



Bumblebee Specialist Group Report 2018

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BBSG IN 2018

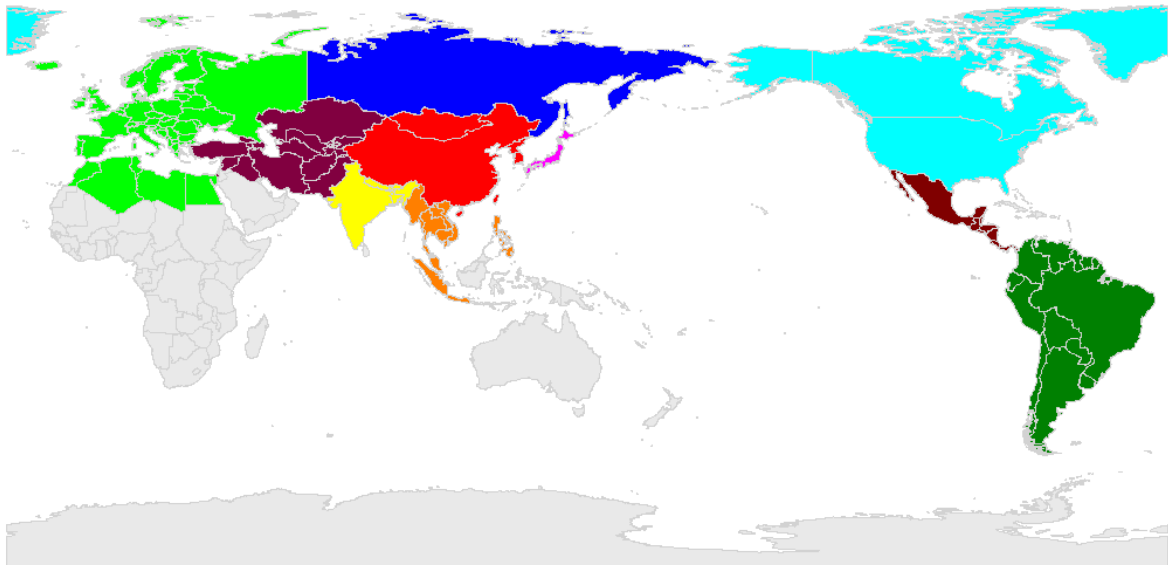
The BBSG exists to foster the conservation of bumblebees and their habitats around the world. In this seventh report of the BBSG's activities, 2018 has been another busy year, with continuing progress towards our goal of evaluating the extinction risk of all ca 265 species of bumblebees worldwide using the IUCN Red List Criteria. Red List assessments have now contributed to advances in species protection in both North and South America.

bumblebeespecialistgroup.org

Where are we now? – Progress with Red List assessments world-wide

In our first seven years, the BBSG has made substantial progress in its mission to evaluate the extinction risk of all bumblebees according to Red List criteria and publish species profiles on the IUCN Red List, especially in Europe and in the Americas. In this report we follow up the situation in each BBSG region – to look at the challenges and opportunities ahead.

It is important to appreciate that the situation is very different in different BBSG regions, with different levels of knowledge of the bumblebees and very different numbers of specialists available to work on the project, and with different levels of support. We are keen to look for opportunities for BBSG members to support one another across regions to help make progress towards our common goal, especially as we move from regional to global assessments of each species. We invite regional coordinators to contact us to let us know which factors limit your ability to accomplish red list assessments for the bumblebee fauna of your region, so that we may have a complete picture of the situation.



BBSG regions.

One of the first requirements for Red List assessment is to obtain a strongly supported list of species, the first units to be assessed. Bumblebees are well known for their variation and for the long history of discussion of their taxonomy, especially for the less intensively studied but much more diverse Asian fauna. Although this discussion of taxonomy is expected to continue, there are current projects to improve our understanding of several groups, covering the species of subgenera including *Alpinobombus*, *Melanobombus*, *Sibiricobombus*, *Alpigenobombus*, and some *Pyrobombus*. The global revision of *Alpinobombus* has now been accepted (subject to minor editorial changes).

EUROPE

Approximately 66-70 species have been recognised in Europe recently, depending on the species concept accepted. All of the species recognised prior to 2017 have been assessed for Red List status within Europe (see the BBSG Annual Report for 2013 and 2014), of which at least nine are endemic to the region, so 56 species need to be assessed beyond Europe. Within Europe, distributions are relatively well recorded and databased, so that baseline data are available (by arrangement) for comparison in the future. Two new species were added recently from molecular studies: *B. konradini* in Italy (Martinet *et al.* 2018) and *B. glacialis* in Novaya Zemlya (Potapov *et al.* 2017).

References

Martinet B, Lecocq T, Braserio N, Biella P, Urbanova K, Valterova I, Cornalba M, Gjershaug JO, Michez D, Rasmont P (2018) Following the cold: geographical differentiation between interglacial refugia and speciation in the arcto-alpine species complex *Bombus monticola* (Hymenoptera: Apidae). *Systematic Entomology*.43:200-217.

Potapov GS, Kondakov AV, Spitsyn VM, Filippov BY, Kolosova YS, Zubril NA, Bolotov IN (2017) An integrative taxonomic approach confirms the valid status of *Bombus glacialis*, an endemic bumblebee species of the High Arctic. *Polar Biology*.

