.

Family	Species	Red List status		Endemic to Europe?	Endemic to EU 27?
		Europe	EU 27		
Apidae	*Ammobates dusmeti*	CR	CR	Yes	Yes
Andrenidae	*Andrena labiatula*	CR	CR	Yes	No
Andrenidae	*Andrena ornata*	CR	NE	No	No
Andrenidae	*Andrena tridentata*	CR	CR	No	No
Apidae	*Bombus cullumanus*	CR	CR	No	No
Megachilidae	*Megachile cypricola*	CR	CR	No	No
Apidae	*Nomada siciliensis*	CR	CR	Yes	Yes
Apidae	*Ammobates melectoides*	EN	EN	Yes	No
Apidae	*Ammobatoides abdominalis*	EN	EN	No	No
Andrenidae	*Andrena comta*	EN	EN	No	No
Colletidae	*Colletes wolfi*	EN	EN	Yes	Yes
Melittidae	*Dasypoda braccata*	EN	EN	No	No
Andrenidae	*Andrena magna*	EN	EN	No	No
Andrenidae	*Andrena stepposa*	EN	EN	Yes	No
Andrenidae	*Andrena stigmatica*	EN	NE	No	No
Apidae	*Bombus armeniacus*	EN	EN	No	No
Apidae	*Bombus brodmannicus*	EN	EN	No	No
Apidae	*Bombus fragrans*	EN	EN	No	No
Apidae	*Bombus inexspectatus*	EN	EN	Yes	No
Apidae	*Bombus mocsaryi*	EN	EN	No	No
Apidae	*Bombus reinigiellus*	EN	EN	Yes	Yes
Apidae	*Bombus zonatus*	EN	EN	No	No
Colletidae	*Colletes anchusae*	EN	EN	No	No
Colletidae	*Colletes caspicus*	EN	EN	No	No
Colletidae	*Colletes collaris*	EN	EN	No	No
Colletidae	*Colletes graeffei*	EN	EN	No	No
Colletidae	*Colletes merceti*	EN	EN	Yes	Yes
Colletidae	*Colletes meyeri*	EN	EN	No	No

Family	Species	Red List status		Endemic to Europe?	Endemic to EU 27?
		Europe	EU 27		
Colletidae	*Colletes punctatus*	EN	EN	No	No
Colletidae	*Colletes sierrensis*	EN	EN	Yes	No
Melittidae	*Dasypoda frieseana*	EN	EN	Yes	No
Melittidae	*Dasypoda spinigera*	EN	EN	No	No
Melittidae	*Dasypoda suripes*	EN	EN	No	No
Andrenidae	*Flavipanurgus granadensis*	EN	EN	Yes	Yes
Halictidae	*Halictus carinthiacus*	EN	EN	Yes	No
Halictidae	*Halictus microcardia*	EN	EN	Yes	Yes
Halictidae	*Halictus semitectus*	EN	EN	No	No
Megachilidae	*Icteranthidium cimbiciforme*	EN	EN	No	No
Halictidae	*Lasioglossum breviventre*	EN	EN	Yes	No
Halictidae	*Lasioglossum laeve*	EN	EN	No	No
Halictidae	*Lasioglossum quadrisignatum*	EN	EN	No	No
Halictidae	*Lasioglossum sexmaculatum*	EN	EN	No	No
Halictidae	*Lasioglossum sexnotatulum*	EN	EN	No	No
Halictidae	*Lasioglossum soror*	EN	EN	No	No
Halictidae	*Lasioglossum subfasciatum*	EN	EN	No	No
Halictidae	*Lasioglossum virens*	EN	EN	No	No
Melittidae	*Melitta melanura*	EN	EN	No	No
Apidae	*Nomada italica*	EN	EN	No	No
Apidae	*Nomada pulchra*	EN	EN	No	No
Megachilidae	*Osmia maritima*	EN	EN	No	No
Apidae	*Parammobatodes minutus*	EN	EN	No	No
Megachilidae	*Trachusa interrupta*	EN	EN	No	No
Andrenidae	*Andrena transitoria*	VU	VU	No	No
Apidae	*Biastes truncatus*	VU	VU	No	No
Apidae	*Bombus alpinus*	VU	VU	Yes	No
Apidae	*Bombus confusus*	VU	VU	No	No
Apidae	*Bombus distinguendus*	VU	VU	No	No
Apidae	*Bombus gerstaeckeri*	VU	VU	No	No
Apidae	*Bombus hyperboreus*	VU	VU	No	No
Apidae	*Bombus muscorum*	VU	VU	No	No
Apidae	*Bombus polaris*	VU	VU	No	No
Apidae	*Bombus pomorum*	VU	VU	No	No
Megachilidae	*Coelioxys elongatula*	VU	VU	No	No
Colletidae	*Colletes chengtehensis*	VU	EN	No	No
Colletidae	*Colletes dimidiatus*	VU	VU	Yes	Yes
Colletidae	*Colletes floralis*	VU	VU	No	No
Colletidae	*Colletes fodiens*	VU	VU	No	No
Colletidae	*Colletes impunctatus*	VU	VU	No	No
Colletidae	*Colletes moricei*	VU	VU	Yes	Yes
Colletidae	*Colletes perezi*	VU	VU	No	No
Colletidae	*Colletes pulchellus*	VU	VU	Yes	Yes
Halictidae	*Halictus leucaheneus*	VU	VU	No	No
Melittidae	*Melitta hispanica*	VU	VU	Yes	Yes
Melittidae	*Melitta kastiliensis*	VU	VU	Yes	Yes
Apidae	*Nomada noskiewiczi*	VU	VU	Yes	Yes
Halictidae	*Systropha planidens*	VU	VU	No	No
Andrenidae	*Andrena nanaeformis*	LC	VU	No	No

Melecta luctuosa (Least Concern). © D. Genoud.

3.2 Status by taxonomic group

European bees belong to a number of different families as described in section 1.2. Table 5 presents the status of these species per family and sub-family.

Compared to the European proportion of threatened species (9.2%), it appears that the species in the families Melittidae and Colletidae represent a higher proportion of threatened species (18.9% and 12.8% respectively); while the species in the Megachilidae show the lowest levels of threat (1.1%). However, all the families include a very high number of Data Deficient species.

Looking at the sub-families can allow conclusions to be drawn in relation to some behavioural and ecological traits. Table 5 shows that there are 14 sub-families, although the Apinae are divided into corbiculate (pollen basket bees - *Bombus* sp. and the Honey Bee, *Apis mellifera*) and non-corbiculate (without pollen baskets). The sub-families that are most threatened are the Colletinae (32.1%), the corbiculate Apinae (23.2%), Dasypodainae (25%) and Melittinae (14.3%). The rest of the sub-families contain less than 5% of threatened species and some have no threatened taxa: Xylocopinae, Hylaeinae, Nomiinae and Nomioidinae.

For the Colletinae, Dasypodainae and Melittinae, the higher proportion of threatened species may be explained by their relatively specialised foraging behaviours (Michez *et al.* 2008, Müller and Kuhlmann 2008) which could make them more susceptible to changes in their environment (Scheper *et al.* 2014). For the corbiculate Apinae, most of the bumblebees are quite unspecialised foragers, however they tend to be more abundant and diversified in colder climates, such as high mountains and boreal and arctic biomes, and have a relatively high vulnerability as their preferred habitats are much more susceptible to climate change (Williams *et al.* 2009, Rasmont *et al. 2*015).

The Near Threatened (NT) status was assigned mainly to the Halictinae (39), Nomadinae (22), and Megachilinae (10) species. This status was given to species that are clearly declining in large parts of Europe but not to the extent that would trigger the IUCN Red List Criteria thresholds. These species require further study as additional population data may clarify their extinction risk status further.

For the sub-families with no threatened species (Xylocopinae, Hylaeinae, Nomiinae and Nomioidinae), some of them are thermophilic, unspecialised foragers that appear to be benefiting from climate change. Some of the Xylocopinae (which include the carpenter bees) have been expanding their distribution for several decades and are clearly driven by climate warming (Roberts and Peat 2011, Terzo and Rasmont 2014).

With regards to the Data Deficient species, the group with the lowest number is the Dasypodainae (2 species) and the Nomiinae (4 species). On the other hand, the sub-families with the highest number of Data Deficient species are the Andrenidae (307 species), the Megachilinae (242 species) and the non-corbiculate-Apinae (192 species). This could be the result of a number of reasons: poor taxonomic knowledge leading to insufficient sampling; the difficulty in sampling the species due to their intrinsic rarity (Nomadinae); or the lack of targeted surveying for certain species groups.

Table 5. IUCN Red List status (at the European level) of bees by family and subfamily*.

Order	Family	Subfamily	Total	CR	EN	VU	NT	LC	DD	% threatened
Hymenoptera	**Andrenidae**		**455**	**3**	**5**	**1**	**7**	**106**	**333**	**2.0**
		Andreninae	413	3	4	1	6	92	307	1.9
		Panurginae	42	0	1	0	1	14	26	2.4
	Apidae		**561**	**3**	**12**	**10**	**27**	**200**	**309**	**4.5**
		Apinae (corbiculate)	69	1	7	8	3	43	7	23.2
		Apinae (not corbiculate)	237	0	0	0	2	43	192	0.0
		Nomadinae	223	2	5	2	22	90	102	4.0
		Xylocopinae	32	0	0	0	0	24	8	0.0
	Colletidae		**141**	**0**	**10**	**8**	**7**	**54**	**62**	**12.8**
		Colletinae	56	0	10	8	5	25	8	32.1
		Hylaeniae	85	0	0	0	2	29	54	0.0
	Halictidae		**307**	**0**	**11**	**2**	**45**	**105**	**144**	**4.2**
		Rhophitinae	30	0	0	1	6	3	20	3.3
		Halictinae	266	0	11	1	39	95	120	4.5
		Nomiinae	6	0	0	0	0	2	4	0.0
		Nomioidinae	5	0	0	0	0	5	0	0.0
	Megachilidae		**441**	**1**	**3**	**1**	**10**	**184**	**242**	**1.1**
		Megachilinae	441	1	3	1	10	184	242	1.1
	Melittidae		**37**	**0**	**5**	**2**	**5**	**14**	**11**	**18.9**
		Dasypodainae	16	0	4	0	2	8	2	25.0
		Melittinae	21	0	1	2	3	6	9	14.3
Total*			**1,942**	**7**	**46**	**24**	**101**	**663**	**1,101**	**4.0**

*This table does not include species classed as Not Applicable (NA).

Coelioxys argentea (Least Concern). © H. Wallays.

Box 1: European bumblebees (*Bombus* spp.)

Compared to all other wild bees in Europe, bumblebees constitute the best studied group. Large sets of information are available allowing for comparison of species trends between different periods.

There are 68 species of bumblebees present across Europe which play a critical role in pollination. They allow plants to reproduce sexually and improve the production of crops, such as tomatoes, peppers and many other types of fruit, vegetables and seeds that make up human diets. Of the five most important pollinators of European crops, three are bumblebee species (Kleijn *et al.* unpublished data).

According to the European Red List of bees, 23.6% of *Bombus* species are threatened with extinction, and 4.4% are considered Near Threatened (Figure 5). Moreover, 45.6% of bumblebee species have a declining population trend, 29.4% are stable, 13.2% are increasing and 11.8% are unknown (Figure 6). Given the large amount of data available for these species, a relatively low proportion were classed as Data Deficient (8.8%).

Bumblebees are generally specially diversified and abundant in cold habitats such as mountain meadows, boreal taiga and Arctic tundra (Williams 1994, Goulson 2010). Thus, climate change, through rising temperatures and long periods of drought, is responsible for major changes in bumblebee habitat (Rasmont *et al.* 2015). For example, *Bombus hyperboreus,* the second largest bumblebee of Europe, listed as Vulnerable on the European Red List, is strictly associated with Arctic and Subarctic regions and only lives in the Scandinavian tundra and in the extreme north of Russia (Løken 1973). Climate change is likely to reduce the area of its habitat dramatically, therefore leading to population decline.

Changes in land use and agricultural practices that result in the loss of the species' natural environment also represent a serious threat to many bumblebees in Europe. The geographic range of the Critically Endangered *Bombus cullumanus* has shrunk enormously in the last ten years following habitat fragmentation and changes in farming practices which involve removing clovers – its main forage (Rasmont *et al.* 2005). As a consequence, its population has declined by more than 80% over the last decade. Previously widespread, it now only occurs in a few scattered locations across Europe.

Europe's largest bumblebee, the Endangered *Bombus fragrans*, is also seriously threatened by the intensification of agriculture, which is destroying areas of its native habitat in the steppes of Ukraine and Russia.

Measures such as increasing the margins and buffer strips around agricultural fields that are rich in flowers and wildlife, and the preservation of grasslands, could be effective tools in alleviating the rapid decline in bumblebee species (Scheper *et al.* 2013). Such interventions can provide bees with forage and may help underpin support for diversity of pollinators such as bumblebees.

Figure 5. IUCN Red List status of *Bombus* spp. in Europe.

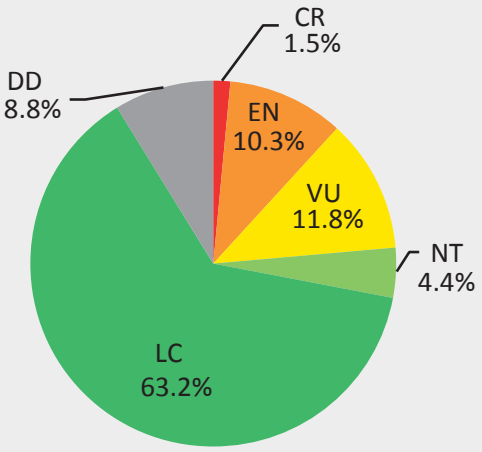
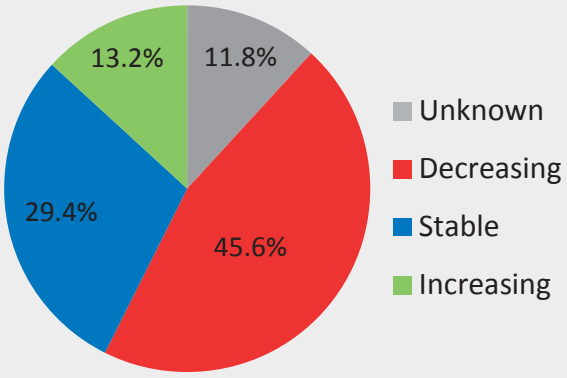
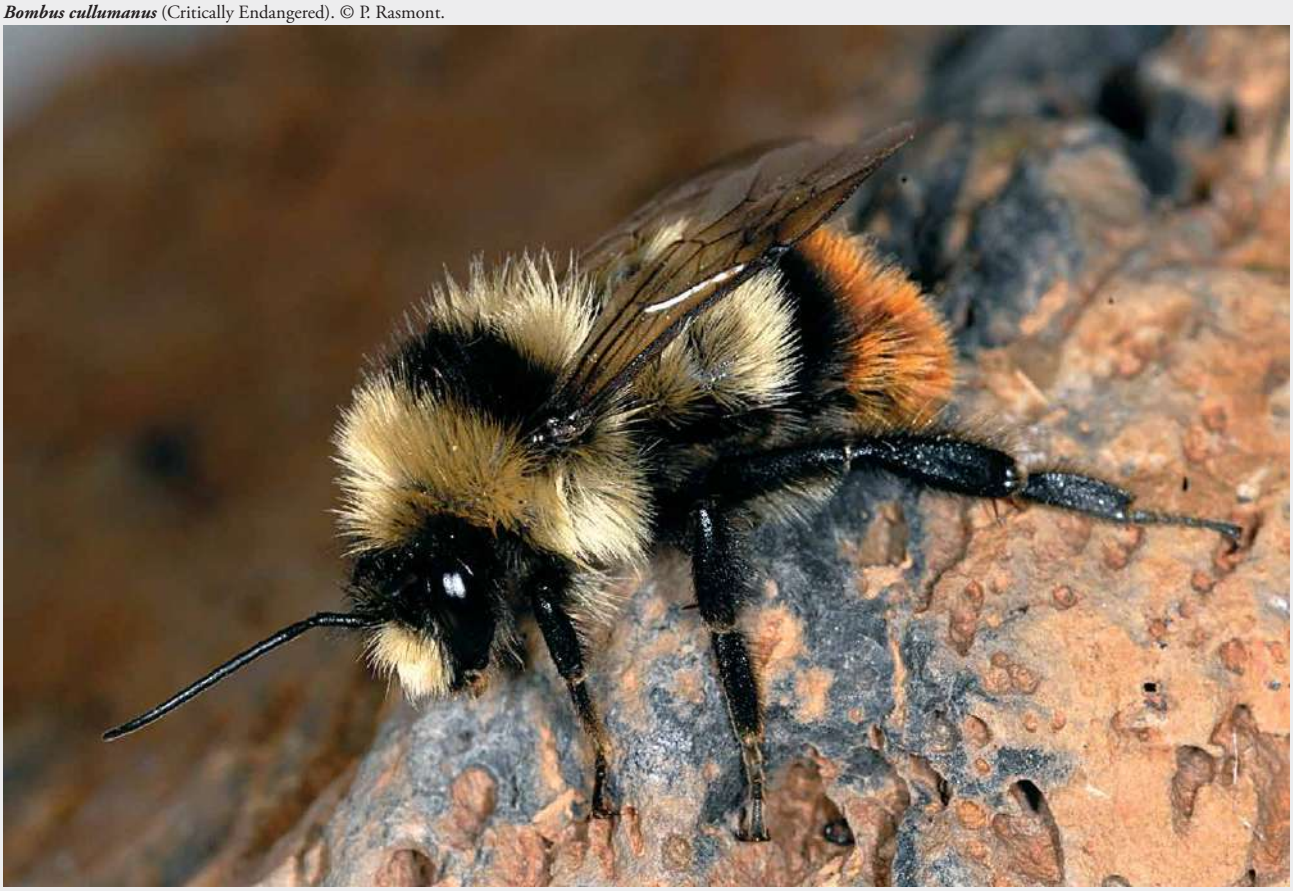


Figure 6. Population trends of *Bombus* spp. in Europe.



Bombus cullumanus (Critically Endangered). © P. Rasmont.



Bombus hyperboreus (Vulnerable). © G. Holmström.

Box 2: The Honey Bee (*Apis mellifera*)

The Honey Bee *Apis mellifera* is assessed as Data Deficient on the European Red List. The species is known to have a native distribution throughout much of Europe (except Iceland, the Faeroe Islands, the Azores, and northern Scandinavia), with numerous subspecies described across its native range. However, it is not known whether the species in Europe currently still occurs in the wild, due to the introgression of managed and feral colonies with wild colonies and the fact that the wild population may not be self-sustaining (De la Rúa *et al.* 2009, Jaffé *et al.* 2010, Moritz *et al.* 2007, Pinto *et al.* 2014).

Some colonies that are found in the wild (e.g., in tree cavities) may contain species that have escaped from a managed colony, and hence these colonies cannot be considered as wild. In addition, as these species are not wild, they may not survive to reproduce.

It is important to state that a managed bee population cannot be considered as wild, as in most areas there have been hundreds of years of selection by humans for positive traits, such as producing better quality honey or less aggressive bees. Most *A. mellifera* colonies are not considered to be self-sustaining as veterinary treatments against the mite *Varroa destructor* (and other parasites) are often provided.

The impact of threats such as the transfer of pathogens and parasites from managed and feral colonies to wild colonies, detrimental bee-keeping practices, loss of forage and nesting habitat, invasive alien species, the lack of pest control, and other anthropogenic impacts such as the use of agrochemicals may have resulted in the loss of wild populations (Blacquiere *et al.* 2012, De la Rúa *et al.* 2009, Fürst *et al.* 2014, Henry *et al.* 2012, Kremen *et al.* 2002, Moritz *et al.* 2010, Rortais *et al.* 2010, Muñoz *et al.* 2014a, Muñoz *et al.* 2014b).

Numerous studies indicate that *A. mellifera* has undergone significant declines in Europe (Potts *et al.* 2010); however, it is not clear if they refer to population reduction of wild or managed colonies although there are studies clearly documenting shifts in the number of managed hives (Jaffe *et al.* 2010).

The Honey Bee is therefore assessed as Data Deficient until further research enables us to differentiate between wild and non-wild colonies in order to determine the conservation status of the species in the wild. Research is also required to understand the impacts of the threats to the species at the colony level, in particular from *V. destructor* and its associated pathogens, malnutrition and herbicides, pesticides and fungicides. Action should be taken to prevent further declines of the species in Europe.

Apis mellifera (Data Deficient). © S. Falk.

Apis mellifera (Data Deficient). © P. Neumann.

3.3 Spatial distribution of species

3.3.1. Species richness

The geographic distribution of bee species richness in Europe is shown in Figure 7 and is based on all bee species (1,965 species). Southern Europe, and particularly the Mediterranean climate region, is the area with the highest species richness. Richness declines gradually towards more northern latitudes and north-eastern Europe. The relatively low bee diversity observed on the Balkan Peninsula north of Greece is almost certainly an anomaly caused by under sampling in this area. For southern and eastern Europe generally, little bee distribution data is available so the patterns observed in Figure 7 should be treated with great caution.

3.3.2. Endemic species richness

In Figure 8 the richness of endemic bee species in Europe is shown and is based on 400 endemic species. While endemism is relatively low in temperate parts of Europe because many species have large ranges extending far into Asia, the situation is different in southern Europe with a high number of endemic bee species. As already mentioned in section 3.3.1, the apparently low bee endemism in large parts of the Balkan Peninsula may be the result of under sampling. The Mediterranean and Macaronesian islands have a number of range-restricted endemic bees, although these regions do not show up on the map because typically each particular island only harbours a few of them.

An endemic species is defined here as having its global range restricted to European political boundaries. Bees, in common with other taxa are not restricted by administrative borders so this definition is in conflict with biogeographically defined regions of endemism specifically in south-western and south-eastern Europe. As many bee species, for example in the Iberian or Balkan Peninsulas, also occur in neighbouring parts of north Africa and Asia Minor respectively. They are not considered here as endemic, although they are endemic to the respective region. Hence, the number of bee species with small ranges is considerably higher in south-western and particularly south-eastern Europe than shown in Figure 8.

Figure 7. Species richness of European bees.