European Region in 2018

Pierre Rasmont

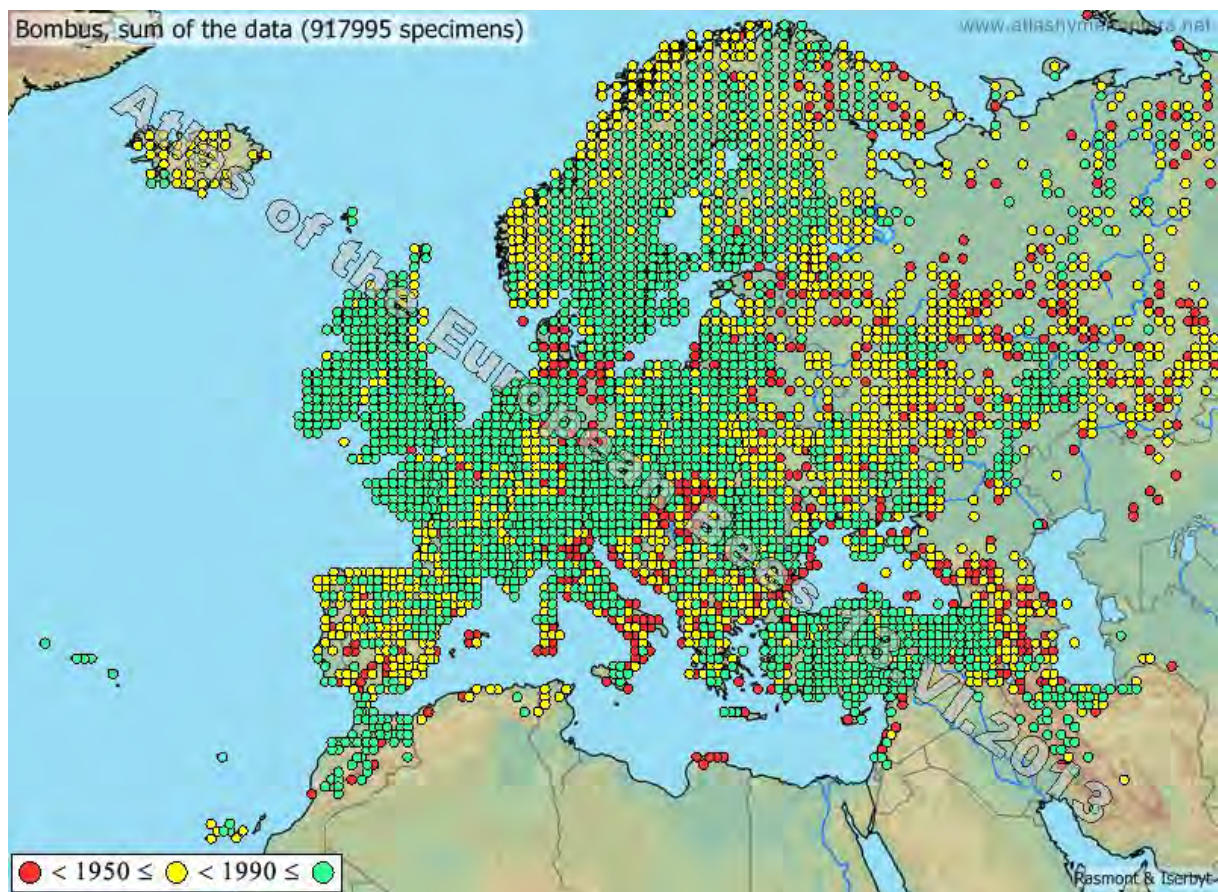
The presently available version of the atlas of European bumblebees is: Rasmont P, Iserbyt I (2010-2014) *Atlas of the European Bees: genus Bombus*. 3d Edition. STEP Project, Atlas Hymenoptera, Mons, Gembloux (<http://www.atlashymenoptera.net/page.asp?ID=169>). All main collaborators of the data gathering agreed on a new *Atlas Hymenoptera* version. Since 2014, we received a huge amount of new data. We increased the total number of data from 917,995 records to 1,358,426 records. The area covered is also significantly increased (below).

Unfortunately, many small data files are not yet integrated, from the countries: Algeria, Czech Republic, France, Iran, Italy, Lebanon, Poland, Spain, Russia, Ukraine, Turkey. The main improvement expected for cover is in Germany and Russia. As the number of data increases, the maintenance of the database becomes more complex and time-consuming.

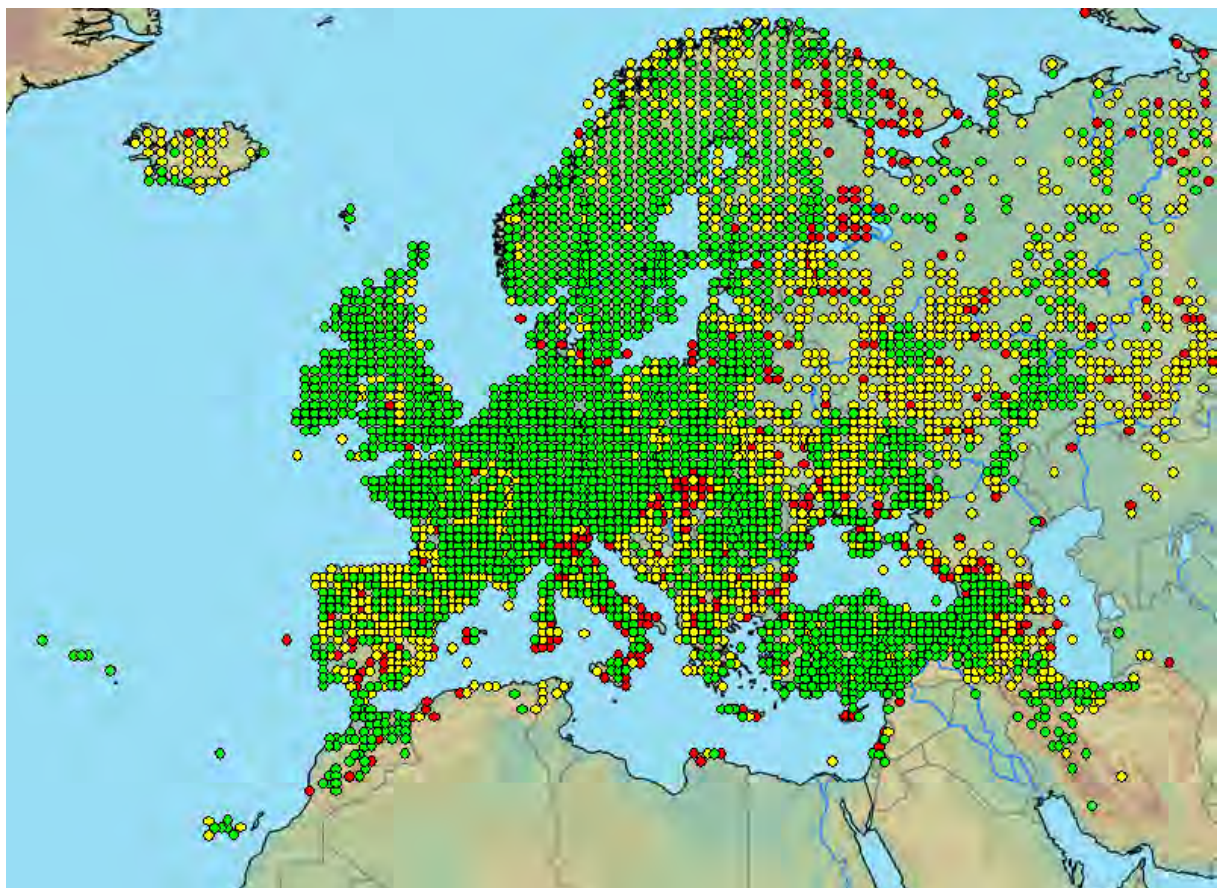
We would also like to provide more information in a new atlas about distribution dynamics of the species. The first version was presented as 'static', with no or few indications about the trends of the species distributions.



Bombus argillaceus, one of the species expanding dramatically its distribution towards the west.



Sum of the *Bombus* data in Atlas Hymenoptera (Rasmont & Iserbyt, 2010-2014) based on 917,995 specimens.



Sum of the present *Bombus* data (unpublished) based on 1,358,426 specimens.

There are several species for which we have no or very few recent data. We would be very grateful to receive as many recent data as possible for these more or less endangered taxa:

- B. armeniacus*. This is a steppe species that seems to be disappearing from most of its original area.
- B. caucasicus* and *B. eriophorus* (from Caucasus and surroundings)
- B. confusus*. The red tipped ssp. *confusus* remains more or less abundant in some Central European areas but seems to have vanished from most of its original area. The white tipped and yellow banded ssp. *paradoxus* seems to have vanished from Europe, remaining only in W. Siberia. Data are needed to document this situation.
- B. cullumanus* (last observations of the ssp. *cullumanus* in W. Europe are from the Pyrenees, for ssp. *serrisquama*, with only a few recent observations in N. Spain, the Volga valley and near Moscow)
- B. fragrans*. This is our largest bumblebee species. It is closely associated with steppes from E. Austria, Hungary, Romania, Ukraine, Russia, Turkey, and Iran. It seems to have vanished from most of its original area.
- B. laesus* and *B. mocsaryi*. This steppe species complex seems to have suffered from a dramatic regression since 2000. Data are needed to document their situation. Be aware of a need to clearly identify the reddish spotted *laesus* from the black spotted *mocsaryi*. It is very likely that it would be better to consider these forms as conspecific.
- B. modestus* (from Russian tundra).
- B. patagiatus* (from Russian tundra).
- B. polaris pyrrhopygus* (from Arctic tundra and Scandinavian Alps) [NB regarded by some as a species *B. pyrrhopygus* separate from *B. polaris* – PW] seems to be vanishing from most areas, especially in N. Russia. Be careful that confusion is very frequent with the closely related *B. alpinus*.
- B. reinigiellus* from Spanish Sierra Nevada.
- B. ruderarius tunensis* from Tunisia and N.E. Algeria. Last record 1979. This subspecies may have vanished.
- B. saltuarius*. Last specimen observed in 1992 in N. Ural, near Vorkuta.
- B. zonatus*. This species seems to have been abundant in the past in some places from Balkan to Ukraine, Russia and Turkey, but we have few recent data.

There are also species that are clearly expanding their distribution. We are interested in all data dealing with new locations at the western edge of their distributions.

- B. argillaceus* is also expanding quite quickly from SE Europa towards the West. It has now reached a large part of Czech Republic. It should be expected in Germany. It has been known for a long time in France, but it should be expanding there towards the west, crossing the Rhone valley.
- B. haematurus*, starting from Balkan 50 years ago, is now reaching Slovakia and E. Italy. It should be expected in Austria.
- B. hypnorum* is now established in Iceland and it could barely go further to the west.
- B. niveatus vorticosus* is now present in the Balkans and in Romania.
- B. schrencki* is progressing slowly towards the west, reaching Poland. It should be observed in the near future in Germany.
- B. semenoviellus* continues its expansion to the west, reaching Sweden and Norway. It is expected to arrive in Switzerland, France, Belgium and The Netherlands.

The BELBEES project in Belgium

The BELBEES project started in 2015 with the aim of assessing the present status of the wild bee species and to disentangle the causes of the decrease in their diversity and abundance. It combined efforts from the University of Gent (Profs. D. Degraaf, Prof. G. Smagghe), the University of Namur (Prof. N. Dendoncker), the University of Liège (Prof. M. Dufrêne, Prof. F. Francis), the University of Mons (Prof. P. Rasmont, Prof. D. Michez), the Royal Belgian Institute of Natural History (Dr. J.-L. Boevé, A. Pauly), the nature conservation NGO Natuurpunt (J. D'Haeseler, P. Van Oormelingen) and Natagora (J.-L. Paquet, J.-S. Piot-Rousseau). It has led to a (nearly) comprehensive gathering of digitized museum data and many recent observations (below). All data are combined in a common database hosted by University of Mons.