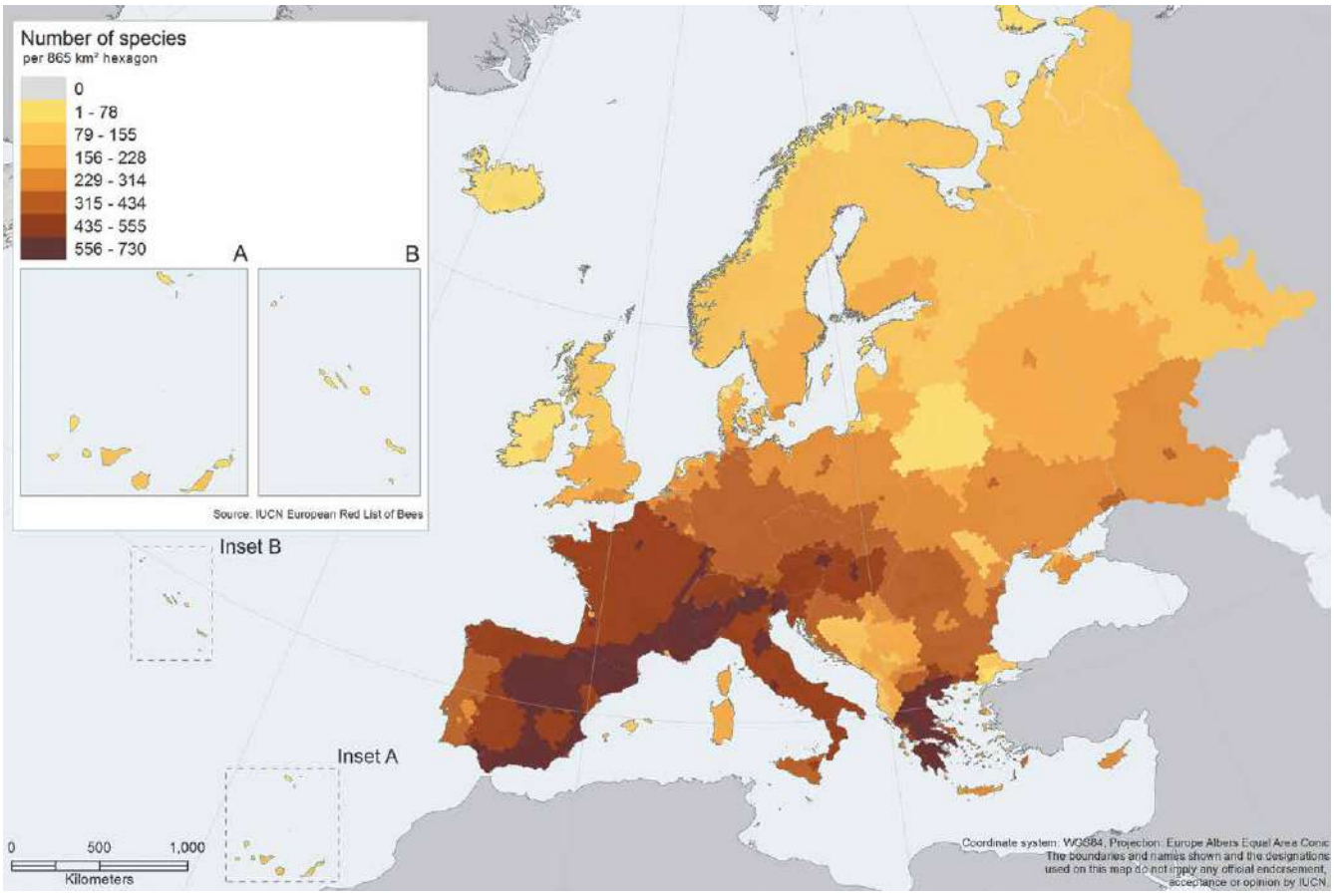
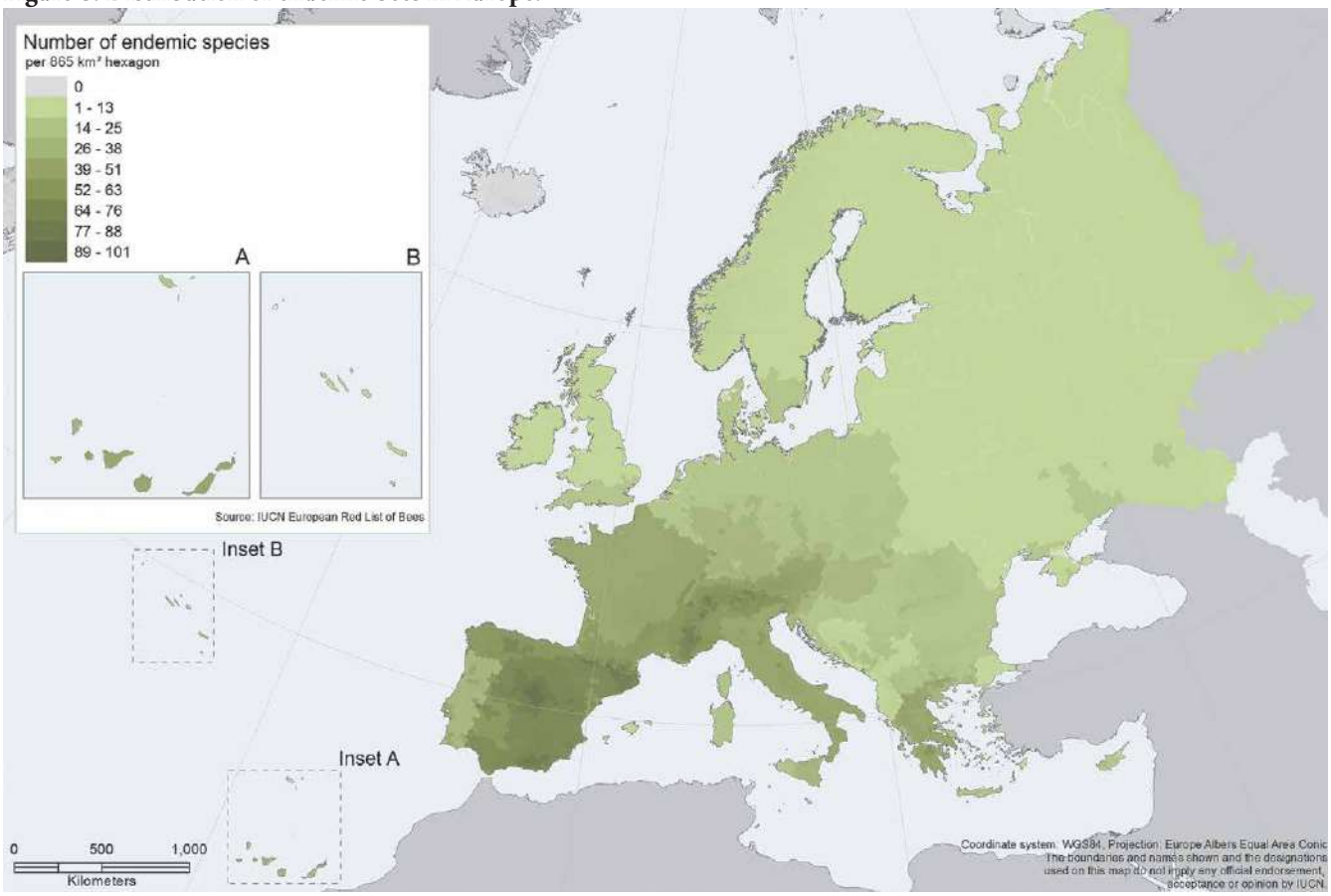


Figure 8. Distribution of endemic bees in Europe.



3.3.3. Distribution of threatened species

In Figure 9, the richness pattern of threatened bee species in Europe, which considered 77 threatened species, is illustrated showing the greatest concentration in south-central Europe eastwards to Crimea while large parts of southern Europe seem to have low numbers of threatened bees. This pattern is different from, and contrasts the picture of overall species diversity (Figure 7) and the distribution of endemics (Figure 8). In part, this may be because there is a large number of species that have been classified as Data Deficient (1,101 bee species, 56.7% of the total European fauna, Table 3 and Figure 3), of which the vast majority appear to be restricted to southern Europe and these have not been considered here. However, given that Mediterranean Europe has undergone a large-scale transformation in land use in the last few decades, it is very likely that many of the range restricted and specialised bee species there are actually threatened. Thus, Figure 9 is misleading regarding the situation in southern Europe and reveals an urgent need for further research and recording in these areas.

Andrena magna (Endangered). © A.V. Fateryga.

3.3.4. Distribution of Data Deficient species

In Figure 10 the richness of Data Deficient species is presented and is based on the total number of Data Deficient species (1,101 species). The pattern is very similar to the map showing general bee richness (Figure 7). This illustrates the deep divide in available

Figure 9. Distribution of threatened bees in Europe.

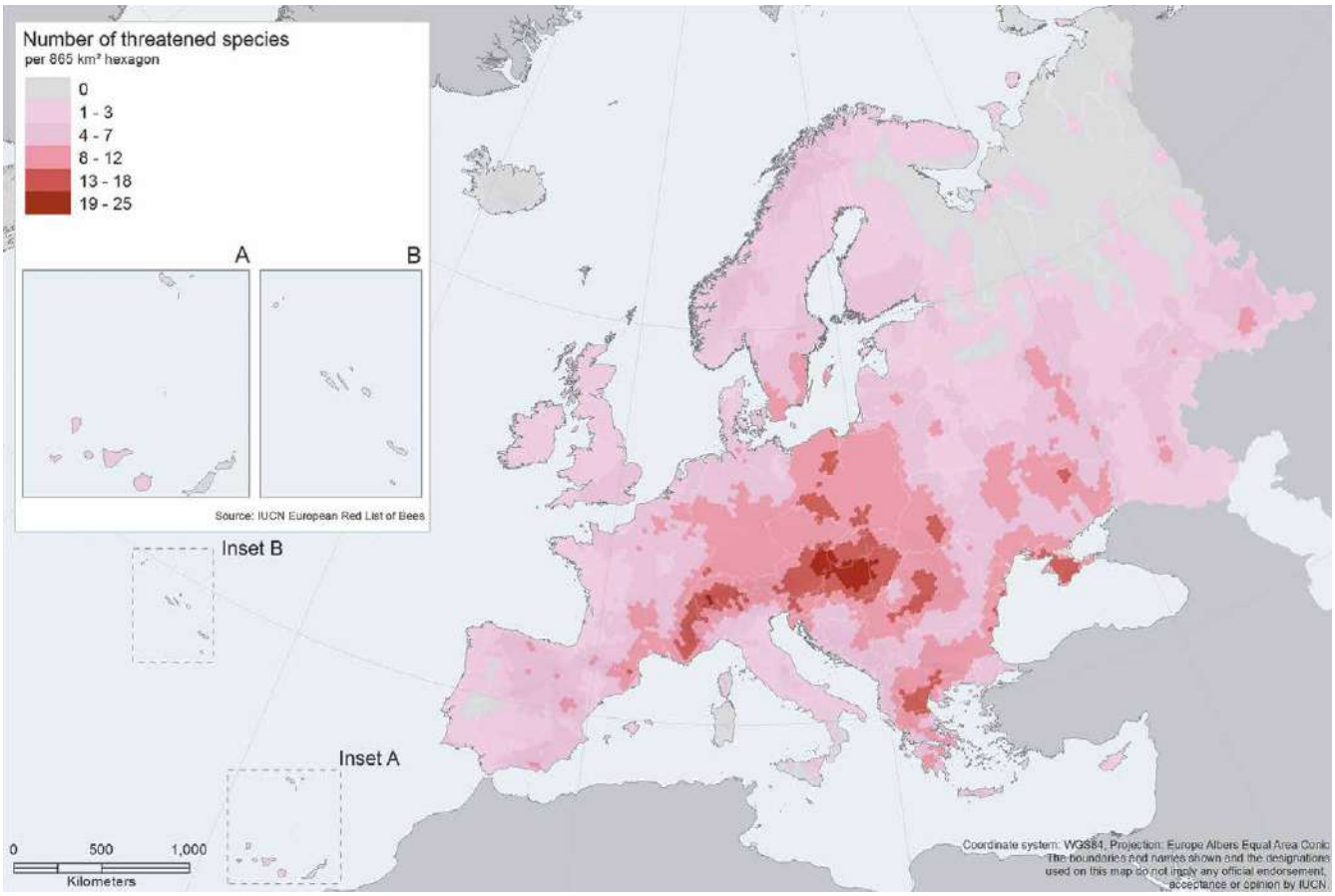
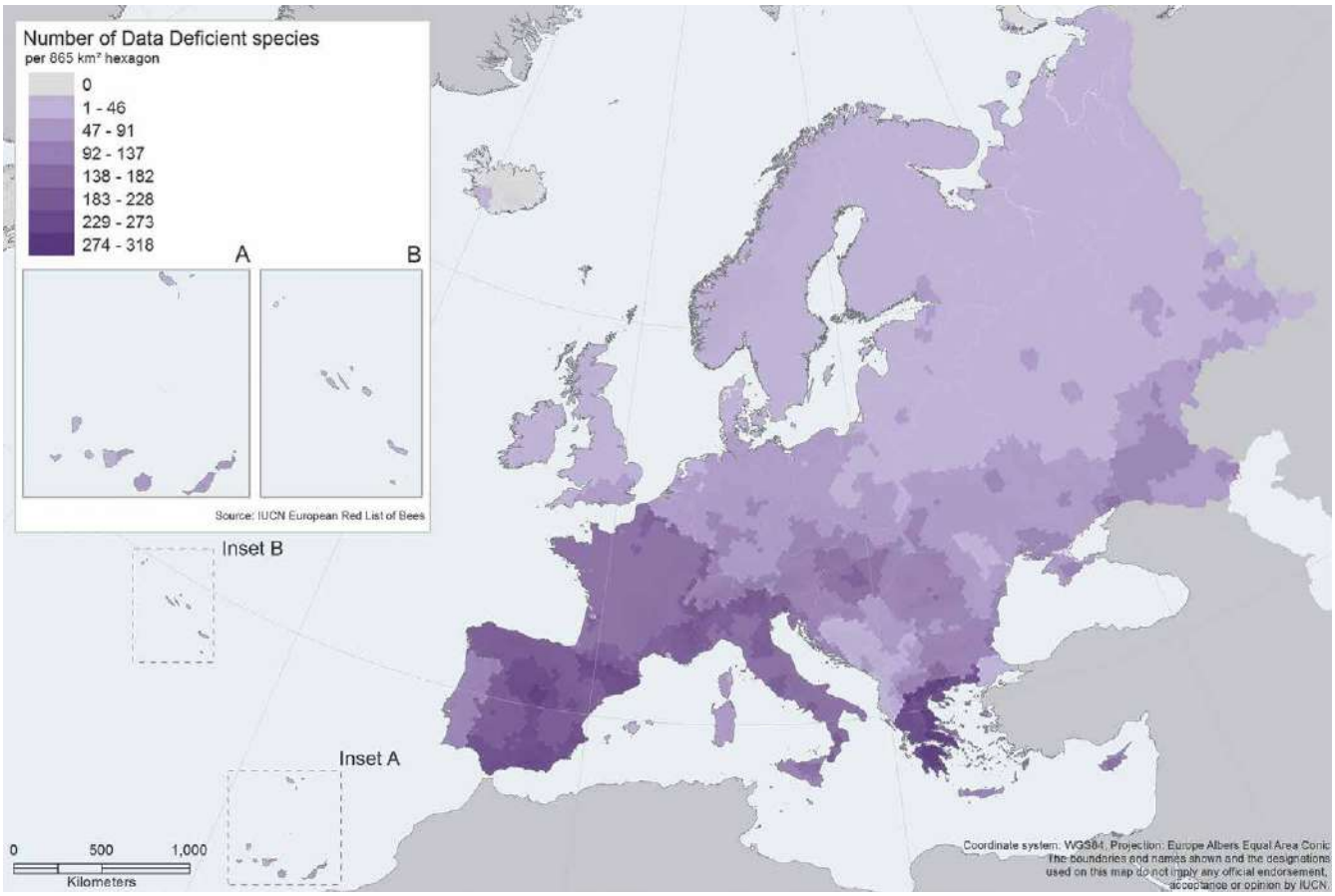


Figure 10. Distribution of Data Deficient bees in Europe.



information on distribution and life history data between the relatively well known, but species-poor, northwest of Europe, and particularly the centre of bee diversity in the Mediterranean region that harbours the majority of the fauna. This deficiency may be due to insufficient, or even complete lack of, taxonomic expertise for large parts of the European bee fauna. Such taxonomic deficits could be overcome by training the next generation of taxonomists, investing in carefully targeted faunistic surveys and better mobilising existing data from museum collections.

Eucera nigrilabris (Data Deficient). © J. Devalez .

3.4 Major threats to bees in Europe

With the majority (56.7%) of European bee species being listed as Data Deficient, any overview of the threats to the continental apifauna will necessarily be incomplete. However, for conservation and management of bee diversity to be undertaken effectively, it is critical to have a clear understanding of taxonomy and ecology of the species present. National governments, through the Convention on Biological Diversity, recognise the existence of a taxonomic impediment and, through the Darwin Declaration, intend to address the situation (Environment Australia 1998). This shortfall in taxonomic expertise is very apparent in our understanding of bees. A major threat to effective deployment of conservation actions for the bees of Europe is an inability to understand and identify the species present and to monitor the state of populations effectively.

According to the European Red List, 212 species had no threats identified, while for 1,067 species threats remain unknown. Identified threats for the remaining species (663) are presented below, and a summary of the relative importance of the different threatening processes is shown in Figure 11.

Agricultural expansion and intensification

Many of the environmental threats to bee diversity are associated with modern agriculture and, in particular, shifting agricultural practice and the increasing intensification of farming (Figure 11). These threats include those related to intensive arable farming (loss of uncultivated habitats and widespread use of insecticides and herbicides (Sydenham *et al.* 2014, Gill and Raine 2014)), livestock farming (resulting in grazing and stocking regimes that are damaging to grasslands and fragile Mediterranean ecosystems) (Vulliamy *et al.* 2006) and the continued presence of commercial timber plantations (Navarro-Cerrillo *et al.* 2013).

According to the European Red List, 366 species are affected by changes in agricultural practice, which can lead to large scale habitat loss and habitat degradation, especially in temperate regions. Shifts from grassland hay cropping regimes to the more intensive silage production (i.e. late season to early season cropping) or increased grazing, has resulted in large scale losses of herb-rich grasslands e.g., 97% loss of enclosed semi-natural grasslands in England and Wales (Bullock *et al.* 2011) and 97-99% of the historically managed grassland in Sweden (Dahlström *et al.* 2008). Loss of season-long flowering impacts particularly strongly on long-lived social insects, especially bumblebees (*Bombus* spp.), and in more intensively farmed regions of Europe, bumblebees are especially susceptible (Carvell *et al.* 2006, Rundlöf *et al.* 2008). The loss of semi-natural grasslands also negatively impacts on localised and specialised solitary species (e.g., *Andrena hattorfiana* and *A. humilis* in Sweden) (Franzén and Nilsson 2004).

In other parts of Europe, traditional land use has been abandoned, allowing for development of scrub and ultimately woodland. This is especially true in places that are generally unsuitable for more intensive farming, and in places such as the Baltic States it is abandonment, rather than habitat fragmentation, that is the key driver of species composition in semi-natural grasslands (Dauber *et al.* 2006). 331 non-threatened species and 35 threatened species are regarded as under threat from agricultural expansion, intensification and shifts in agricultural practice, and 307 non-threatened species and 16 threatened species are regarded as under threat from

livestock farming (often in conjunction with an increased susceptibility to fire in the Mediterranean region).

Pollution, pesticides and herbicides

Among the many threats linked to modern agriculture is the widespread use of agri-chemicals. The results of the European Red List show that 252 species of non-threatened bees, and 7 threatened bee species are regarded as threatened by agricultural and forestry effluents; either by direct contact, or via a sub-lethal effect on the bees themselves (mainly due to insecticide application) or by damaging the floral resources (mainly due to herbicide application) on which bees depend.

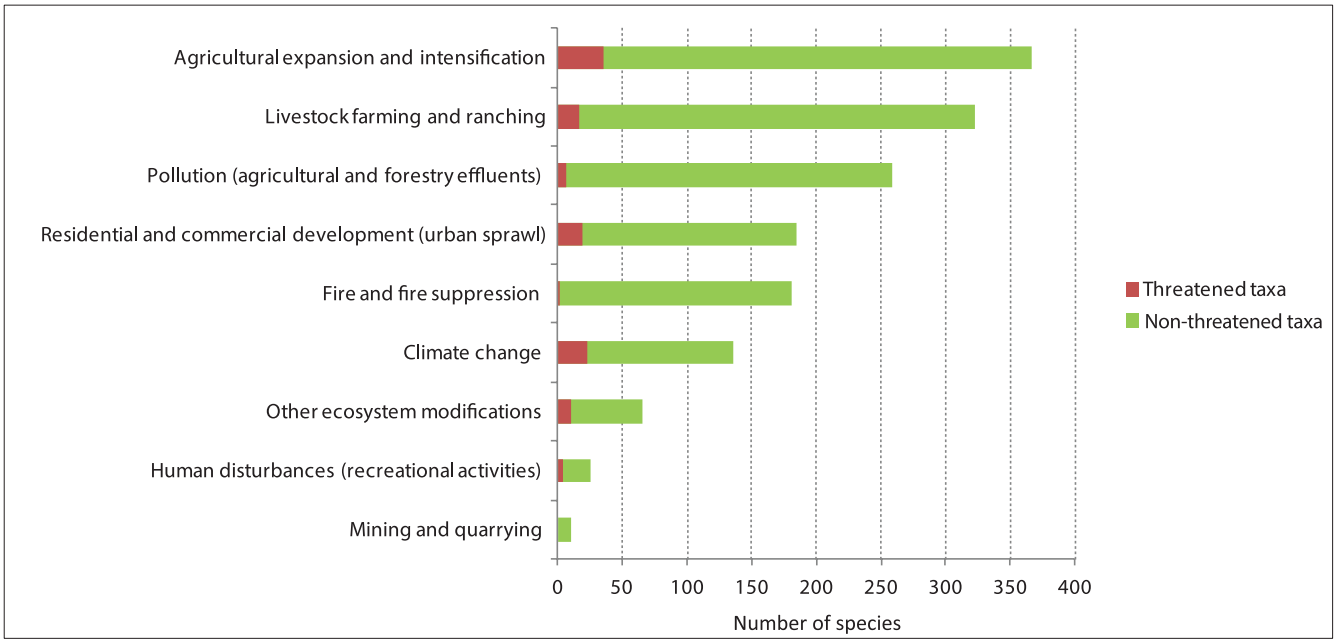
The pesticide story is complex, but studies have shown that exposure to neonicotinoid pesticides can lead directly to the loss of honey bees (e.g., Tapparo *et al.* 2012, Pisa *et al.* 2015), and commercial *Bombus* in the US (e.g., Gradish *et al.* 2010). Exposure to sub-lethal doses of neonicotinoids have been linked with increased levels of the gut pathogen *Nosema* in honey bees (Pettis *et al.* 2012) and colony loss by impairing overwinter survival in honey bees (Lu *et al.* 2014). Elston *et al.* (2013) report that sub-lethal effects of thiamethoxam, a neonicotinoid pesticide, in conjunction with propiconazole, a DMI fungicide, affect colony initiation in bumblebee (*Bombus terrestris*) colonies (see also Godfray *et al.* 2014).

A number of laboratory studies (e.g., Goulson 2013, Sandrock *et al.* 2014) describe the sub-lethal effects of neonicotinoid pesticides on some species of bees, and growing evidence from field studies indicates that levels of systemic pesticides (neonicotinoids and fipronil) that have been documented in the environment are sufficient to cause adverse impacts on a wide range of non-target organisms, including bees (Pisa *et al.* 2015). Traits such as body size, foraging range, food storage, etc. vary highly between bee species and as a result, so does the potential sensitivity to the direct or indirect effects of pesticides (Williams *et al.* 2010). It seems clear that honey bee traits make them more robust than other wild bee species to resist the effects of pesticides (Desneux *et al.* 2007). Nevertheless, our knowledge about the effects of pesticides is based primarily on honey bees. Gill and Raine (2014) have, however, shown that prolonged exposure of sub-lethal doses of Imidachloprid (a neonicotinoid) affects natural foraging behaviour of commercially reared *Bombus terrestris* in the field.

Herbicide application can also impact negatively on bee diversity, as it can reduce the availability of flowers on which bees depend and delay the flowering so the timing between the period when food is most needed by pollinators and food availability is disrupted (Boutin *et al.* 2014). Herbicide application can have a significant local effect on bees, especially those species that are specialised pollen foragers (Nabhan and Buchmann 1995).

Increasing application of Nitrogen-based fertilisers is typical of the widespread intensification of agriculture over much of the continent. Fertiliser use, in addition to encouraging the growth of the target crops, also promotes rank grassland, low in flowering plants (especially Fabaceae) (Wilson *et al.* 1999) and poor for many bees, especially some *Bombus* species and Fabaceae specialists.

Figure 11. Major threats to bees in Europe.



Residential and commercial (including coastal infrastructure) development

Urban sprawl and infrastructure development have continued apace in the late 20th and early 21st century, with the expansion of cities, ports, tourist resorts and associated recreational areas. Global trade in goods grew by an average of 6.9% a year between 1997 and 2006 and sea ports in northern Europe have been enacting major extension projects to accommodate this (e.g., EUROMAX-Terminal in Rotterdam with an expansion in area of 1,000 ha)(EEA 2006, Podevins 2007). Mass tourism in coastal regions has seen an increase in both the size of the local population and number of hotels (e.g., Malaga; Costa del Sol, Spain saw an increase in the number of hotels from 150 to 300 between 1983 and 2000 and a rise in population of 71.6% from 1950-2000) (Segreto *et al.* 2009). It is estimated that by 2020 there will be some 350 million tourists visiting the Mediterranean coastal region alone (Davenport and Davenport 2006). Along the Mediterranean coasts of Spain and France and all along the coast of mainland Italy, 75-80% of the coastal sand dunes have been destroyed by tourism, urbanisation and industry. Sand dune systems in Greece and Portugal are under growing urbanisation pressures as well (van der Meulen and Salman 1996). The increasing numbers of tourists in the Costa del Sol has caused an expansion in the number recreational facilities, from tennis courts, marinas and camping grounds to golf courses (many of which are coastal) (Anonymous 2006). These threatened systems support bees such as *Osmia balearica* and *Osmia uncicornis* (Haeseler 2008).

Tourism associated with skiing is an extremely important economic factor in the Alpine regions of Europe (Abegg *et al.* 1997, Elsasser and Messerli 2001), and the area affected by ski pistes or by infrastructure development related to tourism is still increasing (Wipf *et al.* 2005). Work for this Red List suggests that highly restricted, threatened montane bees such as *Bombus brodmannicus* are believed to be at risk from future skiing-related development. In all, some 166 non-threatened and 19 threatened bee species are regarded as under threat from expanding urban sprawl and infrastructure development, and 21 non-threatened species and 4 threatened species are regarded as under threat from human disturbances associated with tourism.

Other ecosystem modifications, including mining and quarrying

In low lying coastal areas where flood risk from tidal surges is a potentially damaging threat to human life and livelihood, hardening and strengthening of sea walls, and the creation of new defences (such as in the Dutch Delta area) have impacted on coastal habitats, especially saltmarshes. Maintaining the existing coastline generally will cause considerable loss of saltmarsh (Cooper *et al.* 2001) with direct impact on specialised bee species such as *Colletes halophilus* (a European endemic with a restricted range).

Priority habitats with sandy soils in Atlantic Europe include areas that support lowland heathland (a temperate dwarf shrub community). These globally important habitats have been under threat for many years now from urban expansion, widespread plantation of commercial forestry and mineral extraction (Rose *et al.* 2000, Hooftman and Bullock 2012). Urban development can impact habitats through physical degradation and fragmentation, road building, pollution, increased fire risk and waste disposal though landfill (Anonymous 2013). Ten non-threatened species are regarded as under threat from mining and quarrying, and 56 non-threatened species and 10 threatened species are regarded as under threat from a variety of other modifications to ecosystems.

Fire and fire susceptibility

181 species appear to be threatened by fires. Within the Mediterranean basin, between 1980 and 1990, an average of 700,000 ha of phryganic shrublands, heathland and grasslands, were burnt each year by a total of some 60,000 fires, with Greece, Spain, Portugal and France accounting for more than half of this total (Condé and Richard 2002). Greater fire frequencies and fire extent as a result of climate change have been noted in the Mediterranean basin (Pausas and Abdel Malak 2004). In the exceptionally hot and dry summers in the early 21st century, large fires were both widespread and common in the Mediterranean basin. Although lightning is known to be a cause of some fires, it is now considered that about 95% of the fires in the Mediterranean area are of human origin (Condé and Richard 2002). Whilst fire is an important element in maintaining Mediterranean shrubland, an increased frequency of fire in Mediterranean shrubby ecosystems allied with grazing of immediate post-fire communities can decrease bee diversity (Potts *et al.* 2003). 179 non-threatened species and two threatened species are regarded as under threat from an increased susceptibility to fire.

Climate change (including habitat shifting and alteration, droughts and temperature extremes)

Changes in climate are also considered to be an important driver of increased extinction risk and 136 bee species appear to be threatened by it. In the steppic

Epeolus cruciger (Near Threatened). © C. Deschepper.

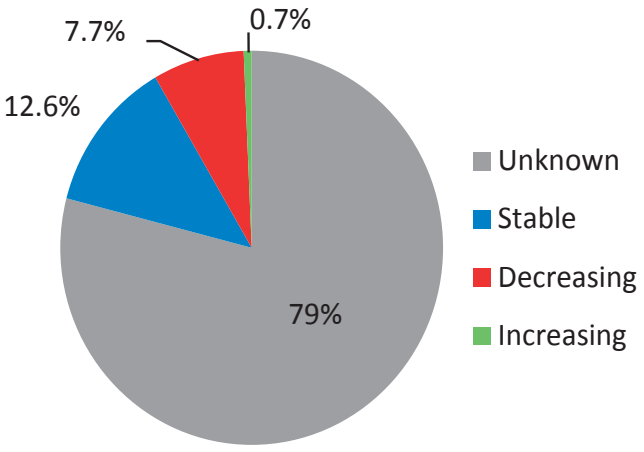
regions of eastern Europe, an increase in summer rainfall (Klimenko 1994, Shahgedanov 2002) has led to habitat conversion from dry xeric grasslands to meadow and scrub (Penksza *et al.* 2003) to the detriment of bee species (e.g., *Bombus fragrans*) that are restricted to these dry habitats (Radchenko 2009). Studies by Maracchi *et al.* (2005) and Olesen and Bindi (2002) also show that climatic change in Europe will lead to more widespread and prolonged heat waves and summer droughts and an increase in temperature across the Boreal, Arctic and Alpine regions will severely impact the vegetation composition. This is already having an effect on the species associated with these habitats, as the bumblebee species of these biomes come under increased threat of extinction (Callaghan *et al.* 2004, Odegaard *et al.* 2009, Rasmont *et al.* 2015). The European Red List shows that 113 non-threatened species and 23 threatened species are regarded as threatened by climate change.

3.5 Population trends

Documenting a species population trend provides key information when assessing its Red List status. As part of this process, the species' overall populations were assessed as declining, stable, increasing or unknown. 7.7% (150 species) of Europe's bee species are thought to be in decline, while 12.6% of populations are considered stable (244 species) and 0.7% (13 species) are increasing (Figure 12). As very little population trend data exists from most European countries, 79% of species (1,535 species) have unknown population trends.

Lasioglossum malachurum (Least Concern). © D. Genoud.

Figure 12. Population trends of European bees.



3.6 Gaps in knowledge

Taxonomic impediment

The bee Red List resulted in 56.7% of species being Data Deficient in Europe (Figure 3). Many taxa of solitary bees, like the Andrenidae, non-cirbiculate Apinae and Nomadinae, still require basic taxonomic research before they can be classified as other than Data Deficient. While the Andrenidae represents 23.6% of bee species diversity in Europe and pollinate an important number of plants, including crops, it remains unknown how many species there are within this diverse group.

Bee systematics (the science of determining the relationships between species) is relatively poorly supported in Europe (and even worse in the developing world) compared to North America. There is no equivalent of research funding at the European level to the National Science Foundation in USA or the taxonomic initiative in Sweden (http://www.artdata.slu.se/). A European wide initiative to promote bee systematic research is essential in order to determine how many species there actually are. This is the basic requirement for conserving the patrimony of species diversity.

A second aspect of the taxonomic impediment is the lack of taxonomic expertise. Unfortunately, the community of European bee taxonomists has been markedly reduced during the second part of the last century. There is consequently a unique wealth of publications about bees in Europe but very few address the basic systematic questionson a broad scale. Many of the modern taxonomists turned to more applied, fundamental or local approaches of systematics and therefore lasting taxonomic questions about the taxa at broader scales have not been addressed. An illustration of the deficiency, is that there is no European equivalent of the Michener *et al.* (1994) key for the North American bees. At species level, many taxa like the genera *Megachile* and *Andrena*, or the tribes Anthophorini, Eucerini and Nomadini still need basic taxonomic research.

Finally, a review of European bee diversity based on new molecular tools will help reveal cryptic species such as those that were shown to exist for bumblebees in Europe (see Lecocq *et al.* 2014) and the halictid bees of North America (Gibbs 2009).

National monitoring and survey

Reviewing published checklists (country and continental level), the national records and the National Red Lists provides an insightful overview of the available local resources. While precise information on bee fauna (species number and species distribution) are available for countries like Sweden, the Netherlands, Belgium, UK, Germany or Switzerland, south eastern European countries like Albania, Greece or Bulgaria are less well covered.

Monitoring has to be fuelled by data from long-term surveys. These kinds of surveys help us understand the population dynamics of species and how they can shift in response to environmental changes. The few studies that provide long term data on bees in Europe are very useful. For example Dupont *et al.* (2011) conducted a survey of the bumblebee community on red clover. Of twelve *Bombus* species that were observed in the 1930's, five of them were not recorded during the contemporary re-survey study. The latter were all long-tongued, late-emerging species which are specialised on long corolla flowers like red clover. Long-tongued bumblebee species showed consistent and dramatic declines in species richness and abundances throughout the flowering season of red clover, which is in decline in Europe, while the short-tongued species were largely unaffected. These local results help us to understand the pattern of decline observed in bees. Bommarco *et al.* (2011) observed the same tendencies in Sweden.

Conservation of European bees would massively benefit from a systematic continental surveillance programme to determine the occurrence and abundance of key species and communities. This also requires the digitisation of data from experts and specimens in national collections, especially in the southern and eastern countries.

Stelis annulata (Data Deficient). © D. Genoud.

4. Conservation measures

4.1 Biodiversity protection in Europe and the EU

European countries and EU Member States are signatories to a number of important conventions aimed at conserving biodiversity, including the 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats, and the 1992 Convention on Biological Diversity.

Through the CBD, the Strategic Plan 2011-2020 was established, which includes 20 targets (Aichi Targets) that are guiding the work of the CBD and all the other biodiversity conventions. In particular, Target 12 focuses on preventing the extinction of known threatened species and improving their status.

The Bern Convention is a binding international legal instrument that aims to conserve wild flora and fauna and their natural habitats and to promote European cooperation towards that objective. It covers all European countries and some African states.

Also at the Pan European level, European countries across the continent endorsed the Pan-European 2020 Strategy for Biodiversity (UNEP 2011), which refocuses efforts to prevent further loss of biodiversity in the Pan European region and provides a European mechanism for supporting the implementation of the global Strategic Plan for Biodiversity.

EU nature conservation policy is based on two main pieces of legislation - the 1979 Birds and the 1992 Habitats Directives. The main aim of the nature directives is to ensure the favourable conservation status (see Box 3) of the habitats and species found in the EU. One of the main tools to enhance and maintain this status is the Natura 2000 network of protected areas, which currently contains over 27,000 terrestrial and marine sites, covering almost a fifth of the EU land areas as well as substantial parts of the surrounding seas (IEEP 2011).

In addition the EU has committed to a long-term (2050) vision and mid-term headline target for biodiversity, which is '*To halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020 and restore them in so far as possible, while stepping up the EU contribution to averting global biodiversity loss*'. This target underpins the EU Biodiversity Strategy 2011-2020.

The establishment of these policy instruments indicate the high political commitment to biodiversity and the need to monitor the status of biodiversity as to assess progress towards meeting conservation objectives and targets.

4.2 Conservation of bee species in the EU

Many of the existing conservation actions are about expanding floral resources, shelter and nest sites for pollinators. There is no global or European action focusing on the conservation of bees in particular. Protected areas, mass flower crops and agri-environment schemes (including organic farming) have been identified as three broad complimentary mitigation strategies for pollinators (including bees) (Wickens *et al.* 2013). Each strategy differs in temporal and spatial coverage but all potentially offer significant benefits to pollinators.

The Natura 2000 network of protected areas almost covers 18% of the EU territory (IEEP 2011). Many rare and scarce species are only found within these sites (e.g., Iserbyt 2009). They have been lost from the wider landscapes and so protected areas provide an essential tool in conservation even if these sites were never designated based on the presence of particular bee species. The results of the Red List assessment indicate that 30 threatened species and 41 Near Threatened species were recorded in at least one protected area.

Mass flowering crops, such as oilseed rape, promoted as part of the EU Common Agricultural Policy (CAP), and also increasing in area through rising demands for biofuels under the renewable fuel Directive, may help support populations of generalist pollinators like common bumblebees (e.g., Westphal *et al.* 2009). Moreover, late-season mass-flowering of red clover can also promote bee diversity (Rundlöf *et al.* 2014). The main limitation of this is the short flowering period and limited number of bee species able to forage on these resources. If the mass flowering crop is the main resource through the flight period of the bee species, it cannot

Anthophora plumipes (Least Concern). © B. Hanssens.

support the production of additional offspring (Westphal *et al.* 2009). Furthermore, negative consequences are possible for specialist or mismatched species and there is potential to distort plant-pollinator interactions in agro-ecosystems (Diekotter *et al.* 2010). Finally, there is still the question of whether mass flowering crops, which draw in bees from the surrounding landscape, increase the risk of exposure to pesticides.

Agri-environment schemes (AES) were introduced within the CAP in the late 1980s and today are developed as part of the EU Rural Development Programmes (RDPs) which pays farmers to provide a range of environmental services. One option available in AES is the establishment of sown wildflower strips on farmland, which can in some cases promote bee abundance and species diversity (Carvell *et al.* 2006, Scheper *et al.* 2013); however they are poor for conservation of rare species (Korpela *et al.* 2013) which is unsurprising as they are not designed for this purpose. A meta-analysis of AES interventions across Europe (Scheper *et al.* 2013) showed that several interventions are effective in locally supporting bees: sown flower margins, naturally regenerating margins, arable organic farming, and low input meadows. Studies synthesising global evidence on local and landscape factors affecting bees have concluded that benefits can be derived from: maintaining patches of semi-natural habitat in the agroecosystems (e.g., Ricketts *et al.* 2008); organic or low input farming compared to conventional farming (e.g., Kennedy *et al.* 2013); and small, mixed crop fields with uncultivated boundary features compared to large, monocultures with little boundary vegetation (e.g., Kennedy *et al.* 2013).

In general, bee species diversity, and especially common generalist species, can be promoted in different kinds of landscapes by ensuring a variety of good quality local habitat (Kleijn *et al.* 2011). In order to improve the status of habitat specialist species, a mosaic of habitats containing the specific forage and nesting resources needed by these bees is required. While local studies indicate that there are some benefits for bees from protected areas, AES and mass flowering crops, many questions remain regarding which is most effective for different species of bee and how these can be integrated at the landscape level to provide the best conservation support for bees and other pollinators.

4.3 Conservation of bee species at the national level

Some European countries have developed specific actions at the national level in order to enhance bee populations. The United Kingdom has launched an ambitious plan for bee conservation, "The National Pollinator Strategy". This plan is based on five key areas: (i) supporting

pollinators on farmland; (ii) supporting pollinators in cities and the countryside; (iii) enhancing the response to pest and disease risks; (iv) raising awareness of what pollinators need; and (v) improving evidence on the status of pollinators and the services they provide. Moreover, some bee species also count on targeted and specific Biodiversity Action Plans in the UK. Other EU Member States are also developing bee initiatives and strategies (e.g., France).

National Red Lists or Red Data Books of bees have been developed in many European countries in order to provide special protection to bee species at the national level. These include the Red Lists of Belarus (Prischchepchik 2008), Czech Republic (Farkac *et al.* 2005), Denmark (Wind and Pihl 2010), Estonia (Lilleleht 2001), Finland (Rassi *et al.* 2010), Germany (Westrich *et al.* 2008, 2011), Great Britain (Shirt 1987), Hungary (Sárospataki et al. 2005), Ireland (Fitzpatrick *et al.* 2006), Latvia (Spuris 1998), Lithuania (Rašomavičius 2007), Moldova (Dectiu 2002), the Netherlands (Peeters and Reemer 2003), Norway (Kålås *et al.* 2010), Poland (Głowaciński and Nowacki 2009), Slovakia (Belakova 1996), Slovenia (Anonymous 2002), Spain (Verdú and Galante 2006, Verdú and Galante 2008, Verdú *et al.* 2011), Sweden (Gärdenfors 2010), Switzerland (Amiet 1994) and Ukraine (Radchenko *et al.* 2009); and some of these countries have actually assessed their species more than once (e.g., Germany and Sweden). There are other regional Red Lists such as the Red Book of invertebrates of Andalucia (Spain) (Barea *et al.* 2008), the Red List of Carpathian Endangered Species (Witkowski *et al.* 2003) or the Red List of the Tula Region (Bolshakov *et al.* 2013). Additionally, a few countries have legislation in place with the aim of legally protecting all or some species of bees, such as Belgium, Germany, Czech Republic, Switzerland, Slovakia, Hungary or Poland.

4.4 Extinction risk versus conservation status

The IUCN Red List Criteria classifies species solely on the basis of their relative extinction risk (IUCN 2012a). However, Unfavourable Conservation Status according to the EU Habitats Directive has a much broader definition. This is identified clearly in Article 1 of the Directive (see Box 3). No species meeting the IUCN Red List Criteria for one of the threatened categories at a regional level can be considered to have a Favourable Conservation Status in the EU. To be classified as Vulnerable (the lowest of the three IUCN threatened categories) a species must undergo a reduction in population size of at least 30% over ten years or three generations (or have a very small or small and declining population or geographic range). It is difficult to claim that a species experiencing a decline of this magnitude is maintaining its population, that its range is stable, and that it remains a viable component of its habitat. Crucially, however, this does not mean that the opposite is true: species that are not threatened as defined by IUCN Red List Criteria do not necessarily have a Favourable Conservation Status (BirdLife International 2004). Guidelines issued by the European Commission on the protection of species under the Habitats Directive reinforce that 'the fact that a habitat or species is not threatened (i.e. not faced by any direct extinction risk) does not necessarily mean that it has a favourable conservation status'.

Many bee species appear to remain widely distributed in Europe, although their populations and ranges have suffered significant long-term declines as a result of

Box 3: Selected provisions of the EU Habitats Directive (92/43/EEC)

Article 1(i) defines the conservation status of a species as "the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations in the European territory of the Member States". It states that a species' conservation status will be taken as Favourable when:

- Population dynamics data on the species concerned suggests that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is likely to be reduced for the considerable future; and
- There is, and probably will continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

habitat loss and degradation in conjunction with other threats (see sections 3.4 and 3.5). The European Red List has highlighted the fact that 9.2% of bees have declining populations and almost 80% have unknown population trends (see Figure 12). Special emphasis needs to be placed on Data Deficient species, especially as some are suspected to be in a critical state of decline at the national level in some parts of the EU and within Europe, but the lack of information from across the whole range or part of the range of these species meant that a threat category could not be assigned. These species should not be regarded as having Favourable Conservation Status, and should be the focus of further research across the region.

4.5 Red List versus priority for conservation action

Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List Categories, generally precedes the setting of conservation priorities. The purpose of the Red List categorisation is to produce a relative estimate of the likelihood of extinction of a taxon. Setting conservation priorities, on the other hand, normally includes the assessment of extinction risk, but takes also into account other factors such as ecological, phylogenetic, historical, economical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel, cost-effectiveness, and legal frameworks for the conservation of threatened taxa. In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities. For example, it is important to consider not only conditions within the region but also the status of the taxon from a global perspective and the proportion of the global population that occurs within the region. The decision on how these three variables, as well as the other factors, are used for establishing conservation priorities is a matter for the regional authorities to determine.

Rhodanthidium sticticum (Data Deficient). © D. Genoud.

5. Recommendations

5.1 Policy recommendations

Across Europe, many governments, NGOs and other parties are showing increasing commitment to conserving wild pollinators and supporting the services they provide to both crops and wild flowers. While these initiatives are moving in the right direction, there remain a number of significant opportunities to better protect Europe's wild bee fauna. Below, a series of policy recommendations followed by a set of supporting activities, are proposed which, if implemented, together would greatly strengthen the long-term conservation of European pollinators. While many of these recommendations are focussed on wild bees, they are also likely to have benefits to managed honeybees, to wider biodiversity, and may also enhance the provision of pollination services, though the latter is not specifically the target of our recommendations.

5.1.1 Policy recommendations

1. Species conservation

- Identify opportunities under European and Member State Biodiversity Strategies to develop targeted species and habitat specific conservation measures for wild bees, and particularly those species of conservation concern.
- Develop systematic continental and national tools and resources to monitor the diversity and abundance of bees, including rare species as well as wider bee biodiversity. Ensure standardised methods are adopted to allow comparison across and within European countries.
- Build dedicated networks of bee experts to advise local and national authorities on effective conservation actions.
- Develop measures and legislation to reduce the potential for pest and disease transmission between managed and wild bees, particularly in areas where priority bee species are present. International trade in managed pollinators should be regulated, and the local breeding of managed pollinators for pollination services encouraged.

2. Habitat conservation

- Increase the protection of habitats supporting high bee diversity and endemism, and also those that act as source habitats for bees, with particular focus on Mediterranean and montane areas and species-rich grasslands.
- Develop new targets and indicators for priority bee habitats to assess and monitor the contribution of these to overall landscape quality for bees.
- Enhance cross-policy coordination to strengthen protection and restoration work for existing ecological networks (e.g., Natura 2000), including protected area sites, agri-environment measures and green infrastructure.
- Provide clear guidance to local and national planning authorities on how to implement Green Infrastructure in order to enhance the quality of the built landscape for wild bees, for example by creating areas of wildflowers on green spaces around new developments.

3. Agri-environment schemes

- Improve the effectiveness of Agri-Environment Schemes (AES) by setting specific long-term objectives, including those for wild bees, at a range of spatial scales and develop targeted options to support wider bee biodiversity in agro-ecosystems.
- Develop new AES measures which provide forage and, in particular, nesting resources for bees for a range of farming systems.
- Provide "bundles" of bee-friendly measures within AES, which can be deployed together to provide forage, nesting and other resources within local landscapes.
- Encourage industry-led efforts to support the uptake and effective management of AES options that benefit bees.

4. Agricultural production

- Realise opportunities under the Common Agricultural Policy (CAP) Pillar I to promote sustainable agriculture and improve the baseline quality of farmed land for bees by expanding the area required for Ecological Focus Areas (EFA) and encouraging novel land uses such as planting legumes and other cover crops.

- Encourage and support arable farmers to provide more diverse and abundant mass-flowering crops for bees within the farmed landscape.
- Develop additional support for alternative sustainable farming systems such as agroforestry and infield mixed cropping which can have substantial benefits to bees.
- Commit to a sustainable long-term reduction in the use of pesticides, with quantitative targets for the reductions in the total application of all pesticide active ingredients, and encourage the uptake of alternative pest management methods including the use of natural enemies and Integrated Pest Management (IPM).
- Improve the advice to farmers, landowners, managers of public and amenity spaces and gardeners on best practices for using insecticides. This should draw upon research evidence to provide guidance which takes in to account the diverse life histories of European bees and other pollinators.

5.1.2 Supporting activities

5. Knowledge and networks

- Support further research into the drivers of bee declines at a range of local and national scales and the identification of bees that act as indicators of localised ecosystem health.
- Invest in systematic research to fully characterise bee diversity across Europe.
- Expand the pool of bee experts and tools for bee identification, by facilitating European academic and government organisations to work together to strengthen the pool of taxonomic expertise and individuals able to identify species.
- Digitise national bee collections to make existing data widely available for analysis and to fill knowledge gaps.
- Establish a Europe-wide database of bee species with point data, linking the work of various NGOs and regional initiatives.

5.2 Application of project outputs

This European Red List of bees is part of a wider initiative aimed at assessing the status of European species. It provides key resources for decision-makers, policymakers, resources managers, environmental planners and NGOs. It has gathered large amounts of data on the population, ecology, habitats, threats and recommended conservation measures for each bee species. These data are freely available on the IUCN Red List website (www.iucnredlist.org/initiatives/europe), on the European Commission's website (http://ec.europa.eu/environment/nature/conservation/species/redlist) and through paper publications (see the list of European Red Lists published at the end of this report).

This European Red List includes many species known to deliver pollination services to wildflowers and crops and thus contribute to livelihoods. It provides an interesting dimension by linking the status of these species to the state of key ecosystem services.

Red Lists are a dynamic tool that will evolve with time as species are re-assessed according to new information or situations. They are aimed at stimulating and supporting research, monitoring and conservation action at local, regional and international levels, especially for threatened, Near Threatened and Data Deficient species.

Each species assessment lists the major threats affecting the specific bee as well as conservation measures in place or needed. This will be useful to inform the application of conservation measures for each species.

The outputs of this project can be applied to inform policy, to identify priority sites for biodiversity and priority species to include in research and monitoring programmes.

5.3 Future work

Through the process of compiling data for the European Red List, a number of knowledge gaps have been identified. Across Europe there are significant geographic, geopolitical and taxonomic biases in the quality of data available on the distribution and status of species. Whilst some countries have their own national Red Lists for bees, accessing compiled bee data, especially on distributions and population trends, has proven to be difficult.