Data for Apoidea available for Belgium thanks to BELBEES project.

Family	Number of specimens
Andrenidae	244 132
Apidae not- <i>Bombus</i>	108 351
Apidae <i>Bombus</i>	244 526
Colletidae	52 110
Halictidae	55 499
Megachilidae	71 393
Melittidae	21 593
	797 604

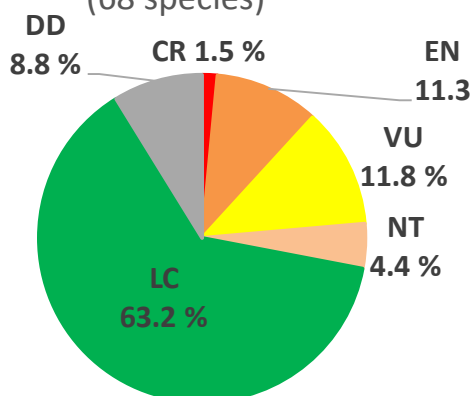
The BELBEES project will allow a careful assessment of the past and present situation of the wild bee population in Belgium. A *Red List of the Wild Bees of Belgium* is currently nearing completion. This shows that of the 399 wild bees recorded in the country, 45 species (11.9%) are now extinct, 139 species (34.8%) are threatened or declining, 162 species (40.6%) are stable or expanding, and 53 species (13.3%) remain data deficient or impossible to assess. Compared to the 1993 assessment (Rasmont *et al.* 1993), the situation is clearly worse: while 25.2% of species appeared to be declining in 1993, now nearly half of the species (47.7%) are declining or even extinct. The analysis of trends for Belgian species belonging to the genus *Bombus* shows that of the 31 *Bombus* species, 32% are not or in little danger, whereas 45% are considered threatened and 23% are extinct at the regional level. These results support the recent decline of bumblebees observed a Europe. The table below summarizes the results of the assessment for bumblebees.

Conservation status of Belgian bumblebees, according to the Red List of Belgian Wild Bees (in preparation).

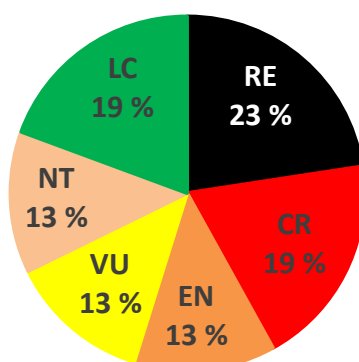
IUCN Status	Number of species	Bumblebee species	Total percentage
Least concern (LC)	6	<i>B. hypnorum</i> , <i>B. lapidarius</i> , <i>B. pascuorum</i> , <i>B. pratorum</i> , <i>B. sylvestris</i> , <i>B. terrestris</i>	19%
Near Threatened (NT)	4	<i>B. bohemicus</i> , <i>B. hortorum</i> , <i>B. lucorum</i> , <i>B. vestalis</i>	13%
Vulnerable (VU)	4	<i>B. campestris</i> , <i>B. jonellus</i> , <i>B. norvegicus</i> , <i>B. soroensis</i>	45%
Endangered (EN)	4	<i>B. cryptarum</i> , <i>B. magnus</i> , <i>B. ruderarius</i> , <i>B. rupestris</i>	
Critically Endangered (CR)	6	<i>B. barbutellus</i> , <i>B. humilis</i> , <i>B. muscorum</i> , <i>B. ruderatus</i> , <i>B. sylvarum</i> , <i>B. veteranus</i>	
Regionally extinct (RE)	7	<i>B. confusus</i> , <i>B. cullumanus</i> , <i>B. distinguendus</i> , <i>B. pomorum</i> , <i>B. quadricolor</i> , <i>B. subterraneus</i> , <i>B. wurflenii</i>	23%

Comparison of conservation status of bumblebees for Europe (Nieto et al. 2015) and Belgium.

Red List status of *Bombus* spp. In Europe
(68 species)



Red List status of *Bombus* spp. In Belgium
(31 species)



There is an obvious dramatic decrease in bumblebee diversity in Belgium. This is not new, but we have now in hand much more complete data for all time periods and locations of the country.

References

Nieto A., Roberts S.P.M., Kemp J., Rasmont P., Kuhlmann M., García Criado M., Biesmeijer J., Bogusch P., Dathe H.H., De la Rúa P., De Meulemeester T., Dehon M., Dewulf A., Ortiz-Sanchez F.J., Lhomme P., Pauly A., Potts S.G., Praz C., Quaranta M., Radchenko V.G., Scheuchl E., Smit J., Straka J., Terzo M., Tomozii B., Window J., Michez D. 2015. European Red List of Bees. International Union for Conservation of Nature, 03/2015; Publication Office of the European Union., ISBN: 978-92-79-44512-5, 84 p.

Rasmont, P., J.Leclercq, A.Jacob-Remacle, A.Pauly & C.Gaspar. 1993. The faunistic drift of Apoidea in Belgium. pp.65-87 in E. Bruneau, Bees for pollination. Commission of the European Communities, Brussels, 237 pp.

NORTH AMERICA

47 species are recognised here, including the species newly described in 2016, *B. kluanensis* from the subarctic north west. All currently recognised species have now been assessed for Red List status globally, although the species of the subgenus *Alpinobombus* are being revised and *B. kluanensis* has yet to be assessed. Assessments of species listed as Data Deficient will be improved in future years as data gaps are filled, especially from parts of species ranges beyond North America (e.g. by bringing together experts from around the world). Within North America, distributions are relatively well recorded and databased, so that baseline data are readily available for comparison in the future.

North American Region in 2018

Sheila Colla / Rich Hatfield / Robbin Thorp

The North American bumblebees were mostly assessed five or more years ago now. It is time to consider updating these assessments with the best available scientific evidence. This October, a meeting BOMBUSS 2.0 will be held at York University in Toronto, ON Canada (For more information see: <https://wildlifepreservation.ca/bombuss-program/>). The aim of this meeting will be to gather academics, conservation practitioners, students and others to determine next steps and knowledge gaps with respect to North American bumblebee conservation and management. We will have a session to discuss updates of the IUCN Red List for North American species.

In Canada, *B. pensylvanicus* was assessed as Special Concern, but it is not yet listed. Two subspecies of *B. occidentalis* were assessed as Vulnerable and Special Concern, but are also not yet listed. *Bombus terricola* is assessed and federally listed as Special Concern. *Bombus affinis* remains listed as Federally Endangered and is up for 10 year review in 2020. Despite extensive search effort across its historical range, it hasn't been seen in Canada since 2009.

In the United States, *B. affinis* remains the only bumblebee that has federal protection under the Endangered Species Act. The U.S. Fish and Wildlife Service is beginning the process of developing a recovery plan for *B. affinis*, including the solicitation of input from *Bombus* experts. Three other bumblebee species are currently under consideration for protection by the service and undergoing species status assessments: *B. terricola*, *B. occidentalis*, and *B. franklini*.

In October of 2018, *B. suckleyi*, *B. franklini*, *B. crotchii*, and *B. occidentalis occidentalis* were petitioned to be protected under the state of California's Endangered Species Act. The listing petition cited each species' IUCN Red List category.

Recent relevant publications

- Gibson SD, Bennett K, Brook RW, Langer SV, MacPhail VJ, Beresford DV (2018) New records and range extensions of bumble bees (*Bombus* spp.) in a previously undersampled region of North America's boreal forest. *The Journal of the Entomological Society of Ontario* 149.
- Herrmann JD, Haddad NM, Levey DJ (2018) Mean body size predicts colony performance in the common eastern bumble bee (*Bombus impatiens*). *Ecological entomology* 43:458-462.
- Hicks BJ, Pilgrim BL, Perry E, Marshall HD (2018) Observations of native bumble bees inside of commercial colonies of *Bombus impatiens* (Hymenoptera: Apidae) and the potential for pathogen spillover. *The Canadian Entomologist* 150:520-531.
- Hughes A (2018) Survey of the critically endangered Rusty Patched Bumble bee (*Bombus affinis*) at Midewin National Tallgrass Prairie,(USDA-FS) Ill.
- Jacobson MM, Tucker EM, Mathiasson ME, Rehan SM (2018) Decline of bumble bees in northeastern North America, with special focus on *Bombus terricola*. *Biological conservation* 217:437-445.
- Johnson SA, Tompkins MM, Tompkins H, Colla SR (2019) Artificial domicile use by bumble bees (*Bombus*; Hymenoptera: Apidae) in Ontario, Canada. *Journal of Insect Science* 19:7.
- Kent CF, Dey A, Patel H, Tsvetkov N, Tiwari T, MacPhail VJ, Gobeil Y, Harpur BA, Gurtowski J, Schatz MC, Colla SR (2018) Conservation genomics of the declining North American bumblebee *Bombus terricola* reveals inbreeding and selection on immune genes. *Frontiers in genetics* 9.
- Koch JB, Rodriguez J, Pitts JP, Strange JP (2018) Phylogeny and population genetic analyses reveals cryptic speciation in the *Bombus fervidus* species complex (Hymenoptera: Apidae). *PloS One* 13:e0207080.
- Mobley MW, Gegear RJ (2018) One size does not fit all: Caste and sex differences in the response of bumblebees (*Bombus impatiens*) to chronic oral neonicotinoid exposure. *PloS One* 13:e0200041.
- Palmier KM, Sheffield CS (2019) First records of the Common Eastern Bumble Bee, *Bombus impatiens* Cresson (Hymenoptera: Apidae, Apinae, Bombini) from the Prairies Ecozone in Canada. *Biodiversity data journal* 7.
- Phelps JD, Strang CG, Gbylik-Sikorska M, Sniegocki T, Posyniak A, Sherry DF (2018) Imidacloprid slows the development of preference for rewarding food sources in bumblebees (*Bombus impatiens*). *Ecotoxicology* 27:175-187.
- Rowe L, Gibson D, Landis D, Gibbs J, Isaacs R (2018) A Comparison of drought-tolerant prairie plants to support managed and wild bees in conservation programs. *Environmental entomology* 47:1128-1142.
- Strange JP, Tripodi AD (2019) Characterizing bumble bee (*Bombus*) communities in the United States and assessing a conservation monitoring method. *Ecology and Evolution*.
- Saunders ME, Smith TJ, Rader R (2018) Bee conservation: Key role of managed bees. *Science* 360(6387):389-389.
- Vaudo AD, Farrell LM, Patch HM, Grozinger CM, Tooker JF (2018) Consistent pollen nutritional intake drives bumble bee (*Bombus impatiens*) colony growth and reproduction across different habitats. *Ecology and evolution* 8:5765-5776.

MESOAMERICA

Approximately 18 species are currently recognised, although several species groups are being revised, with the promise of more species to be added soon. The Red List status for all 18 species has now been assessed globally. Within Mesoamerica, distributions are being recorded and databased, so that improved Red List assessments should be possible in the next few years.