This project has mobilised a network of European and national bee experts, especially thanks to the contributions from the Status and Trends of European Pollinators (STEP) project (www.STEP-project.net), and has made extensive use of their knowledge and experience. It has benefitted greatly from the spatial data made available by the Atlas Hymenoptera (Rasmont and Haubruge 2014). However there are significant gaps in the geographical coverage of such open-source resources,

and issues to overcome, including taxonomic standards and data quality. There is a clear need for drawing together information from all data compilation initiatives under way or planned, and for a wider European bee conservation action plan to be explored, developed, and progressed.

It is hoped that by presenting this assessment, national, regional and international research will be stimulated to provide new data and to improve on the quality of that already given.

Key challenges for the future are to improve monitoring and data quality, and to further develop data openness and dissemination so that the information and analyses presented here can be updated and improved, and so conservation actions can be given as solid a scientific basis as possible.

If the bee assessments are periodically updated, they will enable the changing status of these species to be tracked through time via the production of a Red List Index (Butchart *et al.* 2004, 2005, 2006, 2007). To date, this indicator has been produced for birds, mammals, amphibians and reptiles at the European regional level and has been adopted as one of the headline biodiversity indicators to monitor progress towards halting biodiversity loss in Europe by 2020 (EEA 2007). By regularly updating the data presented here we will be able to track the changing fate of European bees to 2020 and beyond.

Thyreus ramosus (Least Concern). © D. Genoud.

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Appendix 1. Red List status of European bees

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
ANDRENIDAE						
Andrena abbreviata	DD		DD		No	No
Andrena aberrans	NT		NT		No	No
Andrena abjecta	DD		DD		No	No
Andrena abrupta	DD		DD		No	No
Andrena aciculata	DD		DD		No	No
Andrena aegyptiaca	NA		NA		No	No
Andrena aeneiventris	LC		LC		No	No
Andrena aerinifrons	DD		DD		No	No
Andrena afrensis	DD		DD		Yes	No
Andrena agilissima	DD		DD		No	No
Andrena agnata	DD		DD		No	No
Andrena albopunctata	LC		LC		No	No
Andrena alfkenella	DD		DD		No	No
Andrena alfkenelloides	DD		DD		No	No
Andrena allosa	DD		DD		No	No
Andrena alluaudi	LC		LC		No	No
Andrena alutacea	DD		DD		No	No
Andrena anatolica	LC		LC		No	No
Andrena angustior	DD		DD		No	No
Andrena anthrisci	LC		LC		Yes	No
Andrena antigana	LC		LC		No	No
Andrena apicata	DD		DD		No	No
Andrena apiformis	DD		DD		No	No
Andrena argentata	DD		DD		No	No
Andrena asperrima	LC		LC		No	No
Andrena asperula	DD		NE		No	No
Andrena assimilis	DD		DD		No	No
Andrena astica	LC		LC		No	No
Andrena astrella	DD		DD		Yes	Yes
Andrena athenensis	LC		LC		No	No
Andrena atrata	DD		DD		No	No
Andrena atrotegularis	DD		DD		No	No
Andrena avara	DD		DD		No	No
Andrena barbareae	DD		DD		Yes	No
Andrena barbilabris	DD		DD		No	No
Andrena batava	DD		DD		Yes	Yes
Andrena bayona	DD		DD		Yes	Yes
Andrena bellidis	DD		DD		No	No
Andrena biarmica	DD		DD		No	No
Andrena bicolor	LC		LC		No	No
Andrena bicolorata	LC		LC		No	No
Andrena bimaculata	DD		DD		No	No
Andrena binominata	LC		LC		No	No
Andrena bisulcata	LC		LC		No	No
Andrena blanda	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena boyerella	LC		LC		No	No
Andrena braunsiana	DD		DD		No	No
Andrena breviscopa	DD		DD		No	No
Andrena brumanensis	LC		LC		No	No
Andrena bucephala	DD		DD		Yes	No
Andrena bulgariensis	DD		DD		No	No
Andrena caneae	LC		LC		No	No
Andrena caneibia	DD		DD		No	No
Andrena canohirta	DD		DD		No	No
Andrena cantiaca	DD		DD		No	No
Andrena capillosa	DD		NE		No	No
Andrena caprimulga	DD		NE		No	No
Andrena carantonica	DD		DD		No	No
Andrena cervina	DD		DD		Yes	Yes
Andrena chaetogastra	DD		DD		No	No
Andrena chalcogastra	DD		DD		Yes	Yes
Andrena chelma	DD		DD		Yes	Yes
Andrena chersona	DD		NE		No	No
Andrena chrysopus	DD		DD		No	No
Andrena chrysopyga	DD		DD		No	No
Andrena chrysosceles	DD		DD		No	No
Andrena cineraria	LC		LC		No	No
Andrena cinerea	DD		DD		No	No
Andrena cinereophila	LC		LC		No	No
Andrena clarkella	DD		DD		No	No
Andrena clusia	DD		DD		No	No
Andrena clypella	LC		LC		No	No
Andrena coitana	DD		DD		No	No
Andrena colletiformis	DD		DD		No	No
Andrena colonialis	DD		NE		No	No
Andrena combaella	DD		DD		No	No
Andrena combinata	DD		DD		No	No
Andrena compta	DD		DD		No	No
Andrena comta	EN	B2ab(iii,v)	EN	B2ab(iii,v)	No	No
Andrena concinna	LC		LC		Yes	No
Andrena congruens	LC		LC		No	No
Andrena corax	DD		DD		No	No
Andrena cordialis	DD		DD		No	No
Andrena corssubalpina	DD		DD		Yes	Yes
Andrena crassana	LC		LC		No	No
Andrena creberrima	DD		DD		No	No
Andrena cubiceps	DD		DD		No	No
Andrena curiosa	NA		NA		No	No
Andrena curtula	DD		DD		Yes	Yes
Andrena curvana	DD		DD		Yes	No
Andrena curvungula	DD		DD		No	No
Andrena cussariensis	NA		NE		No	No
Andrena cyanomicans	DD		DD		No	No
Andrena cypria	DD		DD		No	No
Andrena cypricola	DD		DD		Yes	Yes
Andrena damara	DD		DD		Yes	Yes
Andrena danuvia	DD		DD		No	No
Andrena dargia	DD		DD		No	No
Andrena decipiens	DD		DD		No	No
Andrena delphiensis	DD		DD		No	No
Andrena denticulata	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena dentiventris	NA		NE		No	No
Andrena derbentina	DD		DD		No	No
Andrena dinizi	DD		DD		Yes	Yes
Andrena discors	LC		LC		No	No
Andrena distinguenda	DD		DD		No	No
Andrena djelfensis	DD		DD		No	No
Andrena dorsalis	DD		DD		No	No
Andrena dorsata	DD		DD		No	No
Andrena dourada	DD		DD		Yes	Yes
Andrena doursana	DD		DD		No	No
Andrena dubiosa	DD		DD		No	No
Andrena ebmerella	DD		DD		Yes	Yes
Andrena ehnbergi	DD		NE		No	No
Andrena elata	DD		DD		Yes	Yes
Andrena elegans	DD		DD		No	No
Andrena elmaria	DD		DD		No	No
Andrena enslinella	DD		DD		No	No
Andrena erberi	DD		DD		No	No
Andrena erythrocnemis	DD		DD		No	No
Andrena espanola	DD		DD		Yes	Yes
Andrena exigua	DD		DD		No	No
Andrena exquisita	DD		DD		No	No
Andrena fabrella	DD		DD		No	No
Andrena falsifica	DD		DD		No	No
Andrena farinosa	DD		DD		Yes	Yes
Andrena ferox	DD		DD		No	No
Andrena ferrugineicrus	LC		LC		No	No
Andrena fertoni	DD		DD		No	No
Andrena figurata	DD		DD		No	No
Andrena fimbriata	DD		DD		Yes	No
Andrena flavilabris	DD		DD		No	No
Andrena flavipes	LC		LC		No	No
Andrena flavobila	DD		DD		No	No
Andrena florea	DD		DD		No	No
Andrena florentina	DD		DD		No	No
Andrena floricola	DD		DD		No	No
Andrena florivaga	LC		LC		No	No
Andrena forsterella	LC		LC		No	No
Andrena freygessneri	DD		DD		Yes	No
Andrena fria	DD		DD		Yes	Yes
Andrena fucata	DD		DD		No	No
Andrena fuliginata	NA		NA		No	No
Andrena fulva	DD		DD		Yes	No
Andrena fulvago	DD		DD		No	No
Andrena fulvata	DD		DD		Yes	No
Andrena fulvicornis	DD		DD		No	No
Andrena fulvida	NT		NT		No	No
Andrena fulvitarsis	LC		LC		No	No
Andrena fumida	DD		DD		No	No
Andrena funerea	DD		DD		Yes	Yes
Andrena fuscipes	DD		DD		No	No
Andrena fuscocalcarata	DD		DD		No	No
Andrena fuscosa	DD		DD		No	No
Andrena gallica	NT		NT		No	No
Andrena gamskrucki	DD		DD		No	No
Andrena gelriae	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena glandaria	DD		DD		No	No
Andrena glidia	DD		DD		No	No
Andrena gordia	DD		DD		No	No
Andrena graecella	DD		DD		Yes	No
Andrena grandilabris	DD		DD		No	No
Andrena granulosa	LC		LC		No	No
Andrena gravida	DD		DD		No	No
Andrena gredana	DD		DD		Yes	Yes
Andrena grossella	DD		DD		Yes	Yes
Andrena grozdanici	DD		NE		No	No
Andrena haemorrhoa	LC		LC		No	No
Andrena hattorfiana	NT		NT		No	No
Andrena hedikae	DD		DD		No	No
Andrena heinrichi	DD		DD		No	No
Andrena helenica	DD		DD		Yes	Yes
Andrena helvola	DD		DD		No	No
Andrena hesperia	LC		LC		No	No
Andrena hillana	DD		DD		Yes	Yes
Andrena hispania	LC		LC		No	No
Andrena humabilis	DD		DD		No	No
Andrena humilis	DD		DD		No	No
Andrena hungarica	DD		DD		No	No
Andrena hyacinthina	DD		DD		No	No
Andrena hybrida	DD		NE		No	No
Andrena hyemala	DD		DD		No	No
Andrena hypopolia	DD		DD		No	No
Andrena hystrix	DD		DD		No	No
Andrena icterina	DD		DD		No	No
Andrena illyrica	DD		DD		Yes	No
Andrena impunctata	LC		LC		No	No
Andrena incisa	DD		DD		No	No
Andrena intermedia	LC		LC		No	No
Andrena isis	NA		NA		No	No
Andrena ispida	DD		DD		No	No
Andrena kamarti	DD		DD		No	No
Andrena korleviciana	DD		DD		Yes	No
Andrena kornosica	DD		DD		Yes	Yes
Andrena kriechbaumeri	DD		DD		No	No
Andrena labialis	DD		DD		No	No
Andrena labiata	DD		DD		No	No
Andrena labiatula	CR	B1ab(iii)+2ab(iii)	CR	B1ab(iii)+2ab(iii)	Yes	No
Andrena lagopus	LC		LC		No	No
Andrena lamiana	LC		LC		No	No
Andrena langadensis	LC		LC		No	No
Andrena lapponica	LC		LC		No	No
Andrena lateralis	DD		DD		No	No
Andrena lathyri	DD		DD		No	No
Andrena lepida	DD		DD		No	No
Andrena leptopyga	DD		DD		No	No
Andrena leucolippa	LC		LC		Yes	Yes
Andrena leucophaea	DD		DD		No	No
Andrena leucopsis	DD		DD		No	No
Andrena limassolica	DD		DD		No	No
Andrena limata	DD		DD		No	No
Andrena limbata	DD		DD		No	No
Andrena limonii	DD		NE		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena lindbergella	DD		DD		No	No
Andrena lineolata	DD		DD		Yes	Yes
Andrena livens	LC		LC		No	No
Andrena longibarbis	DD		DD		No	No
Andrena lonicera	DD		DD		Yes	No
Andrena macroptera	DD		DD		No	No
Andrena maderensis	LC		LC		Yes	Yes
Andrena magna	EN	B2ab(iii)	EN	B2ab(iii)	No	No
Andrena magunta	DD		DD		No	No
Andrena majalis	NA		NA		No	No
Andrena marginata	DD		DD		No	No
Andrena mariana	DD		DD		No	No
Andrena medeninensis	DD		DD		No	No
Andrena mediovittata	DD		DD		No	No
Andrena mehelyi	DD		DD		No	No
Andrena merula	DD		DD		No	No
Andrena metallescens	NA		NE		No	No
Andrena microthorax	DD		DD		No	No
Andrena miegiella	LC		LC		No	No
Andrena minapalumboi	DD		DD		No	No
Andrena minutula	DD		DD		No	No
Andrena minutuloides	DD		DD		No	No
Andrena mistrensis	DD		DD		No	No
Andrena mitis	DD		DD		No	No
Andrena mocsaryi	LC		LC		No	No
Andrena monacha	DD		DD		No	No
Andrena monilia	DD		DD		No	No
Andrena montana	DD		DD		Yes	No
Andrena montarca	DD		DD		Yes	Yes
Andrena morio	DD		DD		No	No
Andrena mucida	DD		DD		No	No
Andrena mucronata	LC		LC		No	No
Andrena murana	DD		DD		Yes	Yes
Andrena muscaria	DD		DD		Yes	Yes
Andrena nana	LC		LC		No	No
Andrena nanaeformis	LC		VU	B2ab(v)	No	No
Andrena nanula	DD		DD		No	No
Andrena nasuta	DD		DD		No	No
Andrena nebularia	DD		DD		Yes	Yes
Andrena neocypriaca	LC		LC		No	No
Andrena neovirida	DD		DD		Yes	Yes
Andrena nigriceps	DD		DD		No	No
Andrena nigroaenea	LC		LC		No	No
Andrena nigroolivacea	LC		LC		No	No
Andrena nigroviridula	DD		DD		No	No
Andrena nilotica	DD		DD		Yes	Yes
Andrena nisoria	NA		NA		No	No
Andrena nitida	LC		LC		No	No
Andrena nitidiuscula	LC		LC		No	No
Andrena nitidula	DD		DD		Yes	Yes
Andrena niveata	DD		DD		No	No
Andrena nobilis	DD		DD		No	No
Andrena notata	DD		DD		Yes	Yes
Andrena nucleola	DD		DD		No	No
Andrena numida	DD		DD		No	No
Andrena nuptialis	LC		LC		Yes	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena nycthemera	DD		DD		No	No
Andrena olympica	DD		DD		Yes	Yes
Andrena optata	DD		DD		No	No
Andrena oralis	DD		DD		No	No
Andrena orana	DD		DD		No	No
Andrena orbitalis	LC		LC		No	No
Andrena orientana	LC		LC		No	No
Andrena ornata	CR	B2ab(iii)	NE		No	No
Andrena osychniukae	DD		DD		No	No
Andrena oulskii	DD		DD		No	No
Andrena ovatula	NT		NT		No	No
Andrena oviventris	DD		DD		No	No
Andrena paganettina	DD		DD		No	No
Andrena pallidicincta	DD		DD		No	No
Andrena pallitarsis	DD		DD		No	No
Andrena palumba	DD		DD		No	No
Andrena pandellei	LC		LC		No	No
Andrena pandosa	DD		DD		No	No
Andrena panurgimorpha	LC		LC		No	No
Andrena panurgina	LC		LC		No	No
Andrena paramythensis	DD		DD		No	No
Andrena pareklisiae	DD		DD		Yes	Yes
Andrena parviceps	LC		LC		No	No
Andrena passerina	DD		DD		No	No
Andrena pastellensis	DD		DD		Yes	No
Andrena paucisquama	DD		DD		No	No
Andrena pauxilla	DD		DD		Yes	No
Andrena pellucens	DD		DD		Yes	Yes
Andrena pelopa	DD		DD		Yes	No
Andrena phoenicura	DD		DD		No	No
Andrena pilipes	LC		LC		No	No
Andrena polemediana	DD		DD		No	No
Andrena polita	LC		LC		No	No
Andrena pontica	DD		DD		No	No
Andrena potentillae	DD		DD		No	No
Andrena praecox	LC		LC		No	No
Andrena probata	DD		DD		No	No
Andrena producta	DD		DD		No	No
Andrena propinqua	DD		DD		No	No
Andrena proxima	DD		DD		No	No
Andrena pruinosa	DD		DD		No	No
Andrena pusilla	DD		DD		No	No
Andrena pyropygia	LC		LC		No	No
Andrena pyrozonata	DD		DD		No	No
Andrena quadrimaculata	DD		DD		No	No
Andrena ranunculi	LC		LC		No	No
Andrena ranunculorum	DD		DD		No	No
Andrena relata	DD		DD		Yes	Yes
Andrena reperta	DD		DD		No	No
Andrena resoluta	DD		DD		Yes	No
Andrena rhenana	DD		DD		Yes	No
Andrena rhypara	DD		DD		No	No
Andrena rhyssonota	LC		LC		No	No
Andrena robusta	DD		DD		No	No
Andrena rogenhoferi	LC		LC		Yes	No
Andrena roripae	DD		NE		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena rosae	DD		DD		No	No
Andrena roseipes	DD		DD		Yes	No
Andrena rotundata	DD		DD		No	No
Andrena rudolfae	DD		NE		No	No
Andrena ruficrus	LC		LC		No	No
Andrena rufizona	DD		DD		No	No
Andrena rufula	LC		LC		No	No
Andrena rugothorace	LC		LC		No	No
Andrena rugulosa	DD		DD		No	No
Andrena rugulosella	DD		NE		No	No
Andrena russula	DD		DD		No	No
Andrena saettana	DD		DD		No	No
Andrena sagittaria	DD		DD		Yes	Yes
Andrena sandanskia	DD		DD		Yes	Yes
Andrena sardoa	LC		LC		No	No
Andrena savignyi	DD		DD		No	No
Andrena saxonica	DD		DD		No	No
Andrena schencki	DD		DD		No	No
Andrena schlettereri	DD		DD		No	No
Andrena schmiedeknechti	LC		LC		No	No
Andrena schulzi	LC		LC		No	No
Andrena schwarzi	DD		NE		No	No
Andrena scita	DD		DD		No	No
Andrena semilaevis	DD		DD		Yes	No
Andrena seminuda	DD		DD		No	No
Andrena semirubra	DD		NE		No	No
Andrena senecionis	LC		LC		No	No
Andrena sericata	DD		DD		No	No
Andrena serraticornis	DD		DD		No	No
Andrena sibthorpi	DD		DD		Yes	Yes
Andrena siciliana	DD		DD		Yes	Yes
Andrena sillata	LC		LC		No	No
Andrena similis	DD		DD		No	No
Andrena simillima	LC		LC		No	No
Andrena simontornyella	LC		LC		No	No
Andrena solenopalpa	DD		DD		Yes	Yes
Andrena soror	DD		DD		No	No
Andrena sphecodimorpha	DD		DD		No	No
Andrena spolata	DD		DD		No	No
Andrena spreta	DD		DD		No	No
Andrena stabiana	LC		LC		No	No
Andrena standfussorum	DD		DD		Yes	Yes
Andrena stepposa	EN	B2ab(iii,v)	EN	B2ab(iii,v)	Yes	No
Andrena stigmatica	EN	B1ab(i,ii,iii)+2ab(i,ii,iii)	NE		No	No
Andrena stoeckhertella	DD		NE		No	No
Andrena strohmella	LC		LC		Yes	No
Andrena subopaca	LC		LC		No	No
Andrena suerinensis	DD		DD		Yes	No
Andrena susterai	DD		DD		No	No
Andrena symphyti	DD		DD		No	No
Andrena synadelpha	DD		DD		No	No
Andrena taprobana	DD		DD		No	No
Andrena taraxaci	DD		DD		No	No
Andrena tarsata	DD		DD		No	No
Andrena taxana	DD		DD		Yes	Yes
Andrena tenuiformis	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Andrena tenuistriata	LC		LC		No	No
Andrena thomsonii	DD		DD		No	No
Andrena thoracica	DD		DD		No	No
Andrena tiaretta	DD		DD		No	No
Andrena tibialis	LC		LC		No	No
Andrena toelgiana	DD		DD		No	No
Andrena tomora	DD		DD		No	No
Andrena torda	DD		DD		No	No
Andrena transitoria	VU	A2c	VU	A2c	No	No
Andrena tricuspidata	DD		DD		Yes	No
Andrena tridentata	CR	B2ab(v)	CR	B2ab(v)	No	No
Andrena trikalensis	DD		DD		Yes	Yes
Andrena trimmerana	DD		DD		No	No
Andrena tringa	LC		LC		No	No
Andrena troodica	DD		DD		No	No
Andrena truncatilabris	DD		DD		No	No
Andrena tscheki	DD		DD		No	No
Andrena tuberculifera	NA		NA		No	No
Andrena tunetana	LC		LC		No	No
Andrena ungeri	LC		LC		No	No
Andrena urdula	LC		LC		No	No
Andrena vacella	DD		DD		Yes	Yes
Andrena vachali	LC		LC		No	No
Andrena vaga	LC		LC		No	No
Andrena variabilis	DD		DD		No	No
Andrena varians	LC		LC		No	No
Andrena vaulogeri	DD		DD		No	No
Andrena ventralis	DD		DD		No	No
Andrena ventricosa	DD		DD		No	No
Andrena verae	DD		NE		No	No
Andrena verticalis	LC		LC		No	No
Andrena vetula	LC		LC		No	No
Andrena villipes	LC		LC		No	No
Andrena viridescens	DD		DD		No	No
Andrena volgensis	DD		NE		No	No
Andrena vulcana	NT		NT		No	No
Andrena vulpecula	DD		DD		No	No
Andrena westensis	LC		LC		No	No
Andrena wilhelmi	DD		DD		No	No
Andrena wilkella	DD		DD		No	No
Andrena wolfi	DD		DD		No	No
Andrena wollastoni	LC		LC		Yes	Yes
Camptopoeum friesei	LC		LC		No	No
Camptopoeum frontale	DD		DD		No	No
Camptopoeum nasutum	DD		DD		Yes	Yes
Camptopoeum variegatum	DD		DD		No	No
Clavipanurgus sculpturatus	DD		DD		No	No
Flavipanurgus flavus	LC		LC		Yes	Yes
Flavipanurgus fuzetus	DD		DD		Yes	Yes
Flavipanurgus granadensis	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes
Flavipanurgus ibericus	LC		LC		Yes	Yes
Flavipanurgus merceti	DD		DD		Yes	Yes
Flavipanurgus venustus	LC		LC		Yes	Yes
Melitturga caudata	LC		LC		No	No
Melitturga clavicornis	NT		NT		No	No
Melitturga praestans	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Melitturga spinosa	DD		DD		No	No
Melitturga syriaca	DD		DD		No	No
Melitturga taurica	DD		DD		No	No
Panurginus albopilosus	LC		LC		No	No
Panurginus alpinus	DD		DD		Yes	No
Panurginus annulatus	DD		DD		Yes	Yes
Panurginus brullei	DD		DD		No	No
Panurginus herzi	DD		DD		No	No
Panurginus labiatus	DD		DD		No	No
Panurginus lactipennis	DD		DD		No	No
Panurginus montanus	DD		DD		Yes	No
Panurginus romani	DD		DD		No	No
Panurginus schwarzi	DD		DD		Yes	Yes
Panurginus sericatus	DD		DD		Yes	No
Panurginus tyrolensis	DD		DD		Yes	No
Panurgus banksianus	LC		LC		No	No
Panurgus calcaratus	LC		LC		No	No
Panurgus canarius	LC		LC		No	No
Panurgus canescens	LC		LC		Yes	Yes
Panurgus cephalotes	LC		LC		No	No
Panurgus corsicus	DD		DD		Yes	Yes
Panurgus dargius	DD		DD		No	No
Panurgus dentipes	LC		LC		Yes	No
Panurgus meridionalis	LC		LC		Yes	Yes
Panurgus perezi	LC		LC		No	No
Panurgus pici	DD		DD		No	No
Panurgus siculus	DD		DD		Yes	Yes
Simpanurgus phyllopodus	DD		DD		Yes	Yes
APIDAE						
Amegilla albigena	LC		LC		No	No
Amegilla andresi	DD		DD		No	No
Amegilla canifrons	LC		LC		Yes	Yes
Amegilla fasciata	DD		DD		No	No
Amegilla garrula	LC		LC		No	No
Amegilla magnilabris	DD		DD		No	No
Amegilla nigricornis	DD		NE		No	No
Amegilla ochroleuca	DD		DD		No	No
Amegilla quadrifasciata	LC		LC		No	No
Amegilla salviae	DD		DD		No	No
Amegilla velocissima	DD		DD		No	No
Ammobates armeniacus	NT		NT		No	No
Ammobates dusmeti	CR	B2ab(v)	CR	B2ab(v)	Yes	Yes
Ammobates globosus	DD		DD		No	No
Ammobates mavromoustakisi	DD		DD		No	No
Ammobates melectoides	EN	B2ab(i,ii,v)	EN	B2ab(i,ii,v)	Yes	No
Ammobates muticus	LC		LC		No	No
Ammobates opacus	DD		DD		No	No
Ammobates oraniensis	DD		DD		No	No
Ammobates punctatus	LC		LC		No	No
Ammobates rufiventris	DD		DD		No	No
Ammobates sanguineus	DD		DD		No	No
Ammobates similis	DD		DD		No	No
Ammobates verhoeffi	DD		DD		No	No
Ammobates vinctus	LC		LC		No	No
Ammobatoides abdominalis	EN	B2ab(i,v)	EN	B2ab(i,v)	No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Ammobatoides luctuosus	DD		DD		No	No
Ammobatoides okalii	DD		DD		Yes	Yes
Ammobatoides scriptus	DD		DD		No	No
Ancyla asiatica	DD		DD		No	No
Ancyla cretensis	DD		DD		No	No
Ancyla holtzi	DD		DD		No	No
Ancyla nigricornis	DD		DD		No	No
Ancyla nitida	DD		DD		No	No
Ancyla oraniensis	DD		DD		No	No
Ancyla orientalica	DD		DD		No	No
Anthophora aestivalis	LC		LC		No	No
Anthophora affinis	DD		DD		No	No
Anthophora agama	DD		DD		No	No
Anthophora albosignata	DD		DD		No	No
Anthophora alluaudi	LC		LC		Yes	Yes
Anthophora altaica	DD		NE		No	No
Anthophora andalusica	DD		DD		Yes	Yes
Anthophora atriceps	DD		DD		No	No
Anthophora atricilla	DD		NE		No	No
Anthophora atroalba	DD		DD		No	No
Anthophora balearica	DD		DD		Yes	Yes
Anthophora balneorum	LC		LC		No	No
Anthophora bimaculata	LC		LC		No	No
Anthophora borealis	NT		NT		No	No
Anthophora calcarata	LC		LC		No	No
Anthophora canescens	DD		DD		No	No
Anthophora cincreus	DD		NE		No	No
Anthophora crassipes	DD		DD		No	No
Anthophora dalmatica	DD		DD		Yes	No
Anthophora deserticola	DD		NE		No	No
Anthophora dispar	LC		LC		No	No
Anthophora dubia	DD		NE		No	No
Anthophora dufourii	DD		DD		No	No
Anthophora erschowi	DD		DD		No	No
Anthophora femorata	DD		DD		No	No
Anthophora ferruginea	DD		DD		No	No
Anthophora fulvipes	DD		DD		No	No
Anthophora fulvitarsis	DD		DD		No	No
Anthophora fulvodimidiata	DD		DD		No	No
Anthophora furcata	LC		LC		No	No
Anthophora gallica	DD		DD		Yes	Yes
Anthophora gracilipes	DD		NE		No	No
Anthophora harmalae	DD		DD		No	No
Anthophora hispanica	DD		DD		No	No
Anthophora ireos	DD		NE		No	No
Anthophora laevigata	DD		DD		Yes	Yes
Anthophora lanata	DD		DD		No	No
Anthophora lanzarotensis	DD		DD		Yes	Yes
Anthophora larvata	DD		DD		No	No
Anthophora leucophaea	DD		DD		No	No
Anthophora lieftincki	DD		DD		Yes	Yes
Anthophora monacha	DD		NE		No	No
Anthophora mucida	DD		DD		No	No
Anthophora nigriceps	DD		DD		No	No
Anthophora nigrovittata	DD		DD		Yes	Yes
Anthophora orientalis	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Anthophora orotavae	DD		DD		Yes	Yes
Anthophora pedata	DD		DD		No	No
Anthophora plagiata	LC		LC		No	No
Anthophora plumipes	LC		LC		No	No
Anthophora podagra	DD		DD		No	No
Anthophora ponomarevae	DD		NE		No	No
Anthophora porphyrea	DD		DD		Yes	Yes
Anthophora pruinosa	DD		DD		Yes	Yes
Anthophora pubescens	DD		DD		No	No
Anthophora pulverosa	DD		DD		Yes	Yes
Anthophora punctilabris	DD		DD		Yes	Yes
Anthophora purpuraria	DD		DD		Yes	Yes
Anthophora quadricolor	DD		DD		No	No
Anthophora quadrimaculata	DD		DD		No	No
Anthophora retusa	LC		LC		No	No
Anthophora robusta	DD		DD		No	No
Anthophora rogenhoferi	DD		DD		No	No
Anthophora romandii	DD		DD		No	No
Anthophora rubricrus	DD		DD		No	No
Anthophora rutilans	DD		DD		No	No
Anthophora salviae	DD		DD		No	No
Anthophora senescens	DD		DD		No	No
Anthophora senicula	DD		DD		Yes	Yes
Anthophora senilis	DD		NE		No	No
Anthophora sichelii	DD		DD		Yes	Yes
Anthophora socia	DD		DD		No	No
Anthophora thomsoni	DD		DD		Yes	Yes
Anthophora uniciliata	DD		DD		Yes	Yes
Anthophora ventrilabris	DD		DD		No	No
Anthophora vernalis	DD		NE		No	No
Apis mellifera	DD		DD		No	No
Biastes brevicornis	LC		LC		No	No
Biastes emarginatus	LC		LC		No	No
Biastes truncatus	VU	B2ab(i,ii,v)	VU	B2ab(i,ii,v)	No	No
Bombus alpinus	VU	B2b(i,ii,iii,v)c(iv)	VU	B2b(i,ii,iii,v)c(iv)	Yes	No
Bombus argillaceus	LC		LC		No	No
Bombus armeniacus	EN	A3c	EN	A3c	No	No
Bombus balteatus	LC		LC		No	No
Bombus barbutellus	LC		LC		No	No
Bombus bohemicus	LC		LC		No	No
Bombus brodmannicus	EN	B2ab(iii)c(iv)	EN	B2ab(iii)c(iv)	No	No
Bombus campestris	LC		LC		No	No
Bombus cingulatus	LC		LC		No	No
Bombus confusus	VU	A2c+3c+4c	VU	A2c+3c+4c	No	No
Bombus consobrinus	LC		LC		No	No
Bombus cryptarum	LC		LC		No	No
Bombus cullumanus	CR	A2c	CR	A2c	No	No
Bombus deuteronymus	DD		DD		No	No
Bombus distinguendus	VU	A2c	VU	A2c	No	No
Bombus flavidus	LC		LC		No	No
Bombus fragrans	EN	A2c+3c+4c	EN	A2c+3c+4c	No	No
Bombus gerstaeckeri	VU	B2ab(iii)	VU	B2ab(iii)	No	No
Bombus glacialis	DD		NE		No	No
Bombus haematurus	LC		LC		No	No
Bombus hortorum	LC		LC		No	No
Bombus humilis	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Bombus hyperboreus	VU	B2b(i,ii,v)c(iv)	VU	B2b(i,ii,v)c(iv)	No	No
Bombus hypnorum	LC		LC		No	No
Bombus inexspectatus	EN	B2ab(iii)	EN	B2ab(iii)	Yes	No
Bombus jonellus	LC		LC		No	No
Bombus laesus	NT		NT		No	No
Bombus lapidarius	LC		LC		No	No
Bombus lapponicus	LC		LC		Yes	No
Bombus lucorum	LC		LC		No	No
Bombus magnus	LC		LC		Yes	No
Bombus mendax	NT		NT		Yes	No
Bombus mesomelas	LC		LC		No	No
Bombus mlokosievitzii	DD		DD		No	No
Bombus mocsaryi	EN	A2a	EN	A2a	No	No
Bombus modestus	DD		NE		No	No
Bombus monticola	LC		LC		No	No
Bombus mucidus	NT		NT		Yes	No
Bombus muscorum	VU	A2c	VU	A2c	No	No
Bombus niveatus	LC		LC		No	No
Bombus norvegicus	LC		LC		No	No
Bombus pascuorum	LC		LC		No	No
Bombus patagiatus	DD		NE		No	No
Bombus perezi	LC		LC		Yes	Yes
Bombus pereziellus	LC		LC		Yes	Yes
Bombus polaris	VU	B2b(ii,iii,v)c(iv)	VU	B2b(ii,iii,v)c(iv)	No	No
Bombus pomorum	VU	A2c	VU	A2c	No	No
Bombus pratorum	LC		LC		No	No
Bombus pyrenaeus	LC		LC		Yes	Yes
Bombus quadricolor	LC		LC		No	No
Bombus reinigiellus	EN	B1ab(iii)+2ab(iii); D	EN	B1ab(iii)+2ab(iii); D	Yes	Yes
Bombus ruderarius	LC		LC		No	No
Bombus ruderatus	LC		LC		No	No
Bombus rupestris	LC		LC		No	No
Bombus saltuarius	DD		NE		No	No
Bombus schrencki	LC		LC		No	No
Bombus semenoviellus	LC		LC		No	No
Bombus sichelii	LC		LC		No	No
Bombus soroeensis	LC		LC		No	No
Bombus sporadicus	LC		LC		No	No
Bombus subterraneus	LC		LC		No	No
Bombus sylvarum	LC		LC		No	No
Bombus sylvestris	LC		LC		No	No
Bombus terrestris	LC		LC		No	No
Bombus vestalis	LC		LC		No	No
Bombus veteranus	LC		LC		No	No
Bombus wurflenii	LC		LC		No	No
Bombus zonatus	EN	B2b(i,ii,iii,v)c(iv)	EN	B2b(i,ii,iii,v)c(iv)	No	No
Ceratina acuta	LC		LC		No	No
Ceratina albosticta	DD		DD		No	No
Ceratina bispinosa	LC		LC		No	No
Ceratina callosa	LC		LC		No	No
Ceratina chalcites	LC		LC		No	No
Ceratina chalybea	LC		LC		No	No
Ceratina chrysomalla	LC		LC		No	No
Ceratina cucurbitina	LC		LC		No	No
Ceratina cyanea	LC		LC		No	No
Ceratina cypriaca	DD		DD		Yes	Yes

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Ceratina dallatorreana	LC		LC		No	No
Ceratina dentiventris	LC		LC		No	No
Ceratina gravidula	LC		LC		Yes	No
Ceratina loewi	DD		DD		No	No
Ceratina mandibularis	LC		LC		No	No
Ceratina mocsaryi	LC		LC		No	No
Ceratina moricei	LC		LC		No	No
Ceratina nigroaenea	LC		LC		No	No
Ceratina nigrolabiata	LC		LC		No	No
Ceratina parvula	LC		LC		No	No
Ceratina sakagamii	DD		DD		No	No
Ceratina saundersi	LC		LC		No	No
Ceratina schwarzi	LC		LC		No	No
Ceratina tarsata	DD		DD		No	No
Ceratina teunisseni	DD		DD		Yes	Yes
Ceratina zandeni	DD		DD		No	No
Ceratina zwakhalsi	DD		NE		No	No
Chiasmognathus orientanus	NT		NT		No	No
Cubitalia morio	DD		DD		No	No
Cubitalia parvicornis	DD		DD		No	No
Epeoloides coecutiens	LC		LC		No	No
Epeolus alpinus	LC		LC		Yes	Yes
Epeolus aureovestitus	DD		DD		No	No
Epeolus compar	DD		DD		Yes	Yes
Epeolus cruciger	NT		NT		Yes	No
Epeolus fallax	LC		LC		Yes	Yes
Epeolus fasciatus	DD		DD		Yes	No
Epeolus flavociliatus	DD		DD		Yes	Yes
Epeolus intermedius	DD		DD		Yes	Yes
Epeolus julliani	LC		LC		No	No
Epeolus minutus	DD		NE		No	No
Epeolus productulus	DD		DD		Yes	No
Epeolus schummeli	NT		NT		No	No
Epeolus siculus	DD		DD		Yes	Yes
Epeolus sigillatus	DD		DD		Yes	Yes
Epeolus tarsalis	NT		NT		No	No
Epeolus transitorius	DD		DD		Yes	No
Epeolus variegatus	LC		LC		No	No
Eucera albofasciata	DD		DD		No	No
Eucera algira	DD		DD		No	No
Eucera alternans	DD		DD		No	No
Eucera barbiventris	DD		DD		No	No
Eucera bidentata	DD		DD		No	No
Eucera brachycera	DD		DD		No	No
Eucera caerulescens	DD		DD		No	No
Eucera caspica	LC		LC		No	No
Eucera chrysopyga	LC		LC		No	No
Eucera cineraria	LC		LC		No	No
Eucera clypeata	LC		LC		No	No
Eucera codinai	DD		DD		Yes	Yes
Eucera collaris	DD		DD		No	No
Eucera commixta	DD		DD		No	No
Eucera curvitarsis	DD		DD		No	No
Eucera cypria	DD		DD		No	No
Eucera dalmatica	LC		LC		No	No
Eucera decolorata	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Eucera digitata	LC		LC		No	No
Eucera dimidiata	LC		LC		No	No
Eucera distinguenda	DD		DD		No	No
Eucera ebmeri	DD		DD		No	No
Eucera elongatula	DD		DD		No	No
Eucera eucnemidea	LC		LC		No	No
Eucera excisa	DD		DD		No	No
Eucera fasciata	DD		DD		No	No
Eucera fedtschenkoi	DD		NE		No	No
Eucera furfurea	DD		DD		No	No
Eucera gaullei	LC		LC		No	No
Eucera gracilipes	NT		NT		Yes	Yes
Eucera helvola	DD		DD		No	No
Eucera hispaliensis	DD		DD		No	No
Eucera hispana	DD		DD		No	No
Eucera hungarica	LC		LC		No	No
Eucera interrupta	LC		LC		No	No
Eucera kullenbergi	DD		DD		No	No
Eucera lanuginosa	DD		DD		No	No
Eucera laxiscopa	DD		DD		No	No
Eucera longicornis	LC		LC		No	No
Eucera lucasi	DD		DD		No	No
Eucera maroccana	DD		DD		No	No
Eucera mastrucata	DD		NE		No	No
Eucera maxima	DD		DD		No	No
Eucera mediterranea	DD		DD		No	No
Eucera microsoma	LC		LC		No	No
Eucera nigrescens	LC		LC		No	No
Eucera nigrifacies	LC		LC		No	No
Eucera nigrilabris	DD		DD		No	No
Eucera nigripes	DD		DD		No	No
Eucera notata	DD		DD		No	No
Eucera numida	LC		LC		No	No
Eucera obliterata	DD		DD		No	No
Eucera obsoleta	DD		DD		No	No
Eucera oraniensis	DD		DD		No	No
Eucera palestinae	DD		DD		No	No
Eucera pannonica	DD		DD		No	No
Eucera paraclypeata	DD		DD		No	No
Eucera parnassia	LC		LC		No	No
Eucera penicillata	DD		DD		No	No
Eucera plumigera	DD		DD		No	No
Eucera pollinaris	DD		DD		No	No
Eucera proxima	DD		DD		No	No
Eucera pseudeucnemidea	DD		DD		No	No
Eucera puncticollis	DD		DD		No	No
Eucera punctulata	DD		DD		No	No
Eucera pythagoras	DD		DD		No	No
Eucera quilisi	DD		DD		Yes	Yes
Eucera radoszkovskii	DD		NE		No	No
Eucera rufa	DD		DD		No	No
Eucera rufipes	DD		NE		No	No
Eucera seminuda	LC		LC		No	No
Eucera spectabilis	DD		DD		No	No
Eucera squamosa	DD		DD		No	No
Eucera syriaca	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Eucera taurica	DD		DD		No	No
Eucera transitoria	DD		NE		No	No
Eucera tricincta	LC		LC		No	No
Eucera velutina	DD		DD		No	No
Eucera vernalis	DD		NE		No	No
Eucera vittulata	DD		DD		No	No
Eucera vulpes	DD		DD		No	No
Eucera zeta	DD		DD		No	No
Habropoda ezonata	DD		DD		Yes	No
Habropoda tarsata	LC		LC		No	No
Habropoda zonatula	DD		DD		No	No
Melecta aegyptiaca	DD		DD		No	No
Melecta albifrons	LC		LC		No	No
Melecta baeri	DD		DD		No	No
Melecta canariensis	DD		DD		Yes	Yes
Melecta caroli	DD		DD		Yes	Yes
Melecta curvispina	DD		DD		Yes	Yes
Melecta duodecimmaculata	DD		DD		No	No
Melecta festiva	DD		DD		No	No
Melecta fulgida	DD		DD		No	No
Melecta funeraria	DD		DD		No	No
Melecta gracilipes	DD		DD		Yes	Yes
Melecta grandis	DD		DD		No	No
Melecta guichardi	DD		DD		No	No
Melecta guilochei	DD		DD		No	No
Melecta italica	DD		DD		No	No
Melecta leucorhyncha	DD		DD		No	No
Melecta luctuosa	LC		LC		No	No
Melecta mundula	DD		DD		No	No
Melecta obscura	DD		DD		No	No
Melecta prophanta	DD		DD		No	No
Melecta tuberculata	DD		DD		No	No
Nomada accentifera	DD		DD		No	No
Nomada agrestis	LC		LC		No	No
Nomada alboguttata	LC		LC		No	No
Nomada alpigena	DD		DD		Yes	Yes
Nomada argentata	NT		NT		Yes	No
Nomada argentea	DD		DD		No	No
Nomada ariasi	DD		DD		Yes	Yes
Nomada armata	NT		NT		Yes	No
Nomada arrogans	DD		DD		Yes	No
Nomada atroscutellaris	LC		LC		Yes	No
Nomada babiyi	DD		DD		No	No
Nomada baccata	NT		NT		Yes	No
Nomada barcelonensis	DD		DD		Yes	Yes
Nomada basalis	LC		LC		No	No
Nomada beaumonti	LC		LC		No	No
Nomada bifasciata	LC		LC		No	No
Nomada bispinosa	LC		LC		No	No
Nomada blepharipes	DD		DD		No	No
Nomada bluethgeni	LC		LC		Yes	No
Nomada bolivari	DD		DD		Yes	Yes
Nomada bouceki	DD		DD		No	No
Nomada braunsiana	NT		NT		No	No
Nomada cadiza	DD		DD		No	No
Nomada calimorpha	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Nomada carnifex	LC		LC		No	No
Nomada caspia	LC		LC		No	No
Nomada castellana	LC		LC		No	No
Nomada cherkesiana	DD		DD		No	No
Nomada concolor	LC		LC		Yes	No
Nomada confinis	DD		DD		No	No
Nomada conjungens	LC		LC		No	No
Nomada connectens	LC		LC		No	No
Nomada corcyraea	DD		DD		Yes	No
Nomada coronata	LC		LC		Yes	Yes
Nomada coxalis	DD		DD		No	No
Nomada cretensis	NT		NT		Yes	Yes
Nomada cristata	DD		DD		No	No
Nomada cruenta	LC		LC		No	No
Nomada cypriaca	DD		DD		No	No
Nomada cypricola	DD		DD		Yes	Yes
Nomada diacantha	DD		DD		No	No
Nomada dira	LC		LC		No	No
Nomada discedens	LC		LC		Yes	Yes
Nomada discrepans	LC		LC		No	No
Nomada distinguenda	LC		LC		No	No
Nomada dolosa	DD		DD		No	No
Nomada duplex	DD		DD		No	No
Nomada emarginata	LC		LC		No	No
Nomada eos	LC		LC		No	No
Nomada errans	NT		NT		Yes	No
Nomada erythrocephala	DD		DD		No	No
Nomada fabriciana	LC		LC		Yes	No
Nomada facilis	LC		LC		No	No
Nomada fallax	LC		LC		No	No
Nomada femoralis	LC		LC		No	No
Nomada fenestrata	DD		DD		No	No
Nomada ferghanica	DD		DD		No	No
Nomada ferruginata	LC		LC		Yes	No
Nomada flava	LC		LC		Yes	No
Nomada flavigenis	DD		DD		No	No
Nomada flavilabris	DD		DD		No	No
Nomada flavinervis	DD		DD		No	No
Nomada flavoguttata	LC		LC		No	No
Nomada flavopicta	LC		LC		No	No
Nomada fucata	LC		LC		No	No
Nomada fulvicornis	LC		LC		No	No
Nomada furva	DD		DD		No	No
Nomada furvoides	DD		DD		No	No
Nomada fusca	LC		LC		Yes	No
Nomada fuscicornis	LC		LC		No	No
Nomada glaberrima	DD		DD		No	No
Nomada glaucopis	LC		LC		No	No
Nomada goodeniana	LC		LC		No	No
Nomada gransassoi	DD		DD		Yes	No
Nomada gredosiana	DD		DD		Yes	Yes
Nomada gribodoi	DD		DD		No	No
Nomada gruenwaldti	DD		DD		Yes	Yes
Nomada guttulata	LC		LC		No	No
Nomada hera	LC		LC		No	No
Nomada hirtipes	LC		LC		Yes	Yes