SOUTH AMERICA

Approximately 26 species are currently recognised, with two species newly described in 2015 (one of these needs confirmation). The other 24 species have now been assessed for Red List status globally. Within South America, distributions are being recorded and databased, so that assessments may be updated in the next few years.

South America Region in 2018

Carolina Morales

During 2018 South American members of the BBSG have been strongly involved in research and outreach activities related to bumblebee conservation in the southernmost part of the region. Two new 2018 articles have been published on the persisting and detrimental impact of massive European *B. terrestris* importation for native bumblebees, in particular to the endemic *B. dahlbomii*, listed as Endangered. These articles have had a lot of impact on local and international media, in Chile, there have been more than 30 items on this topic in the media.

In addition, there have been numerous scientific meetings in the region focused on social insects, bees and pollinators, in which members of the BBSG have participated. These include the *Congress of the International Union for the Study of Social Insects* (IUSSI2018), in Guarujá, Brazil, the *2nd Workshop of the Latin-American Society for Bee Research* (SOLATINA, <http://solatina.org/>) in Montevideo, Uruguay, and the *Safeguarding the Pollinators Services for a Changing World Workshop* (SURPASS), in Bariloche, Argentina, funded by Newton Fund (UK) and CONICET (Argentina). SURPASS is an international partnership to improve knowledge, build research capacity and initiate new collaborative actions for the conservation and sustainable use of pollinators across Latin America (<https://bee-surpass.org/about/>).

Regarding ongoing projects, Dra Cecilia Smith-Ramirez's research group is conducting projects on the efficiency of the commercial bumblebee *B. terrestris* on the pollination of legumes in the Lakes Region in Chile and on floral preferences, and on population changes and distribution of *B. dahlbomii* in the Valdivia Region. In the same region, and on Chiloé Island, the Smith-Ramirez team is studying the long-term temporal trends of this native species for over 19 years. In North Chile, new populations of the native species *B. funebris* have been recorded by Rodrigo Barahona, who is conducting a second year of population sampling for disease studies.

In Argentina, the Group of Pollination Ecology lead by Dr Marcelo Aizen, in collaboration with Carolina Morales and Marina Arbetman, among others, have applied for funding for: a large scale project aimed to survey the extent of invasion of *B. terrestris* in Argentina and Chile and compare it with results from previous surveys; to study changes in the genetic structure and diversity of *B. terrestris* populations over space and time during the course of multiple introduction events; and to assess whether new pathogen and/or new pathogen variants have accompanied successive invasion pulses. In addition, in collaboration with Prof. Amy Toth, from Iowa State University (USA), this research group is making advances in the development of genomic tools for *B. dahlbomii* research, using next generation sequencing.

Finally, there have been many outreach activities focused on the conservation of *B. dahlbomii*. In Chile, the Project *Abejorro Colorado: Biodiversidad en peligro de extinción*, Fondo Nacional de Desarrollo Regional-Coyhaique (FNDR), carried out by a local NGO in Aysen Region Chile, and the initiative *Moscardón Revive* have given many talks to the public. In Argentina, Dra Carolina Morales has participated in the first book for children printed in braille system entitled *Mangu, un abejorro patagónico*, a fictional story inspired in the native species *B. dahlbomii*. This book is also available as an audiobook and relates the adventures of a native bumblebee worker on her first flight in the Patagonian forests (www.mangu.com.ar). The book was presented in different parts of Argentina in workshops and educational activities for schoolchildren (<https://inibioma.conicet.gov.ar/presentacion-del-libro-mangu-un-abejorro-patagonico/>).

In spite of all these scientific studies, educational initiatives, and the mass media coverage, massive importations of European bumblebees are still taking place in the region. More and renewed efforts at the international level are urgently needed to achieve the implementation of the recommendations of the BBSG Commercial Bumblebee Policy Statement in order to avoid unintended damage from the commercial use of bumblebee colonies to the native bumblebee fauna. Discussions about introduced and commercial species and sharing information with members of other regions will be very welcome for us. Moreover, Red List assessments for the Data Deficient species should be updated in the near future. Scientific budgets for more basic research on the remaining bumblebee species is urgently needed to discover their habitat needs and conservation status, to provide inputs for more robust assessments, and to be able to take care of them for the future.

References

- Aizen MA, Smith-Ramírez C, Morales CL, Vieli L, Sáez A, Barahona-Segovia RM, Arbetman MP, Montalva J, Garibaldi LA, Inouye DW, Harder LD (2018).] Coordinated species importation policies are needed to reduce serious invasions globally: the case of alien bumblebees in South America. *Journal of Applied Ecology*.
 Karina A, Requier F, Sánchez PA, Basualdo M, Branchiccela B, Calderón R, Correa-Benítez A, Delgado-Cañedo A, Fuselli S, Morales C, Pérez-Castro E, Plischuk S, Porrini MP, Goncalves LS, María J, González T, Torres A, Velarde R, Invernizzi C (2018) SOLATINA: A Latin-American Society for Bee Research to Foster the Interactions Between Scientists and Coordinate Large-Scale Research Programs. *Bee World* 95:124-127
<https://doi.org/10.1080/0005772X.2018.1508813>
 Montero-Castaño A, Calviño-Cancela M, Rojas-Nossa S, De la Rúa P, Arbetman M, Morales CL (2018) Invasiones biológicas y pérdida de polinizadores. *Revista Ecosistemas* 27:42-51 (in Spanish)
 Smith-Ramírez C, Vieli L, Barahona R, Montalva J, Cianferoni F, Ruz L, Fontúrbel FE, Valdivia CE, Medel R, Pauchard A, Celis JL, Riesco V, Monzón V, Vivallo F, Neira M (2018) Las razones de por qué Chile debe detener la importación del abejorro comercial *Bombus terrestris* (Linnaeus) y comenzar a controlarlo. *Gayana* 82:118-127 (in Spanish)

In the Media

- https://www.topics.nl/belgische-hommels-zetten-zuid-amerika-op-stelten-er-kan-zelfs-een-rechtszaak-van-komena9739440demorgen/46b46283baca7eaadbc256298c8ae5bbd463fc7c9c9d6ee4c3659fa8680eee7d/?context=zoek/?query=hommels&referrerUserId=_guid_nMudcHMOj5OwKd0bxz5YYwDVk2keG06VqexAENQDco4=
<https://www.lanacion.com.ar/2125955-alerta-por-una-invasion-de-abejorros-foraneos-en-la-patagonia>

NORTH ASIA

Approximately 68 species are recognised. No species have yet been assessed for Red List status within North Asia. Of the total, only two species are currently considered endemic. Low endemism may in part reflect the region's position at the crossroads among several other regions. Within North Asia, distributions are being recorded and databased, so that Red List assessments should be possible in the next few years.

North Asia Region in 2018

Alexandr Byvaltsev / Tatyana Pereyaslovets / Vladimir Pereyaslovets



Yugansky Nature Reserve, with a view of the Siberian taiga and Bolshoy Yugan River in Cordon Kamennyi, July 2018. (Photo by Vladimir Pereyaslovets.)

We continue to evaluate the diversity of bumblebees of Russia. One of our current interests is to inventory the fauna of protected areas. There are 111 Nature Reserves in Russia, but lists of bumblebee species are available for only a few of them.

Yugansky Nature Reserve is located in the central part of the West Siberian plain, in the southern part of the Middle Ob lowland in the basin of the Bolshoy Yugan River, a left tributary of the Ob River (Surgutsky District of the Khanty-Mansi Autonomous Okrug). The reserve was created in 1982 and covers an area of 648,636 ha.

During the summer of 2018, bumblebees were collected by Tatyana and Vladimir Pereyaslovets in the northern boundary of the reserve, at Ugut Village (60.50° N 74.06° E, the location of administration of the reserve, abbreviated UV) and at Cordon Kamennyi

(60.32° N 73.93° E, abbreviated CK). In total, 59 specimens of 12 species were collected: *B. bohemicus* UV CK, *B. cingulatus* CK, *B. consobrinus* UV, *B. cryptarum* UV, *B. hypnorum* UV CK, *B. jonellus* UV, *B. modestus* CK, *B. norvegicus* CK, *B. pascuorum* UV, *B. pratorum* CK, *B. schrencki* UV CK, *B. sporadicus* UV CK.

This is the first information on the bumblebee fauna of the reserve. The known diversity of these bees in the Khanty-Mansi Autonomous Okrug is 28 species (Demidova 2012; Levchenko & Tomkovich 2014). All of them are expected to be found in the Yugansky Nature Reserve.

References

Demidova AT (2012) *Ecology and species diversity of bumblebees (Hymenoptera, Apidae, Bombini) of the Middle Ob lowland*. PhD dissertation, Surgut State University, Surgut, 168 pp. [In Russian]
Levchenko TV, Tomkovich KP (2014) Contribution to the bee fauna (Hymenoptera: Apiformes) of the Khanty-Mansi Autonomous Region, Western Siberia, Russia. *Entomofauna* 26: 313–348.

JAPAN

Approximately 14 species are currently recognised. No species have yet been assessed for Red List status within Japan. Of the total, only one species is currently considered endemic, so 13 need to be assessed beyond Japan. There are many records in collections and in the literature that could be mobilised if funding were available, but field surveys are urgently needed.

A recent review of reproductive interference between introduced *B. terrestris* and indigenous *B. ignitus* and *B. hypocrita* considers (1) mass release of *B. hypocrita* males and (2) insecticide spraying with insect growth regulator against *B. terrestris* (Tsuchida *et al.* 2019). The latter proposal could have potentially serious consequences for other insects and ecosystems and needs urgent public debate in which the BBSG should be represented.

Reference

Tsuchida K, Yamaguchi A, Kanbe Y, Goka K (2019) Reproductive interference in an introduced bumblebee: polyandry may mitigate negative reproductive impact. *Insects* 10: 59. <https://doi.org/10.3390/insects1002009>

WEST ASIA

Approximately 73 species are currently recognised. No species have yet been assessed for Red List status within West Asia. Of the total, 10 species are considered endemic, so 63 need to be assessed beyond West Asia. Within West Asia, the fauna of Turkey is already well mapped (many species shared with Europe) and good progress is being made in Iran. In Central Asia there are many records in collections and in the literature that could be mobilised if funding were available.

West Asia Region in 2018

Ahmet Murat Aytekin for Turkey

Despite a particularly difficult time still continues in the region, studies of the bumblebee fauna have been made without interruption during 2018. Unfortunately studies declined dramatically due to the loss of researchers. But more or less good things sometimes happen and there is always light even in the dark if you look from a bumblebee's ocelli.



Bumblebees at Hacettepe University Campus, Beytepe. (Photos by Burcu Daşer Özgüşi.)

The studies in Turkey concentrated more on commercial rearing and integrated taxonomic studies of bumblebees. A new project has been accepted by Turkish Scientific Council named as *Investigation of genome-wide expression profiles of antennal chemoreceptors during the development of bumblebee (Bombus terrestris L.)* and a new thesis has been started by PhD student Burcu Daşer Özgüşi (*Systematic and transcriptome studies on some species of Bombus Latreille, 1802*). We were also able to make limited small studies on the very rarely visited places in Turkey like Tunceli in which there were no data previously. By the help of these studies we are more hopeful about receiving some data in 2019. But there

are no recent data on the status of bumblebees in Turkey. Two new studies were accepted to print which are listed below which can be interesting for our colleagues.