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Nomada hispanica	DD		DD		Yes	Yes
Nomada hungarica	DD		DD		No	No
Nomada illustris	DD		DD		Yes	No
Nomada immaculata	DD		DD		No	No
Nomada imperialis	LC		LC		No	No
Nomada incisa	DD		DD		No	No
Nomada insignipes	LC		LC		No	No
Nomada integra	LC		LC		No	No
Nomada italica	EN	B2ab(v)	EN	B2ab(v)	No	No
Nomada jaramense	DD		DD		Yes	Yes
Nomada kervilleana	DD		DD		No	No
Nomada kohli	LC		LC		No	No
Nomada kornosica	DD		DD		Yes	Yes
Nomada kriesteni	DD		DD		Yes	Yes
Nomada lamellata	DD		DD		Yes	Yes
Nomada lateritia	DD		DD		No	No
Nomada lathburiana	LC		LC		No	No
Nomada laticrus	DD		DD		No	No
Nomada leucophthalma	LC		LC		No	No
Nomada limassolica	DD		DD		No	No
Nomada linsenmaieri	LC		LC		No	No
Nomada litigiosa	DD		DD		No	No
Nomada lucidula	LC		LC		No	No
Nomada maculicornis	DD		DD		No	No
Nomada mandibularis	DD		DD		Yes	Yes
Nomada marshamella	LC		LC		No	No
Nomada mauritanica	LC		LC		No	No
Nomada mavromoustakisi	LC		LC		No	No
Nomada melanopyga	DD		DD		No	No
Nomada melathoracica	LC		LC		Yes	No
Nomada merceti	LC		LC		Yes	Yes
Nomada mocsaryi	DD		DD		No	No
Nomada moeschleri	LC		LC		No	No
Nomada mutabilis	LC		LC		No	No
Nomada mutica	NT		NT		No	No
Nomada nausicaa	LC		LC		No	No
Nomada nesiotica	DD		DD		Yes	Yes
Nomada nigrovaria	DD		DD		No	No
Nomada nobilis	LC		LC		No	No
Nomada noskiewiczi	VU	B2ab(v)	VU	B2ab(v)	Yes	Yes
Nomada numida	LC		LC		No	No
Nomada obscura	LC		LC		No	No
Nomada obtusifrons	NT		NT		No	No
Nomada oculata	DD		DD		No	No
Nomada opaca	NT		NT		No	No
Nomada orbitalis	DD		DD		Yes	Yes
Nomada pallispinosa	DD		DD		No	No
Nomada panurgina	LC		LC		No	No
Nomada panzeri	LC		LC		No	No
Nomada pastoralis	DD		NE		No	No
Nomada pectoralis	DD		DD		No	No
Nomada piccioliana	LC		LC		Yes	No
Nomada platythorax	DD		DD		No	No
Nomada pleurosticta	NT		NT		No	No
Nomada polemediana	DD		DD		Yes	Yes
Nomada posthuma	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Nomada priesneri	LC		LC		Yes	Yes
Nomada propinqua	LC		LC		No	No
Nomada pruinosa	DD		DD		No	No
Nomada pulchra	EN	B2ab(ii,v)	EN	B2ab(ii,v)	No	No
Nomada pygidialis	LC		LC		No	No
Nomada rhenana	NT		NT		No	No
Nomada roberjeotiana	NT		NT		No	No
Nomada rostrata	DD		DD		No	No
Nomada rubiginosa	LC		LC		No	No
Nomada rubricollis	LC		LC		No	No
Nomada rubricoxa	DD		DD		Yes	Yes
Nomada rubriventris	DD		DD		No	No
Nomada ruficornis	LC		LC		No	No
Nomada rufipes	LC		LC		No	No
Nomada rufoabdominalis	DD		DD		Yes	Yes
Nomada sabulosa	DD		DD		No	No
Nomada sanguinea	LC		LC		No	No
Nomada scheuchli	DD		DD		No	No
Nomada serricornis	DD		DD		No	No
Nomada sexfasciata	LC		LC		No	No
Nomada sheppardana	LC		LC		No	No
Nomada siciliensis	CR	D	CR	D	Yes	Yes
Nomada sicula	DD		DD		Yes	Yes
Nomada signata	LC		LC		Yes	No
Nomada similis	LC		LC		Yes	No
Nomada standfussi	DD		DD		Yes	Yes
Nomada stigma	LC		LC		No	No
Nomada stoeckherti	DD		DD		No	No
Nomada striata	LC		LC		No	No
Nomada succincta	LC		LC		No	No
Nomada sybarita	DD		DD		No	No
Nomada symphyti	NT		NT		No	No
Nomada tenella	NT		NT		No	No
Nomada thersites	DD		DD		No	No
Nomada transitoria	LC		LC		No	No
Nomada trapeziformis	NT		NT		No	No
Nomada tridentirostris	LC		LC		No	No
Nomada trispinosa	LC		LC		No	No
Nomada umbrosa	DD		DD		No	No
Nomada unispinosa	DD		DD		No	No
Nomada verna	DD		DD		Yes	No
Nomada villosa	NT		NT		No	No
Nomada zonata	LC		LC		No	No
Parammobatodes maroccanus	DD		DD		No	No
Parammobatodes minutus	EN	B2ab(iii)	EN	B2ab(iii)	No	No
Pasites maculatus	LC		LC		No	No
Schmiedeknechtia oraniensis	DD		DD		No	No
Tarsalia ancyliformis	DD		DD		No	No
Tarsalia hirtipes	DD		DD		No	No
Tetralonia malvae	LC		LC		No	No
Tetraloniella alticincta	LC		LC		No	No
Tetraloniella cinctella	DD		DD		No	No
Tetraloniella dentata	LC		LC		No	No
Tetraloniella fulvescens	DD		DD		No	No
Tetraloniella glauca	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Tetraloniella graja	DD		DD		No	No
Tetraloniella hohmanni	DD		DD		Yes	Yes
Tetraloniella iberica	DD		DD		No	No
Tetraloniella inulae	DD		DD		No	No
Tetraloniella julliani	DD		DD		No	No
Tetraloniella lanzarotensis	DD		DD		Yes	Yes
Tetraloniella lyncea	DD		DD		Yes	No
Tetraloniella nana	DD		DD		No	No
Tetraloniella pollinosa	DD		DD		No	No
Tetraloniella ruficornis	DD		DD		No	No
Tetraloniella salicariae	DD		DD		No	No
Tetraloniella scabiosae	DD		DD		No	No
Tetraloniella strigata	DD		DD		No	No
Tetraloniella vicina	DD		NE		No	No
Thyreus affinis	DD		DD		No	No
Thyreus elegans	DD		DD		No	No
Thyreus hellenicus	DD		DD		No	No
Thyreus hirtus	DD		DD		No	No
Thyreus histrionicus	LC		LC		No	No
Thyreus hohmanni	DD		DD		Yes	Yes
Thyreus orbatus	LC		LC		No	No
Thyreus picaron	DD		DD		No	No
Thyreus ramosus	LC		LC		No	No
Thyreus scutellaris	DD		DD		No	No
Thyreus tricuspis	DD		DD		No	No
Thyreus truncatus	DD		DD		No	No
Triepeolus tristis	NT		NT		No	No
Xylocopa cantabrita	LC		LC		No	No
Xylocopa iris	LC		LC		No	No
Xylocopa olivieri	LC		LC		No	No
Xylocopa valga	LC		LC		No	No
Xylocopa violacea	LC		LC		No	No
COLLETIDAE						
Colletes abeillei	LC		LC		No	No
Colletes acutiformis	NA		NA		No	No
Colletes acutus	LC		LC		No	No
Colletes albomaculatus	NT		NT		No	No
Colletes anchusae	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes brevigena	LC		LC		No	No
Colletes canescens	DD		DD		No	No
Colletes carinatus	LC		LC		No	No
Colletes cariniger	LC		LC		No	No
Colletes caskanus	DD		DD		No	No
Colletes caspicus	EN	B2ab(i,iii)	EN	B2ab(i,iii)	No	No
Colletes chengtehensis	VU	B2ab(iii)	EN	B2ab(iii)	No	No
Colletes collaris	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes creticus	NT		NT		Yes	Yes
Colletes cunicularius	LC		LC		No	No
Colletes cyprius	NT		NT		Yes	Yes
Colletes daviesanus	LC		LC		No	No
Colletes dimidiatus	VU	B1ab(ii,iii)+2ab(ii,iii)	VU	B1ab(ii,iii)+2ab(ii,iii)	Yes	Yes
Colletes dinizi	DD		DD		Yes	Yes
Colletes dusmeti	LC		LC		No	No
Colletes eous	LC		LC		No	No
Colletes escalerai	NA		NA		No	No
Colletes floralis	VU	B2ab(ii,iii)	VU	B2ab(ii,iii)	No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Colletes fodiens	VU	B2ab(ii,iii)	VU	B2ab(ii,iii)	No	No
Colletes foveolaris	LC		LC		No	No
Colletes gallicus	LC		LC		No	No
Colletes graeffei	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes halophilus	NT		NT		Yes	Yes
Colletes hederae	LC		LC		Yes	No
Colletes hethiticus	DD		DD		No	No
Colletes hylaeiformis	LC		LC		No	No
Colletes impunctatus	VU	B2ab(ii,iii)	VU	B2ab(ii,iii)	No	No
Colletes inexpectatus	LC		LC		No	No
Colletes intricans	NA		NA		No	No
Colletes ligatus	LC		LC		No	No
Colletes maidli	LC		LC		No	No
Colletes marginatus	LC		LC		No	No
Colletes merceti	EN	B2ab(iii)	EN	B2ab(iii)	Yes	Yes
Colletes meyeri	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes mlokossewiczi	LC		LC		No	No
Colletes moricei	VU	B1ab(ii,iii)+2ab(ii,iii)	VU	B1ab(ii,iii)+2ab(ii,iii)	Yes	Yes
Colletes nasutus	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes nigricans	LC		LC		No	No
Colletes noskiewiczi	LC		LC		No	No
Colletes pannonicus	LC		LC		Yes	Yes
Colletes perezi	VU	B1ab(ii,iii)+2ab(ii,iii)	VU	B1ab(ii,iii)+2ab(ii,iii)	No	No
Colletes pulchellus	VU	B2ab(ii,iii)	VU	B2ab(ii,iii)	Yes	Yes
Colletes punctatus	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	No	No
Colletes schmidi	LC		LC		Yes	Yes
Colletes senilis	DD		DD		No	No
Colletes sidemii	NA		NE		No	No
Colletes sierrensis	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	No
Colletes similis	LC		LC		No	No
Colletes squamulosus	DD		DD		No	No
Colletes standfussi	DD		DD		Yes	Yes
Colletes succinctus	NT		NT		No	No
Colletes tardus	DD		DD		Yes	No
Colletes tuberculatus	LC		LC		No	No
Colletes tuberculiger	LC		LC		Yes	Yes
Colletes wolfi	EN	B2ab(ii,iii)	EN	B2ab(ii,iii)	Yes	Yes
Hylaeus absolutus	DD		DD		No	No
Hylaeus adriaticus	DD		DD		Yes	No
Hylaeus alpinus	DD		DD		Yes	No
Hylaeus angustatus	LC		LC		No	No
Hylaeus annularis	DD		DD		No	No
Hylaeus annulatus	DD		DD		No	No
Hylaeus ater	LC		LC		Yes	Yes
Hylaeus azorae	DD		DD		Yes	Yes
Hylaeus biarmicus	DD		DD		No	No
Hylaeus bifasciatus	DD		DD		No	No
Hylaeus brachycephalus	DD		DD		No	No
Hylaeus breviceps	DD		NE		No	No
Hylaeus brevicornis	LC		LC		No	No
Hylaeus canariensis	DD		DD		Yes	Yes
Hylaeus cardioscapus	DD		DD		No	No
Hylaeus clypearis	LC		LC		No	No
Hylaeus communis	LC		LC		No	No
Hylaeus conformis	DD		DD		No	No
Hylaeus confusus	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Hylaeus convergens	DD		DD		Yes	Yes
Hylaeus coriaceus	DD		DD		No	No
Hylaeus cornutus	LC		LC		No	No
Hylaeus crassanus	NT		NT		Yes	No
Hylaeus cypricola	DD		DD		No	No
Hylaeus deceptorius	DD		DD		Yes	Yes
Hylaeus difformis	LC		LC		No	No
Hylaeus dilatatus	LC		LC		No	No
Hylaeus duckei	DD		DD		No	No
Hylaeus euryscapus	DD		DD		No	No
Hylaeus friesei	NT		NT		Yes	No
Hylaeus garrulus	DD		DD		Yes	Yes
Hylaeus gazagnairei	NA		NA		No	No
Hylaeus gibbus	LC		LC		No	No
Hylaeus glacialis	DD		DD		No	No
Hylaeus gracilicornis	LC		LC		No	No
Hylaeus gredleri	LC		LC		No	No
Hylaeus hellenicus	DD		DD		Yes	Yes
Hylaeus hohmanni	DD		DD		Yes	Yes
Hylaeus hyalinatus	LC		LC		No	No
Hylaeus hyperpunctatus	DD		DD		Yes	No
Hylaeus ibericus	DD		DD		Yes	Yes
Hylaeus imparilis	LC		LC		No	No
Hylaeus incongruus	DD		DD		No	No
Hylaeus intermedius	DD		DD		No	No
Hylaeus kahri	DD		DD		No	No
Hylaeus koenigsmanni	DD		DD		Yes	Yes
Hylaeus leptocephalus	LC		LC		No	No
Hylaeus lineolatus	LC		LC		No	No
Hylaeus longimaculus	LC		LC		No	No
Hylaeus maderensis	DD		DD		Yes	Yes
Hylaeus meridionalis	DD		DD		No	No
Hylaeus milossus	DD		DD		Yes	Yes
Hylaeus moricei	LC		LC		No	No
Hylaeus nigritus	LC		LC		No	No
Hylaeus nivaliformis	DD		DD		Yes	No
Hylaeus nivalis	DD		DD		Yes	No
Hylaeus paulus	LC		LC		No	No
Hylaeus pectoralis	DD		DD		No	No
Hylaeus penalaris	DD		DD		Yes	Yes
Hylaeus pfankuchi	LC		LC		No	No
Hylaeus pictipes	LC		LC		No	No
Hylaeus pictus	DD		DD		Yes	Yes
Hylaeus pilosulus	DD		DD		No	No
Hylaeus praenotatus	DD		DD		No	No
Hylaeus punctatus	LC		LC		No	No
Hylaeus punctulatissimus	DD		DD		No	No
Hylaeus punctus	DD		DD		No	No
Hylaeus pyrenaicus	DD		DD		Yes	Yes
Hylaeus rinki	LC		LC		No	No
Hylaeus rubicola	DD		DD		No	No
Hylaeus rugicollis	DD		DD		No	No
Hylaeus scutellaris	DD		NE		No	No
Hylaeus scutellatus	DD		DD		No	No
Hylaeus sidensis	DD		DD		No	No
Hylaeus signatus	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Hylaeus sinuatus	LC		LC		No	No
Hylaeus soror	DD		DD		No	No
Hylaeus stigmorhinus	DD		DD		Yes	Yes
Hylaeus styriacus	DD		DD		No	No
Hylaeus sulphuripes	LC		LC		No	No
Hylaeus taeniolatus	LC		LC		No	No
Hylaeus teruelus	DD		DD		Yes	Yes
Hylaeus trifidus	DD		DD		No	No
Hylaeus trinotatus	DD		DD		No	No
Hylaeus tyrolensis	DD		DD		No	No
Hylaeus variegatus	LC		LC		No	No
HALICTIDAE						
Ceylalictus variegatus	LC		LC		No	No
Dufourea alpina	LC		LC		Yes	No
Dufourea coeruleocephala	DD		DD		Yes	No
Dufourea cypria	DD		DD		No	No
Dufourea dentiventris	NT		NT		No	No
Dufourea fortunata	DD		DD		Yes	Yes
Dufourea gaullei	DD		DD		No	No
Dufourea graeca	DD		DD		No	No
Dufourea halictula	NT		NT		No	No
Dufourea inermis	NT		NT		No	No
Dufourea iris	DD		DD		Yes	Yes
Dufourea longiglossa	DD		DD		Yes	Yes
Dufourea lusitanica	DD		DD		Yes	Yes
Dufourea merceti	DD		DD		Yes	Yes
Dufourea minuta	NT		NT		No	No
Dufourea paradoxa	LC		LC		No	No
Dufourea styx	DD		DD		Yes	No
Dufourea trautmanni	DD		DD		Yes	Yes
Dufourea wolfi	DD		DD		No	No
Halictus adjikenticus	DD		DD		No	No
Halictus alfkenellus	DD		DD		No	No
Halictus asperulus	DD		DD		No	No
Halictus brunnescens	DD		DD		No	No
Halictus carinthiacus	EN	B2ab(i,ii,iii)	EN	B2ab(i,ii,iii)	Yes	No
Halictus centaureae	DD		DD		Yes	No
Halictus cephalicus	LC		LC		No	No
Halictus cochlearitarsis	LC		LC		No	No
Halictus compressus	LC		LC		No	No
Halictus concinnus	LC		LC		Yes	Yes
Halictus confusus	LC		LC		No	No
Halictus consobrinus	DD		DD		No	No
Halictus constantinensis	DD		DD		No	No
Halictus crenicornis	DD		DD		Yes	Yes
Halictus cypricus	DD		DD		No	No
Halictus fatsensis	DD		DD		No	No
Halictus frontalis	LC		LC		Yes	Yes
Halictus fulvipes	LC		LC		No	No
Halictus fumatipennis	DD		DD		Yes	Yes
Halictus gavarnicus	LC		LC		No	No
Halictus gemmeus	LC		LC		No	No
Halictus graecus	DD		DD		No	No
Halictus grossellus	DD		DD		No	No
Halictus gruenwaldti	DD		DD		Yes	Yes
Halictus holomelaenus	DD		DD		Yes	Yes

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Halictus inpilosus	DD		DD		Yes	Yes
Halictus jaramielicus	DD		DD		Yes	Yes
Halictus kessleri	LC		LC		No	No
Halictus langobardicus	LC		LC		Yes	No
Halictus leucaheneus	VU	B2ab(iii,v)	VU	B2ab(iii,v)	No	No
Halictus luganicus	DD		DD		No	No
Halictus lussinicus	DD		DD		Yes	No
Halictus maculatus	LC		LC		No	No
Halictus mediterranellus	DD		DD		Yes	Yes
Halictus microcardia	EN	B1ab(iii,v)+2ab(iii,v)	EN	B1ab(iii,v)+2ab(iii,v)	Yes	Yes
Halictus mucoreus	DD		NE		No	No
Halictus nicosiae	DD		DD		Yes	Yes
Halictus patellatus	LC		LC		No	No
Halictus pollinosus	LC		LC		No	No
Halictus ponticus	DD		DD		Yes	No
Halictus pseudomucoreus	DD		NE		No	No
Halictus pseudotetrazonius	DD		DD		Yes	Yes
Halictus pyrenaeus	DD		DD		Yes	Yes
Halictus quadricinctus	NT		NT		No	No
Halictus quadripartitus	DD		DD		Yes	Yes
Halictus resurgens	LC		LC		No	No
Halictus rossicus	DD		DD		Yes	No
Halictus rubicundus	LC		LC		No	No
Halictus sajoi	DD		DD		No	No
Halictus scabiosae	LC		LC		No	No
Halictus seladonius	LC		LC		No	No
Halictus semitectus	EN	B2ab(v)	EN	B2ab(v)	No	No
Halictus senilis	DD		DD		No	No
Halictus sexcinctus	LC		LC		No	No
Halictus simplex	LC		LC		No	No
Halictus smaragdulus	LC		LC		No	No
Halictus subauratus	LC		LC		No	No
Halictus tetrazonianellus	DD		DD		No	No
Halictus tetrazonius	DD		DD		No	No
Halictus tridivisus	DD		DD		Yes	Yes
Halictus tuberculatus	DD		NE		No	No
Halictus tumulorum	LC		LC		No	No
Halictus vestitus	LC		LC		No	No
Lasioglossum acephaloides	DD		DD		No	No
Lasioglossum aegyptiellum	DD		DD		No	No
Lasioglossum aeratum	LC		LC		No	No
Lasioglossum akroundicum	DD		DD		Yes	Yes
Lasioglossum albipes	LC		LC		No	No
Lasioglossum albocinctum	LC		LC		No	No
Lasioglossum albovirens	NT		NT		No	No
Lasioglossum algirum	NT		NT		No	No
Lasioglossum alinense	DD		NE		No	No
Lasioglossum alpigenum	LC		LC		Yes	No
Lasioglossum anellum	DD		DD		No	No
Lasioglossum angusticeps	NT		NT		No	No
Lasioglossum angustipes	DD		DD		No	No
Lasioglossum annulipes	NA		NA		No	No
Lasioglossum apostoli	DD		DD		No	No
Lasioglossum arctifrons	LC		LC		Yes	Yes
Lasioglossum ariadne	DD		DD		Yes	Yes
Lasioglossum articulare	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Lasioglossum aureimontanum	DD		DD		Yes	Yes
Lasioglossum aureolum	LC		LC		No	No
Lasioglossum bavaricum	LC		LC		Yes	No
Lasioglossum bicallosum	DD		DD		No	No
Lasioglossum bimaculatum	LC		LC		No	No
Lasioglossum bischoffi	DD		DD		No	No
Lasioglossum bluethgeni	LC		LC		No	No
Lasioglossum boreale	DD		DD		No	No
Lasioglossum brevicorne	NT		NT		No	No
Lasioglossum breviventre	EN	B2ab(i,ii,v)	EN	B2ab(i,ii,v)	Yes	No
Lasioglossum buccale	DD		DD		No	No
Lasioglossum calceatum	LC		LC		No	No
Lasioglossum callizonium	LC		LC		No	No
Lasioglossum capitale	DD		DD		No	No
Lasioglossum castilianum	DD		DD		Yes	Yes
Lasioglossum chalcodes	LC		LC		Yes	Yes
Lasioglossum clypeare	NT		NT		No	No
Lasioglossum clypeiferellum	DD		DD		No	No
Lasioglossum collopiense	DD		DD		No	No
Lasioglossum convexiusculum	NT		NT		No	No
Lasioglossum corsicanum	DD		DD		Yes	Yes
Lasioglossum corvinum	LC		LC		No	No
Lasioglossum costulatum	NT		NT		No	No
Lasioglossum crassepunctatum	DD		DD		No	No
Lasioglossum cristula	DD		DD		No	No
Lasioglossum cupromicans	LC		LC		No	No
Lasioglossum damascenum	DD		DD		No	No
Lasioglossum danuvium	DD		DD		Yes	No
Lasioglossum debilior	NA		NA		No	No
Lasioglossum denislucum	DD		DD		No	No
Lasioglossum discum	LC		LC		No	No
Lasioglossum dolichocephalum	NT		NT		No	No
Lasioglossum duckei	NT		NT		No	No
Lasioglossum dusmeti	DD		DD		Yes	Yes
Lasioglossum elegans	DD		DD		No	No
Lasioglossum ellipticeps	NA		NA		No	No
Lasioglossum erraticum	DD		DD		No	No
Lasioglossum euboeense	DD		DD		No	No
Lasioglossum eurasicum	DD		DD		Yes	No
Lasioglossum euxinicum	DD		DD		No	No
Lasioglossum fratellum	LC		LC		No	No
Lasioglossum fulvicorne	LC		LC		No	No
Lasioglossum glabriusculum	LC		LC		No	No
Lasioglossum glaciegenitum	DD		DD		No	No
Lasioglossum gorkiense	NA		NE		No	No
Lasioglossum griseolum	LC		LC		No	No
Lasioglossum haesitans	DD		DD		No	No
Lasioglossum hilare	DD		DD		No	No
Lasioglossum ibericum	DD		DD		Yes	Yes
Lasioglossum imbecillum	DD		DD		No	No
Lasioglossum immunitum	DD		DD		No	No
Lasioglossum intermedium	NT		NT		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Lasioglossum interruptum	LC		LC		No	No
Lasioglossum kotschyi	DD		DD		Yes	Yes
Lasioglossum kussariense	DD		DD		No	No
Lasioglossum laetum	LC		LC		Yes	Yes
Lasioglossum laeve	EN	B2ab(i,ii,iv)	EN	B2ab(i,ii,iv)	No	No
Lasioglossum laevidorsum	DD		DD		No	No
Lasioglossum laevigatum	NT		NT		No	No
Lasioglossum laterale	DD		DD		No	No
Lasioglossum laticeps	LC		LC		No	No
Lasioglossum lativentre	LC		LC		No	No
Lasioglossum leucomontanum	DD		DD		Yes	Yes
Lasioglossum leucopus	LC		LC		No	No
Lasioglossum leucozonium	LC		LC		No	No
Lasioglossum limbelloides	DD		DD		No	No
Lasioglossum limbellum	DD		DD		No	No
Lasioglossum lineare	DD		DD		No	No
Lasioglossum lissonotum	DD		DD		Yes	No
Lasioglossum littorale	NT		NT		No	No
Lasioglossum lucidulum	LC		LC		No	No
Lasioglossum majus	NT		NT		No	No
Lasioglossum malachurum	LC		LC		No	No
Lasioglossum mandibulare	NT		NT		No	No
Lasioglossum marginatum	LC		LC		No	No
Lasioglossum marginellum	NT		NT		No	No
Lasioglossum maurusium	NT		NT		No	No
Lasioglossum mediterraneum	LC		LC		No	No
Lasioglossum mesosclerum	DD		DD		No	No
Lasioglossum minutissimum	LC		LC		No	No
Lasioglossum minutulum	NT		NT		Yes	No
Lasioglossum montivolans	DD		DD		No	No
Lasioglossum morio	LC		LC		No	No
Lasioglossum musculoides	DD		DD		No	No
Lasioglossum nigripes	LC		LC		No	No
Lasioglossum nitidiusculum	LC		LC		No	No
Lasioglossum nitidulum	LC		LC		No	No
Lasioglossum niveocinctum	NA		NE		No	No
Lasioglossum obscuratum	DD		DD		No	No
Lasioglossum orihuelicum	DD		DD		Yes	Yes
Lasioglossum pallens	LC		LC		No	No
Lasioglossum parvulum	LC		LC		No	No
Lasioglossum pauperatum	LC		LC		No	No
Lasioglossum pauxillum	LC		LC		No	No
Lasioglossum perclavipes	DD		DD		No	No
Lasioglossum peregrinum	DD		DD		No	No
Lasioglossum phoenicurum	DD		DD		No	No
Lasioglossum pleurospeculum	DD		DD		Yes	No
Lasioglossum podolicum	NT		NT		No	No
Lasioglossum politum	LC		LC		No	No
Lasioglossum prasinum	NT		NT		No	No
Lasioglossum pseudocaspicum	DD		DD		No	No
Lasioglossum pseudoplanulum	DD		DD		No	No
Lasioglossum punctatissimum	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Lasioglossum puncticolle	LC		LC		No	No
Lasioglossum pygmaeum	NT		NT		No	No
Lasioglossum quadrinotatulum	NT		NT		No	No
Lasioglossum quadrinotatum	NT		NT		No	No
Lasioglossum quadrisignatum	EN	B2ab(i,ii)	EN	B2ab(i,ii)	No	No
Lasioglossum ragusanum	DD		DD		Yes	No
Lasioglossum rostratum	NA		NE		No	No
Lasioglossum rufitarse	LC		LC		No	No
Lasioglossum rupestre	DD		DD		No	No
Lasioglossum sabulosum	NT		NT		Yes	No
Lasioglossum samaricum	DD		DD		No	No
Lasioglossum semilucens	LC		LC		No	No
Lasioglossum setulellum	NT		NT		No	No
Lasioglossum setulosum	NT		NT		Yes	No
Lasioglossum sexmaculatum	EN	B2ab(iii,v)	EN	B2ab(iii,v)	No	No
Lasioglossum sexnotatulum	EN	B2ab(v)	EN	B2ab(v)	No	No
Lasioglossum sexnotatum	NT		NT		No	No
Lasioglossum sexstrigatum	LC		LC		No	No
Lasioglossum smeathmanellum	LC		LC		No	No
Lasioglossum soror	EN	B2ab(iii)	EN	B2ab(iii)	No	No
Lasioglossum sphecodimorphum	DD		DD		No	No
Lasioglossum strictifrons	DD		DD		No	No
Lasioglossum subaenescens	NT		NT		No	No
Lasioglossum subfasciatum	EN	B2ab(i,ii,v)	EN	B2ab(i,ii,v)	No	No
Lasioglossum subfulvicorne	LC		LC		No	No
Lasioglossum subhirtum	LC		LC		No	No
Lasioglossum tarsatum	NT		NT		No	No
Lasioglossum tauricum	DD		DD		Yes	No
Lasioglossum transitorium	LC		LC		No	No
Lasioglossum trichopygum	DD		DD		No	No
Lasioglossum tricinctum	DD		DD		No	No
Lasioglossum truncaticolle	DD		DD		No	No
Lasioglossum tschibuklinum	DD		DD		No	No
Lasioglossum vergilianum	DD		DD		Yes	Yes
Lasioglossum villosulum	LC		LC		No	No
Lasioglossum virens	EN	B2ab(iii)	EN	B2ab(iii)	No	No
Lasioglossum viride	LC		LC		Yes	Yes
Lasioglossum wollastoni	LC		LC		Yes	Yes
Lasioglossum xanthopus	NT		NT		No	No
Lasioglossum zonulum	LC		LC		No	No
Nomiapis bispinosa	LC		LC		No	No
Nomiapis diversipes	LC		LC		No	No
Nomiapis equestris	DD		DD		No	No
Nomiapis femoralis	DD		DD		No	No
Nomiapis monstrosa	DD		DD		No	No
Nomiapis valga	DD		DD		No	No
Nomioides deceptor	LC		LC		No	No
Nomioides facilis	LC		LC		No	No
Nomioides fortunatus	LC		LC		No	No
Nomioides minutissimus	LC		LC		No	No
Rhophitoides canus	LC		LC		No	No
Rhophitoides epiroticus	DD		DD		Yes	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Rophites algirus	DD		DD		No	No
Rophites clypealis	DD		NE		No	No
Rophites foveolatus	DD		DD		No	No
Rophites hartmanni	DD		DD		No	No
Rophites hellenicus	DD		DD		Yes	No
Rophites leclercqi	DD		DD		No	No
Rophites quinquespinosus	NT		NT		No	No
Rophites thracius	DD		DD		Yes	Yes
Sphecodes albilabris	LC		LC		No	No
Sphecodes algeriensis	DD		DD		No	No
Sphecodes alternatus	LC		LC		No	No
Sphecodes anatolicus	DD		DD		No	No
Sphecodes atlanticus	DD		DD		Yes	Yes
Sphecodes barbatus	DD		DD		No	No
Sphecodes combai	DD		DD		Yes	Yes
Sphecodes crassanus	LC		LC		No	No
Sphecodes crassus	LC		LC		No	No
Sphecodes creticus	DD		DD		Yes	Yes
Sphecodes cristatus	NT		NT		No	No
Sphecodes croaticus	NT		NT		No	No
Sphecodes cypricus	DD		DD		Yes	Yes
Sphecodes dusmeti	DD		DD		No	No
Sphecodes ephippius	LC		LC		No	No
Sphecodes ferruginatus	LC		LC		No	No
Sphecodes geoffrellus	LC		LC		No	No
Sphecodes gibbus	LC		LC		No	No
Sphecodes gomerensis	DD		DD		Yes	Yes
Sphecodes hirtellus	DD		DD		No	No
Sphecodes hyalinatus	NT		NT		No	No
Sphecodes intermedius	NT		NT		No	No
Sphecodes larochei	DD		DD		Yes	Yes
Sphecodes longuloides	DD		DD		No	No
Sphecodes longulus	LC		LC		No	No
Sphecodes majalis	NT		NT		No	No
Sphecodes marginatus	LC		LC		No	No
Sphecodes miniatus	LC		LC		No	No
Sphecodes monilicornis	LC		LC		No	No
Sphecodes niger	LC		LC		No	No
Sphecodes nomioidis	LC		LC		No	No
Sphecodes olivieri	DD		DD		No	No
Sphecodes pellucidus	LC		LC		No	No
Sphecodes piceohirtus	DD		DD		Yes	Yes
Sphecodes pinguiculus	NT		NT		No	No
Sphecodes pseudocrassus	DD		DD		Yes	Yes
Sphecodes pseudofasciatus	DD		DD		No	No
Sphecodes puncticeps	LC		LC		No	No
Sphecodes reticulatus	LC		LC		No	No
Sphecodes rubicundus	NT		NT		No	No
Sphecodes rubripes	DD		DD		Yes	Yes
Sphecodes ruficrus	LC		LC		No	No
Sphecodes rufiventris	LC		LC		No	No
Sphecodes scabricollis	DD		DD		No	No
Sphecodes schenckii	NT		NT		No	No
Sphecodes spinulosus	NT		NT		No	No
Sphecodes zangherii	DD		DD		No	No
Systropha curvicornis	NT		NT		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Systropha planidens	VU	B2ab(v)	VU	B2ab(v)	No	No
Thrincohalictus prognathus	NA		NA		No	No
MEGACHILIDAE						
Afranthidium carduele	DD		DD		No	No
Afranthidium malacopygum	DD		DD		No	No
Afranthidium schulthessii	NT		NT		No	No
Aglaoapis tridentata	LC		LC		No	No
Anthidiellum breviusculum	LC		LC		No	No
Anthidiellum strigatum	LC		LC		No	No
Anthidium cingulatum	LC		LC		No	No
Anthidium dalmaticum	NT		NT		No	No
Anthidium diadema	DD		DD		No	No
Anthidium florentinum	LC		LC		No	No
Anthidium loti	DD		DD		No	No
Anthidium manicatum	LC		LC		No	No
Anthidium montanum	NT		NT		No	No
Anthidium oblongatum	LC		LC		No	No
Anthidium punctatum	LC		LC		No	No
Anthidium septemspinosum	DD		DD		No	No
Anthidium spiniventre	NT		NT		No	No
Anthidium taeniatum	DD		DD		No	No
Anthidium undulatiforme	NT		NT		No	No
Anthidium undulatum	LC		LC		No	No
Anthidium wuestneii	DD		DD		No	No
Chelostoma aegaeicum	DD		DD		No	No
Chelostoma campanularum	LC		LC		No	No
Chelostoma diodon	DD		DD		No	No
Chelostoma distinctum	LC		LC		No	No
Chelostoma edentulum	DD		DD		No	No
Chelostoma emarginatum	LC		LC		No	No
Chelostoma florisomne	LC		LC		No	No
Chelostoma forcipatum	DD		DD		No	No
Chelostoma foveolatum	LC		LC		No	No
Chelostoma grande	DD		DD		Yes	No
Chelostoma handlirschi	DD		DD		No	No
Chelostoma hellenicum	DD		DD		Yes	Yes
Chelostoma incognitum	DD		DD		No	No
Chelostoma laticaudum	DD		DD		Yes	Yes
Chelostoma longifacies	DD		DD		No	No
Chelostoma lucens	LC		LC		No	No
Chelostoma mocsaryi	LC		LC		No	No
Chelostoma nasutum	LC		LC		No	No
Chelostoma proximum	LC		NE		No	No
Chelostoma rapunculi	LC		LC		No	No
Chelostoma siciliae	DD		DD		Yes	Yes
Chelostoma styriacum	LC		LC		No	No
Chelostoma transversum	DD		DD		No	No
Chelostoma ventrale	LC		LC		No	No
Coelioxys acanthopyga	DD		DD		No	No
Coelioxys acanthura	LC		LC		No	No
Coelioxys afra	LC		LC		No	No
Coelioxys alata	LC		LC		No	No
Coelioxys argentea	LC		LC		No	No
Coelioxys artemis	DD		DD		No	No
Coelioxys aurolimbata	LC		LC		No	No
Coelioxys brevis	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Coelioxys caudata	DD		DD		No	No
Coelioxys conoidea	LC		LC		No	No
Coelioxys coturnix	LC		LC		No	No
Coelioxys decipiens	LC		LC		No	No
Coelioxys echinata	LC		LC		No	No
Coelioxys elegantula	LC		LC		No	No
Coelioxys elongata	LC		LC		No	No
Coelioxys elongatula	VU	B2ab(iii)	VU	B2ab(iii)	No	No
Coelioxys elsei	DD		DD		No	No
Coelioxys emarginata	LC		LC		No	No
Coelioxys haemorrhoa	LC		LC		No	No
Coelioxys inermis	LC		LC		No	No
Coelioxys lanceolata	LC		LC		No	No
Coelioxys mandibularis	LC		LC		No	No
Coelioxys obtusa	LC		LC		No	No
Coelioxys obtusispina	DD		DD		No	No
Coelioxys osmiae	DD		DD		No	No
Coelioxys polycentris	LC		LC		No	No
Coelioxys quadridentata	LC		LC		No	No
Coelioxys rufescens	LC		LC		No	No
Dioxys ardens	DD		DD		No	No
Dioxys atlantica	DD		DD		Yes	Yes
Dioxys cincta	LC		LC		No	No
Dioxys lanzarotensis	DD		DD		Yes	Yes
Dioxys moesta	DD		DD		No	No
Dioxys pumila	DD		DD		No	No
Ensliniana bidentata	DD		DD		No	No
Eoanthidium clypeare	DD		DD		No	No
Eoanthidium insulare	LC		LC		No	No
Haetosmia circumventa	DD		DD		No	No
Haetosmia vechti	DD		DD		No	No
Heriades clavicornis	DD		DD		No	No
Heriades crenulata	LC		LC		No	No
Heriades labiata	DD		DD		No	No
Heriades punctulifera	DD		DD		No	No
Heriades rubicola	LC		LC		No	No
Heriades truncorum	LC		LC		No	No
Hofferia schmiedeknechti	LC		LC		No	No
Hoplitis abnormis	DD		DD		No	No
Hoplitis acuticornis	LC		LC		No	No
Hoplitis adunca	LC		LC		No	No
Hoplitis agis	DD		DD		No	No
Hoplitis albatera	DD		DD		Yes	Yes
Hoplitis albiscopa	DD		DD		No	No
Hoplitis anipuncta	DD		DD		No	No
Hoplitis annulata	LC		LC		No	No
Hoplitis anthocopoides	LC		LC		No	No
Hoplitis antigae	DD		DD		No	No
Hoplitis batyamae	DD		DD		No	No
Hoplitis benoisti	LC		LC		No	No
Hoplitis bicallosa	DD		DD		No	No
Hoplitis bihamata	DD		DD		No	No
Hoplitis bispinosa	DD		DD		No	No
Hoplitis bisulca	LC		LC		No	No
Hoplitis brachypogon	LC		LC		No	No
Hoplitis cadiza	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Hoplitis campanularis	LC		LC		No	No
Hoplitis carinata	LC		LC		No	No
Hoplitis caularis	DD		NE		No	No
Hoplitis ciliaris	LC		LC		No	No
Hoplitis claviventris	LC		LC		No	No
Hoplitis cretaea	DD		DD		Yes	Yes
Hoplitis cristatula	LC		LC		No	No
Hoplitis curtula	DD		DD		No	No
Hoplitis curvipes	LC		LC		No	No
Hoplitis cypriaca	DD		DD		No	No
Hoplitis dalmatica	LC		LC		No	No
Hoplitis fabrei	DD		DD		Yes	Yes
Hoplitis fasciculata	DD		DD		No	No
Hoplitis fertoni	DD		DD		No	No
Hoplitis fulva	LC		LC		No	No
Hoplitis furcula	DD		DD		No	No
Hoplitis galbula	DD		DD		No	No
Hoplitis graeca	DD		DD		Yes	Yes
Hoplitis grandiscapa	DD		DD		No	No
Hoplitis grossepunctata	DD		DD		No	No
Hoplitis grumi	DD		DD		No	No
Hoplitis haemi	DD		DD		No	No
Hoplitis hilbera	DD		DD		Yes	Yes
Hoplitis holmboei	DD		DD		Yes	Yes
Hoplitis idaensis	DD		DD		No	No
Hoplitis illyrica	LC		LC		No	No
Hoplitis insularis	DD		DD		No	No
Hoplitis jakovlevi	LC		LC		No	No
Hoplitis jheringii	LC		LC		No	No
Hoplitis laboriosa	DD		NE		No	No
Hoplitis laevifrons	LC		LC		No	No
Hoplitis lepeletieri	LC		LC		Yes	No
Hoplitis leucomelana	LC		LC		No	No
Hoplitis limassolica	DD		DD		No	No
Hoplitis lithodorae	DD		DD		Yes	Yes
Hoplitis loti	LC		LC		Yes	No
Hoplitis lysholmi	DD		DD		No	No
Hoplitis manicata	LC		LC		No	No
Hoplitis manuelae	DD		DD		Yes	Yes
Hoplitis marchali	LC		LC		No	No
Hoplitis maritima	DD		NE		No	No
Hoplitis mazzuccoi	LC		LC		No	No
Hoplitis mitis	LC		LC		No	No
Hoplitis mocsaryi	LC		LC		No	No
Hoplitis mollis	DD		DD		No	No
Hoplitis monticola	DD		DD		No	No
Hoplitis moricei	DD		DD		No	No
Hoplitis mucida	LC		LC		No	No
Hoplitis nicolaei	DD		DD		No	No
Hoplitis nitidula	LC		NE		No	No
Hoplitis obtusa	DD		DD		No	No
Hoplitis occidentalis	DD		DD		No	No
Hoplitis ochraceicornis	LC		LC		Yes	No
Hoplitis pallicornis	LC		LC		No	No
Hoplitis papaveris	LC		LC		No	No
Hoplitis parnesica	DD		DD		Yes	Yes

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Hoplitis peniculifera	DD		DD		Yes	Yes
Hoplitis perezi	LC		LC		No	No
Hoplitis pici	LC		LC		No	No
Hoplitis pomarina	DD		DD		No	No
Hoplitis praestans	LC		LC		No	No
Hoplitis princeps	DD		DD		No	No
Hoplitis pulchella	DD		DD		No	No
Hoplitis quinquespinosa	LC		LC		No	No
Hoplitis ravouxi	LC		LC		Yes	No
Hoplitis robusta	LC		LC		No	No
Hoplitis saundersi	LC		LC		No	No
Hoplitis saxialis	DD		DD		No	No
Hoplitis serainae	DD		DD		No	No
Hoplitis stellaris	DD		DD		No	No
Hoplitis strymonia	DD		DD		No	No
Hoplitis subbutea	DD		DD		No	No
Hoplitis submanicata	DD		DD		No	No
Hoplitis tenuispina	DD		DD		Yes	Yes
Hoplitis tigrina	DD		DD		No	No
Hoplitis tkalcuella	DD		DD		Yes	Yes
Hoplitis tridentata	LC		LC		No	No
Hoplitis tuberculata	LC		LC		No	No
Hoplitis villosa	LC		LC		Yes	No
Hoplitis yermasoyiae	LC		LC		No	No
Hoplitis zaianorum	DD		DD		No	No
Hoplitis zandeni	DD		DD		Yes	Yes
Icteranthidium cimbiciforme	EN	B2ab(i,ii)	EN	B2ab(i,ii)	No	No
Icteranthidium ferrugineum	DD		DD		No	No
Icteranthidium grohmanni	LC		LC		No	No
Icteranthidium laterale	LC		LC		No	No
Icteranthidium ovasi	NT		NT		No	No
Lithurgus chrysurus	LC		LC		No	No
Lithurgus cornutus	LC		LC		No	No
Lithurgus tibialis	LC		LC		No	No
Megachile albisecta	DD		DD		No	No
Megachile albocristata	LC		LC		No	No
Megachile albohirta	DD		DD		No	No
Megachile albonotata	DD		DD		No	No
Megachile alpicola	DD		DD		Yes	No
Megachile analis	DD		DD		No	No
Megachile apennina	DD		DD		Yes	Yes
Megachile apicalis	LC		LC		No	No
Megachile atlantica	DD		DD		No	No
Megachile baetica	DD		DD		Yes	Yes
Megachile basilaris	DD		DD		No	No
Megachile benoisti	DD		DD		Yes	Yes
Megachile binominata	DD		DD		Yes	Yes
Megachile bioculata	DD		DD		Yes	Yes
Megachile bombycina	DD		DD		No	No
Megachile breviceps	DD		DD		Yes	Yes
Megachile burdigalensis	DD		DD		No	No
Megachile canariensis	DD		DD		Yes	Yes
Megachile canescens	DD		DD		Yes	Yes
Megachile centuncularis	LC		LC		No	No
Megachile circumcincta	LC		LC		No	No
Megachile concinna	DD		DD		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Megachile cressa	DD		DD		Yes	Yes
Megachile cypricola	CR	D	CR	D	No	No
Megachile dacica	DD		DD		Yes	Yes
Megachile deceptoria	DD		DD		No	No
Megachile diabolica	NT		NT		No	No
Megachile ericetorum	LC		LC		No	No
Megachile farinosa	DD		DD		No	No
Megachile fertoni	DD		DD		No	No
Megachile flabellipes	DD		DD		No	No
Megachile foersteri	DD		DD		No	No
Megachile fuerteventurae	DD		DD		Yes	Yes
Megachile fulvimana	DD		DD		No	No
Megachile genalis	DD		DD		No	No
Megachile ghilianii	DD		DD		Yes	Yes
Megachile giraudi	DD		DD		Yes	No
Megachile gothalauniensis	DD		DD		Yes	Yes
Megachile hohmanni	DD		DD		Yes	Yes
Megachile hungarica	DD		DD		No	No
Megachile lagopoda	LC		LC		Yes	No
Megachile lanigera	DD		DD		No	No
Megachile lapponica	DD		DD		No	No
Megachile leachella	LC		LC		No	No
Megachile lefebvrei	DD		DD		No	No
Megachile leucomalla	DD		DD		No	No
Megachile ligniseca	DD		DD		No	No
Megachile lucidifrons	DD		DD		Yes	Yes
Megachile maackii	DD		DD		No	No
Megachile manicata	DD		DD		No	No
Megachile maritima	DD		DD		No	No
Megachile mavromoustakisi	DD		DD		Yes	Yes
Megachile melanogaster	DD		DD		No	No
Megachile melanopyga	LC		LC		No	No
Megachile montenegrensis	DD		DD		No	No
Megachile nigriventris	DD		DD		No	No
Megachile octosignata	DD		DD		No	No
Megachile opacifrons	DD		DD		Yes	Yes
Megachile parietina	LC		LC		Yes	No
Megachile picicornis	DD		DD		No	No
Megachile pilicrus	DD		DD		No	No
Megachile pilidens	LC		LC		No	No
Megachile pugillatoria	DD		DD		Yes	Yes
Megachile punctatissima	DD		DD		Yes	Yes
Megachile pusilla	DD		DD		Yes	Yes
Megachile pyrenaea	DD		DD		No	No
Megachile pyrenaica	DD		DD		No	No
Megachile rhodosiaca	DD		DD		Yes	Yes
Megachile roeweri	DD		DD		Yes	Yes
Megachile rotundata	DD		DD		No	No
Megachile rufescens	DD		DD		Yes	Yes
Megachile rufitarsis	NA		NA		No	No
Megachile schmiedeknechti	DD		DD		No	No
Megachile semicircularis	DD		DD		Yes	Yes
Megachile semipleta	DD		DD		Yes	Yes
Megachile sexmaculata	DD		DD		No	No
Megachile sicula	DD		DD		No	No
Megachile troodica	DD		DD		Yes	Yes

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Megachile versicolor	DD		DD		No	No
Megachile walkeri	DD		DD		No	No
Megachile willughbiella	LC		LC		No	No
Metadioxys graeca	DD		DD		No	No
Osmia aeruginosa	DD		DD		No	No
Osmia alfkenii	DD		DD		No	No
Osmia alticola	LC		LC		Yes	No
Osmia amathusica	DD		DD		No	No
Osmia anceyi	LC		LC		No	No
Osmia andrenoides	LC		LC		No	No
Osmia apicata	LC		LC		No	No
Osmia argyropyga	LC		LC		No	No
Osmia ariadne	DD		DD		Yes	Yes
Osmia aurulenta	LC		LC		No	No
Osmia balearica	DD		DD		Yes	Yes
Osmia bicolor	LC		LC		No	No
Osmia bicornis	LC		LC		No	No
Osmia bidentata	LC		LC		No	No
Osmia bischoffi	LC		LC		No	No
Osmia breviata	DD		DD		No	No
Osmia brevicornis	LC		LC		No	No
Osmia caerulescens	LC		LC		No	No
Osmia cephalotes	LC		LC		No	No
Osmia cerinthidis	LC		LC		No	No
Osmia cinctella	DD		DD		No	No
Osmia cinnabarina	DD		DD		No	No
Osmia clypearis	LC		LC		No	No
Osmia corniculata	DD		DD		No	No
Osmia cornuta	LC		LC		No	No
Osmia croatica	LC		LC		No	No
Osmia cyanescens	DD		NE		No	No
Osmia cyanoxantha	LC		LC		No	No
Osmia dilaticornis	DD		DD		No	No
Osmia dimidiata	LC		LC		No	No
Osmia distinguenda	LC		LC		No	No
Osmia dives	LC		LC		No	No
Osmia dlabolae	DD		DD		No	No
Osmia dusmeti	DD		DD		Yes	Yes
Osmia elegans	DD		DD		No	No
Osmia emarginata	LC		LC		No	No
Osmia erythrogastra	LC		LC		No	No
Osmia fallax	DD		DD		No	No
Osmia ferruginea	LC		LC		No	No
Osmia forticornis	DD		DD		No	No
Osmia frieseana	DD		DD		No	No
Osmia gallarum	LC		LC		No	No
Osmia hellados	DD		DD		No	No
Osmia heteracantha	LC		LC		No	No
Osmia iberica	DD		DD		Yes	Yes
Osmia inermis	LC		LC		No	No
Osmia jason	LC		LC		No	No
Osmia kohli	DD		DD		No	No
Osmia labialis	LC		LC		No	No
Osmia larochei	DD		DD		Yes	Yes
Osmia laticauda	DD		DD		No	No
Osmia laticeps	LC		LC		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Osmia latreillei	LC		LC		No	No
Osmia leaiana	LC		LC		No	No
Osmia ligurica	LC		LC		No	No
Osmia lobata	DD		DD		No	No
Osmia lunata	LC		LC		No	No
Osmia madeirensis	DD		DD		Yes	Yes
Osmia maritima	EN	B2ab(ii,iii,v)	EN	B2ab(ii,iii,v)	No	No
Osmia melanogaster	LC		LC		No	No
Osmia melanura	LC		LC		No	No
Osmia mirhiji	DD		DD		Yes	Yes
Osmia moreensis	DD		DD		Yes	Yes
Osmia mustelina	LC		LC		No	No
Osmia nana	DD		DD		No	No
Osmia nasoproducta	DD		DD		No	No
Osmia nasuta	DD		DD		No	No
Osmia nigriventris	LC		LC		No	No
Osmia nigrohirta	DD		DD		No	No
Osmia niveata	LC		LC		No	No
Osmia niveocincta	DD		DD		No	No
Osmia notata	LC		LC		No	No
Osmia olgae	DD		DD		No	No
Osmia padri	DD		DD		No	No
Osmia palmae	DD		DD		Yes	Yes
Osmia parietina	LC		LC		No	No
Osmia picena	DD		DD		Yes	Yes
Osmia pilicornis	LC		LC		Yes	No
Osmia pinguis	LC		LC		No	No
Osmia rhodoensis	LC		LC		No	No
Osmia rufohirta	LC		LC		No	No
Osmia rutila	DD		DD		No	No
Osmia saxicola	LC		LC		No	No
Osmia scutellaris	LC		LC		No	No
Osmia signata	LC		LC		No	No
Osmia spinigera	DD		DD		No	No
Osmia spinulosa	LC		LC		No	No
Osmia steinmanni	DD		DD		Yes	No
Osmia subcornuta	LC		LC		No	No
Osmia submicans	LC		LC		No	No
Osmia svenssoni	DD		DD		Yes	Yes
Osmia sybarita	LC		LC		No	No
Osmia tergestensis	LC		LC		No	No
Osmia teunisseni	DD		DD		No	No
Osmia tricornis	LC		LC		No	No
Osmia tunensis	LC		LC		No	No
Osmia uncicornis	LC		LC		No	No
Osmia uncinata	LC		LC		No	No
Osmia versicolor	LC		LC		No	No
Osmia viridana	LC		LC		No	No
Osmia xanthomelana	LC		LC		No	No
Paradioxys pannonica	DD		DD		No	No
Protosmia asensioi	DD		DD		Yes	Yes
Protosmia capitata	DD		DD		Yes	Yes
Protosmia exenterata	LC		LC		No	No
Protosmia glutinosa	LC		LC		No	No
Protosmia longiceps	DD		DD		No	No
Protosmia minutula	DD		DD		Yes	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Protosmia monstrosa	DD		DD		No	No
Protosmia montana	DD		DD		No	No
Protosmia paradoxa	DD		DD		No	No
Protosmia sideritis	DD		DD		No	No
Protosmia stigmatica	DD		DD		No	No
Protosmia tauricola	LC		LC		No	No
Protosmia tiflensis	LC		LC		No	No
Pseudoanthidium alpinum	DD		DD		No	No
Pseudoanthidium canariense	DD		DD		Yes	Yes
Pseudoanthidium cribratum	DD		DD		No	No
Pseudoanthidium eximium	NT		NT		No	No
Pseudoanthidium melanurum	LC		LC		No	No
Pseudoanthidium nanum	LC		LC		No	No
Pseudoanthidium reticulatum	DD		DD		No	No
Pseudoanthidium scapulare	DD		DD		No	No
Pseudoanthidium tenellum	DD		DD		No	No
Rhodanthidium acuminatum	NT		NT		No	No
Rhodanthidium caturigense	DD		DD		No	No
Rhodanthidium ducale	DD		DD		No	No
Rhodanthidium infuscatum	DD		DD		No	No
Rhodanthidium septemdentatum	DD		DD		No	No
Rhodanthidium siculum	DD		DD		No	No
Rhodanthidium sticticum	DD		DD		No	No
Stelis aegyptiaca	DD		DD		No	No
Stelis annulata	DD		DD		No	No
Stelis breviuscula	LC		LC		No	No
Stelis franconica	DD		DD		Yes	No
Stelis gigantea	DD		DD		No	No
Stelis hispanica	DD		DD		No	No
Stelis iugae	DD		DD		No	No
Stelis minima	LC		LC		No	No
Stelis minuta	LC		LC		No	No
Stelis nasuta	LC		LC		No	No
Stelis odontopyga	LC		LC		No	No
Stelis orientalis	DD		DD		No	No
Stelis ornatula	LC		LC		No	No
Stelis ortizi	DD		DD		Yes	Yes
Stelis pentelica	DD		DD		No	No
Stelis phaeoptera	DD		DD		No	No
Stelis punctulatissima	LC		LC		No	No
Stelis rhodia	DD		DD		No	No
Stelis ruficornis	DD		DD		No	No
Stelis scutellaris	DD		DD		No	No
Stelis signata	LC		LC		No	No
Stelis simillima	LC		LC		No	No
Stenoheriades asiaticus	DD		DD		No	No
Stenoheriades hofferi	DD		DD		No	No
Trachusa byssina	LC		LC		No	No
Trachusa dumerlei	LC		LC		No	No
Trachusa interrupta	EN	B2ab(v)	EN	B2ab(v)	No	No
Trachusa laeviventris	DD		DD		No	No
Trachusa laticeps	NT		NT		No	No

Taxonomy	IUCN Red List Category (Europe)	IUCN Red List Criteria (Europe)	IUCN Red List Category (EU 27)	IUCN Red List Criteria (EU 27)	Endemic to Europe	Endemic to EU 27
Trachusa pubescens	DD		DD		No	No
MELITTIDAE						
Dasypoda albimana	NT		NT		No	No
Dasypoda argentata	NT		NT		No	No
Dasypoda braccata	EN	B2ab(iii,v)	EN	B2ab(iii,v)	No	No
Dasypoda cingulata	LC		LC		No	No
Dasypoda crassicornis	LC		LC		No	No
Dasypoda dusmeti	LC		LC		No	No
Dasypoda frieseana	EN	B2ab(iii)	EN	B2ab(iii)	Yes	No
Dasypoda hirtipes	LC		LC		No	No
Dasypoda iberica	DD		DD		Yes	Yes
Dasypoda morotei	LC		LC		Yes	Yes
Dasypoda pyriformis	LC		LC		Yes	No
Dasypoda pyrotrichia	LC		LC		No	No
Dasypoda sinuata	DD		DD		No	No
Dasypoda spinigera	EN	B2ab(iii)	EN	B2ab(iii)	No	No
Dasypoda suripes	EN	B2ab(iii,iv,v)	EN	B2ab(iii,iv,v)	No	No
Dasypoda visnaga	LC		LC		No	No
Macropis europaea	LC		LC		Yes	No
Macropis frivaldszkyi	NT		NT		No	No
Macropis fulvipes	LC		LC		No	No
Melitta aegyptiaca	DD		DD		No	No
Melitta budashkini	DD		DD		Yes	No
Melitta budensis	LC		DD		No	No
Melitta dimidiata	NT		NT		No	No
Melitta haemorrhoidalis	LC		LC		No	No
Melitta hispanica	VU	D2	VU	D2	Yes	Yes
Melitta iberica	DD		DD		Yes	Yes
Melitta kastiliensis	VU	D2	VU	D2	Yes	Yes
Melitta leporina	LC		LC		No	No
Melitta maura	DD		DD		No	No
Melitta melanura	EN	B2ab(ii,v)	EN	B2ab(ii,v)	No	No
Melitta murciana	DD		DD		Yes	Yes
Melitta nigricans	LC		LC		No	No
Melitta schmiedeknechti	DD		DD		No	No
Melitta seitzi	DD		DD		Yes	Yes
Melitta tomentosa	DD		DD		Yes	No
Melitta tricincta	NT		NT		No	No
Melitta udmurtica	DD		DD		Yes	No

Appendix 2. Example of species summary and distribution map

The species summary gives all the information collated (for each species) during this assessment, including a distribution map. You can search for and download all the summaries and distribution maps from the European Red List website and data portal available online at http://ec.europa.eu/environment/nature/conservation/species/redlist/ and http://www.iucnredlist.org/initiatives/europe.

Colletes albomaculatus - (Lucas, 1849)

ANIMALIA - ARTHROPODA - INSECTA - HYMENOPTERA - COLLETIDAE - Colletes - albomaculatus

Common Names: No Common Names

Synonyms: Colletes niveofasciatus Dours, 1872; Halictus albomaculatus Lucas, 1849

Red List Status
NT, (IUCN version 3.1)

Red List Assessment

Assessment Information

Date of Assessment: 2013-07-11

Reviewed?	Date of Review:	Status:	Reasons for Rejection:	Improvements Needed:
true	2013-09-04	Passed	-	-

Assessor(s): Kuhlmann, M.

Reviewer(s): Miller, R.M., Nieto, A. & Roberts, S.

Regions: Europe

Assessment Rationale

European regional assessment: Near Threatened (NT)

EU 27 regional assessment: Near Threatened (NT)

Listed as Near Threatened because its area of occupancy (AOO) is small (620 km²), it is disappearing from the northern limits of its range and there is likely to be a decline in the habitat of the species due to anthropogenic pressure, thus making this species close to qualifying for a threatened category under Criterion B2.

Distribution

Geographic Range

Colletes albomaculatus is widely distributed in north Africa, southern and south-central Europe towards the Middle East and Central Asia (Ortiz-Sánchez *et al*. 2002, Kuhlmann 2005, Kuhlmann and Özbek 2007, Roberts *et al*. 2011, Proshchalykin and Kuhlmann 2012, Kuhlmann *et al*. 2012). The extent of occurrence (EOO) in Europe is 3,946,279 km² and in the EU 27 is 3,173,130 km². The area of occupancy (AOO) in Europe is 620 km² and in the EU 27 is 508 km².

Area of Occupancy (AOO)

Estimated area of occupancy (AOO) - in km2	Justification
620	-

Extent of Occurrence (EOO)

Estimated extent of occurrence (EOO)- in km2	Justification
3946279	-

Map Status

Map Status	Data Sensitive?	Justification	Geographic range this applies to:	Date restriction imposed:
Done	-	-	-	-

Biogeographic Realms

Biogeographic Realm: Palearctic

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Austria	Extant	Native	-	Resident
Bulgaria	Extant	Native	-	Resident
Croatia	Extant	Native	-	Resident
Czech Republic	Extinct Post-1500	Native	-	Resident
France	Extant	Native	-	Resident
France -> France (mainland)	Extant	Native	-	Resident
Greece	Extant	Native	-	Resident
Greece -> Greece (mainland)	Extant	Native	-	Resident
Greece -> Kriti	Extant	Native	-	Resident
Hungary	Extant	Native	-	Resident
Italy	Extant	Native	-	Resident
Italy -> Italy (mainland)	Extant	Native	-	Resident
Italy -> Sardegna	Extant	Native	-	Resident
Italy -> Sicilia	Extant	Native	-	Resident
Macedonia, the former Yugoslav Republic of	Extant	Native	-	Resident
Portugal	Extant	Native	-	Resident
Portugal -> Portugal (mainland)	Extant	Native	-	Resident
Romania	Extant	Native	-	Resident
Slovakia	Extant	Native	-	Resident
Slovenia	Extant	Native	-	Resident
Spain	Extant	Native	-	Resident
Spain -> Baleares	Extant	Native	-	Resident
Spain -> Spain (mainland)	Extant	Native	-	Resident
Ukraine	Extant	Native	-	Resident
Ukraine -> Krym	Extant	Native	-	Resident
Ukraine -> Ukraine (main part)	Extant	Native	-	Resident

Population

Little is known about the populations of *Colletes albomaculatus* but it is likely to be in decline due to anthropogenic pressure on its habitats. At the northern limits of its range this species is disappearing for unknown reasons but change in habitat size and quality is a likely cause.

Population Information

Current Population Trend: Decreasing

Habitats and Ecology

The habitats used by *Colletes albomaculatus* are unknown but likely are open vegetation types (e.g., Mediterranean shrub lands, grasslands). The species is a flower visitor that preferably collects pollen on Resedaceae (it is polylectic, taking pollen from a wide variety of plants, but with strong preference for Resedaceae) (Müller and Kuhlmann 2008).

IUCN Habitats Classification Scheme

Habitat	Season	Suitability	Major Importance?
3.8. Shrubland -> Shrubland - Mediterranean-type Shrubby Vegetation	resident	Suitable	Yes
4.4. Grassland -> Grassland - Temperate	resident	Suitable	Yes

Systems

System: Terrestrial

Use and Trade

General Use and Trade Information

Species not utilized: true

This species is not utilized.

Threats

Likely threats are the anthropogenic loss (agriculture, habitat destruction, change in land use) of habitat (e.g. open vegetation types with bare soil), nesting sites and host plants.

Threats Classification Scheme

Threat	Timing	Scope	Severity	Impact Score
2.1.1. Agriculture & aquaculture -> Annual & perennial non-timber crops -> Shifting agriculture	Unknown	Unknown	Unknown	Unknown
2.3.4. Agriculture & aquaculture -> Livestock farming & ranching -> Scale Unknown/Unrecorded	Unknown	Unknown	Unknown	Unknown

Conservation

This species is included in the National Red List or Red Data Book of the Czech Republic (Regionally Extinct; Farkac *et al.* 2005) and Slovenia (Vulnerable; Anonymous 2002).

It is recommended to conserve suitable habitats (e.g. open vegetation types with bare soil), nesting sites and the host plants of this species.

Further research is required to establish the current status of the species throughout its range and to identify the existing threats.

It is not known if the species occurs in any protected area.

Conservation Actions In- Place

Occur in at least one PA	Note
Unknown	-

Important Conservation Actions Needed

Conservation Actions	Note
1.1. Land/water protection -> Site/area protection	-
1.2. Land/water protection -> Resource & habitat protection	-

Research Needed

Research	Note
1.2. Research -> Population size, distribution & trends	-
1.3. Research -> Life history & ecology	-
1.5. Research -> Threats	-

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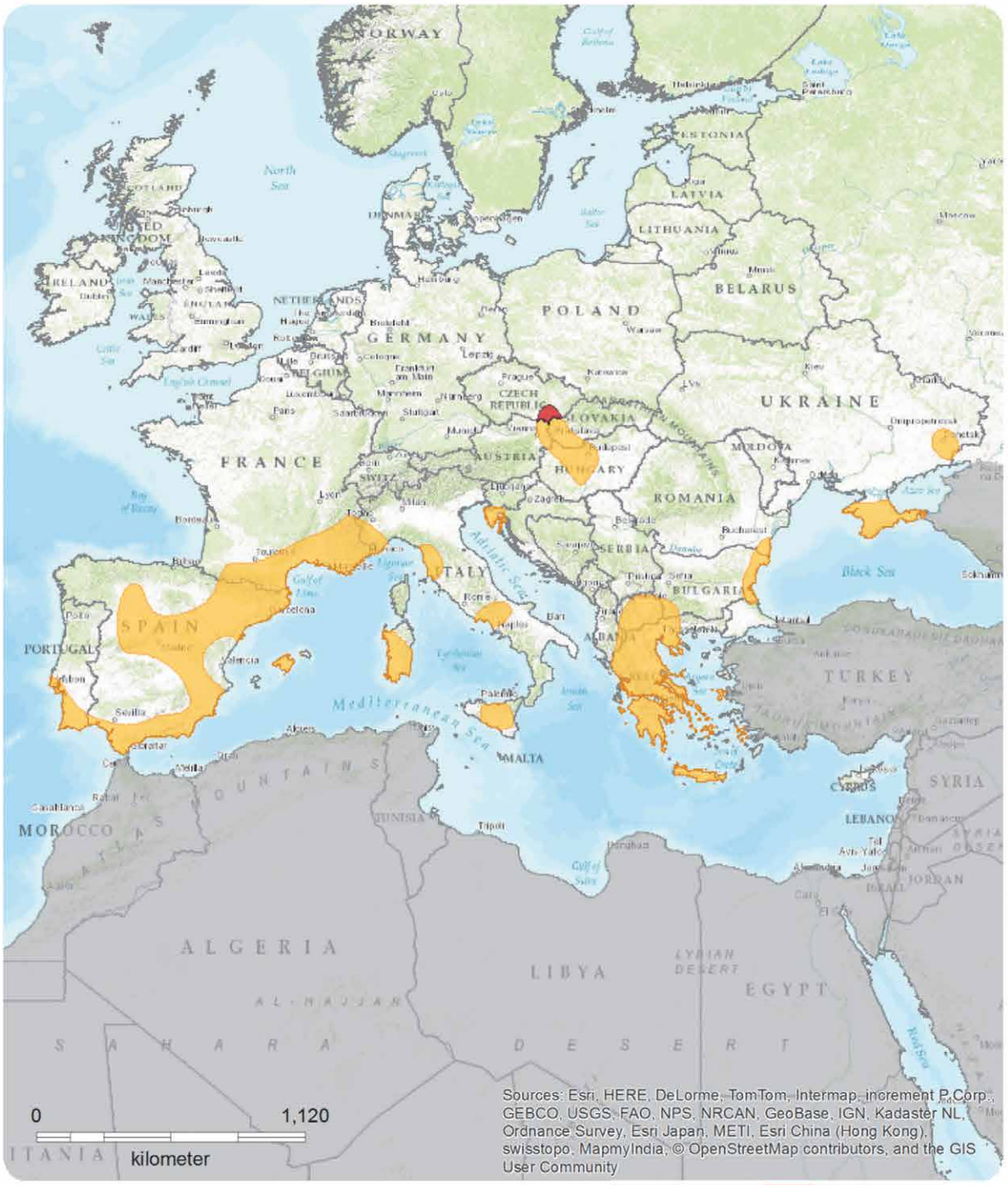
European Regional Assessment



Colletes albomaculatus

NE | DD | LC | **NT** NEAR THREATENED | VU | EN | CR | EW | EX

Range

Extant (resident)

Regionally Extinct

Compiled by:
European Red List, IUCN (2013)

Map created 12/17/2014

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

IUCN Red List of Threatened Species™ – Regional Assessments

Europe

- *The Status and Distribution of European Mammals*. Compiled by Helen J. Temple and Andrew Terry, 2007
- *European Red List of Reptiles*. Compiled by Neil Cox and Helen J. Temple, 2009
- *European Red List of Amphibians*. Compiled by Helen J. Temple and Neil Cox, 2009
- *European Red List of Dragonflies*. Compiled by Vincent J. Kalkman, Jean-Pierre Boudot, R. Bernard, Klaus-Jurgen Conze, Geert De Knijf, Elena Dyatlova, Sonia Ferreira, Miloš Jović, Jurgen Ott, Elisa Riservato and Goran Sahlen, 2010
- *European Red List of Saproxylic Beetles*. Compiled by Ana Nieto and Keith Alexander, 2010
- *European Red List of Butterflies*. Compiled by Chris van Swaay, Sue Collins, Annabelle Cuttelod, Dirk Maes, Miguel Lopez Munguira, Martina Šašić, Josef Settele, Theo Verstrael, Rudi Verovnik, Martin Warren, Martin Wiemers and Irma Wynhoff, 2010
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- *European Red List of Freshwater Fishes*. Jorg Freyhof and Emma Brooks, 2011
- *European Red List of Vascular Plants*. Melanie Bilz, Shelagh P. Kell, Nigel Maxted and Richard V. Lansdown, 2011
- *European Red List of Medicinal Plants.* David J. Allen, Melanie Bilz, Rebecca Miller, Jemma Window and Anastasiya Timoshyna, 2014

Other regions

- *The Status and Distribution of Freshwater Biodiversity in Eastern Africa*. Compiled by William R.T. Darwall, Kevin G. Smith, Thomas Lowe, Jean-Christophe Vié, 2005
- *The Status and Distribution of Freshwater Fish Endemic to the Mediterranean Basin*. Compiled by Kevin G. Smith and William R.T. Darwall, 2006
- *The Status and Distribution of Reptiles and Amphibians of the Mediterranean Basin*. Compiled by Neil Cox, Janice Chanson and Simon Stuart, 2006
- *Overview of the Cartilaginous Fishes (Chondrichthyans) in the Mediterranean Sea.* Compiled by Rachel D. Cavanagh and Claudine Gibson, 2007
- *The Status and Distribution of Dragonflies of the Mediterranean Basin*. Compiled by Elisa Riservato, Jean-Pierre Boudot, Sonia Ferreira, Miloš Jović, Vincent J. Kalkman, Wolfgang Schneider, Boudjema Samraoui and Annabelle Cuttelod, 2009
- *The Status and Distribution of Mediterranean Mammals*. Compiled by Helen J. Temple and Annabelle Cuttelod, 2009
- *The Status and Distribution of Freshwater Biodiversity in Southern Africa*. Compiled by William R.T. Darwall, Kevin G. Smith, Denis Tweddle and Paul Skelton, 2009
- *The Status and Distribution of Freshwater Biodiversity in Western Africa*. Compiled by Kevin Smith, Mame D. Diop and Mamadou Niane, 2009
- *The Status and Distribution of Freshwater Biodiversity in Northern Africa*. Compiled by Nieves Garcia, Annabelle Cuttelod and Dania Abdul Malak, 2010
- *The Status and Distribution of Freshwater Biodiversity in the Eastern Himalaya*. Compiled by David Allen, Sanjay Molur and B.A. Daniel, 2010
- *Overview of the Conservation Status of the Marine Fishes of the Mediterranean Sea*. Compiled by Dania Abdul Malak, Suzanne R. Livingstone, David Pollard, Beth A. Polidoro, Annabelle Cuttelod, Michel Bariche, Murat Bilecenoglu,

Kent E. Carpenter, Bruce B. Collette, Patrice Francour, Menachem Goren, Mohamed Hichem Kara, Enric Massutí, Costas Papaconstantinou and Leonardo Tunesi, 20112

- *The Status and Distribution of Freshwater Biodiversity in Central Africa*. Compiled by Emma G.E. Brooks, David Allen and William R.T. Darwall, 2011
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- *The Status and Distribution of Freshwater Biodiversity in the Western Ghats, India*. Sanjay Molur, Kevin G. Smith, B.A. Daniel and William Darwall, 2011
- *The Status and Distribution of Freshwater Biodiversity in Indo-Burma*. David Allen, Kevin G. Smith, and William Darwall, 2012

IUCN – The Species Survival Commission

The Species Survival Commission (SSC) is the largest of IUCN's six volunteer commissions with a diverse global membership of nearly 10,000 experts. With biodiversity loss as one of the world's most pressing crises, and many species declining to critical levels, the SSC drives its efforts and expertise to conserving nature through positive and informed action. This is achieved through the strength of its dedicated science-based network of volunteer experts who constitute the invaluable "power house" of the SSC.

www.iucn.org/ssc

IUCN – Global Species Programme

The IUCN Global Species Programme supports the activities of the IUCN Species Survival Commission and individual Specialist Groups, as well as implementing global species conservation initiatives. It is an integral part of the IUCN Secretariat and is managed from IUCNs international headquarters in Gland, Switzerland. The Global Species Programme includes a number of technical units covering Species Trade and Use, The IUCN Red List, Freshwater Biodiversity Unit and Climate Change Unit (all located in Cambridge, UK), the Biodiversity Assessment Unit (located in Washington DC, USA), and the Marine Biodiversity Unit (hosted by Old Dominion University Norfolk VA, USA).

www.iucn.org/species

IUCN – European Union Representative Office

The IUCN European Union Representative Office is located in Brussels. It is an out-posted Headquarters office unit providing global services to the organization, and vital linkages for IUCN - its Members, National Committees, scientific Commissions and the global Secretariat - to key EU institutions and other public and private actors with regional headquarters in Brussels. The IUCN EU Office is the focal point for EU nature policies, partnerships and networking, and influencing decisions and raising awareness of nature conservation among the EU institutions are at the core of its mandate. The IUCN EU Office hosts staff dedicated to the above mentioned functions as well as project staff from the Global Species Programme.

www.iucn.org/europe

The European Red List is a review of the conservation status of European species according to IUCN regional Red Listing guidelines. It identifies those species that are threatened with extinction at the regional level – in order that appropriate conservation action can be taken to improve their status.

This publication summarises results for all Europe's native species of bees (1,965 species). 9.2% of species are threatened with extinction at the European level due to habitat loss as a result of agriculture intensification (e.g., changes in agricultural practices including the use of pesticides and fertilisers), urban development, increased frequency of fires and climate change.

The European Red List was compiled by IUCN's Global Species Programme and the European Union Representative Office with support from the STEP project (www.STEP-project.onet) and it is the product of a service contract with the European Commission. It is available online at http://ec.europa.eu/environment/nature/conservation/species/redlist and http://www.iucnredlist.org/initiatives/europe

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