References

Özenirler Ç, Aytekin AM (2018) Which parts of the male genitalia are more diagnostic for bumblebee taxonomy? An alternative methodological perspective with geometric morphometrics. *Zootaxa*.

Özenirler Ç, Aytekin AM, Sorkun K (2018) Increasing seed and oil quality of *Carthamus tinctorius* L. by honeybee and bumblebee pollination. *Journal of Apicultural Research*.

Alireza Monfared for Iran



Bumblebee sampling in Qazvin, north west of Tehran. (Photos by Alireza Monfared.)

Assessments of bumblebees species continued during spring and summer of 2018. I also searched for colonies for further study. This covered known localities as well as likely new habitats in the Alborz and Zagros mountains. Because of a drought in 2018, unfortunately the number and diversity of species in previously known habitats showed clear decreases, although some species like *B. argillaceus* remained frequent. In some localities where in previous years we had seen many bumblebees, no more were seen despite the presence of many of their food plants.

In the summer of 2018, we started an Iranian Bees Research Institute (IBRI) in Yasouj. Our collection now has more than 45,000 specimens of Iranian bees, including about 4000 bumblebees from all over Iran. This museum is primarily for research and is visited by researchers from universities in Iran and from Europe. As part of our Red Listing and conservation aims, we educate high school students about the importance of identification and protection of our species. We have also planned space for various labs and equipment, including bumblebee rearing rooms, a bee behaviour study room, and collections.



Iranian Pollinator Insects Museum in Yasouj University, established by Alireza. The collection, now comprises more than 45,000 Iranian bee specimens for research with free access to students and foreign entomologists.

Any help to develop this centre from BBSG members would be welcome. Paul Williams and Pierre Rasmont are two BBSG members who have worked with us in helping with species identifications of Iranian bumblebees.



(Left) Alireza Monfared with Prof. Pierre Rasmont at Mons University in 2017 and (right) Alireza with Paul Williams in London in 2006.

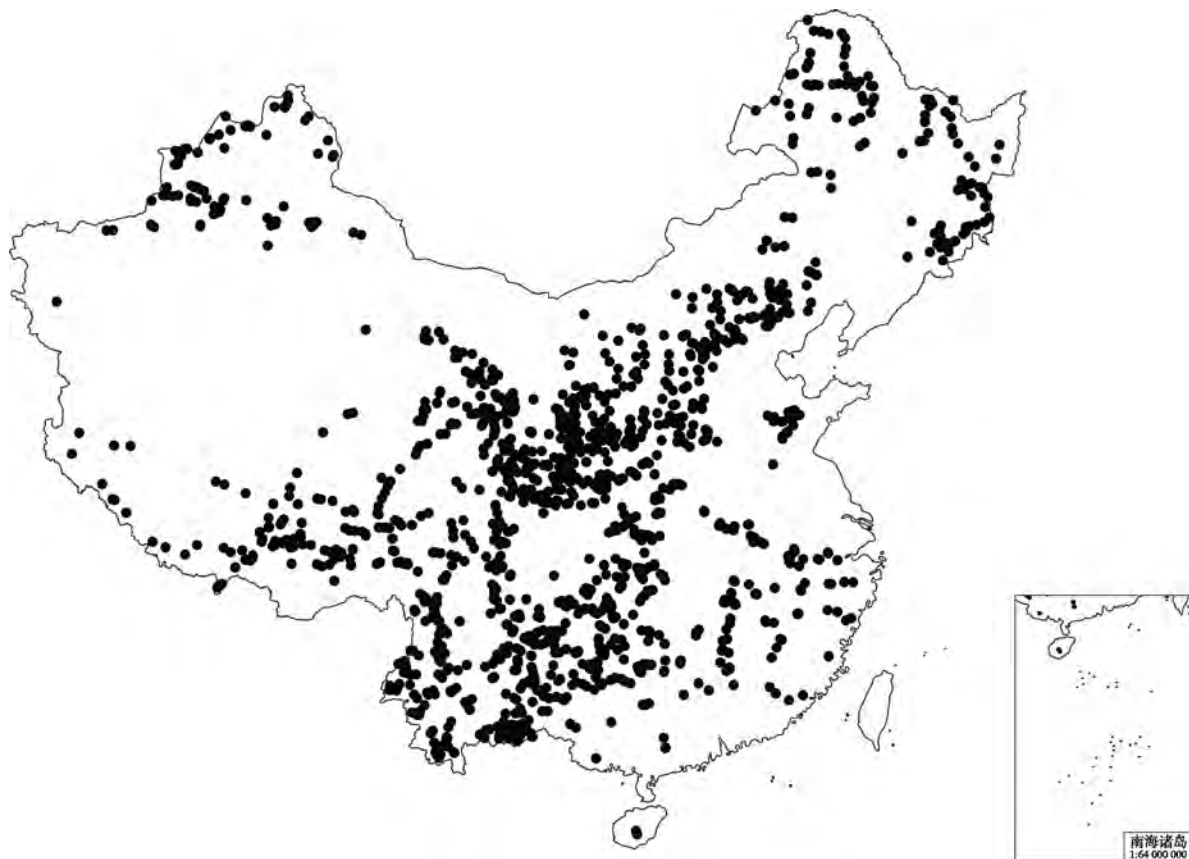
EAST ASIA

Approximately 124 species are currently recognised, although several species groups are being revised, with the promise that more species will be added soon. No species have yet been assessed for Red List status within East Asia. Of the total, 23 species are considered endemic, so 101 need to be assessed beyond East Asia (some species just crossing the border into the Himalaya region or to the South East Asia region). Within East Asia, much effort has been put into recording and databasing distributions, so that Red List assessments should be possible within the next few years.

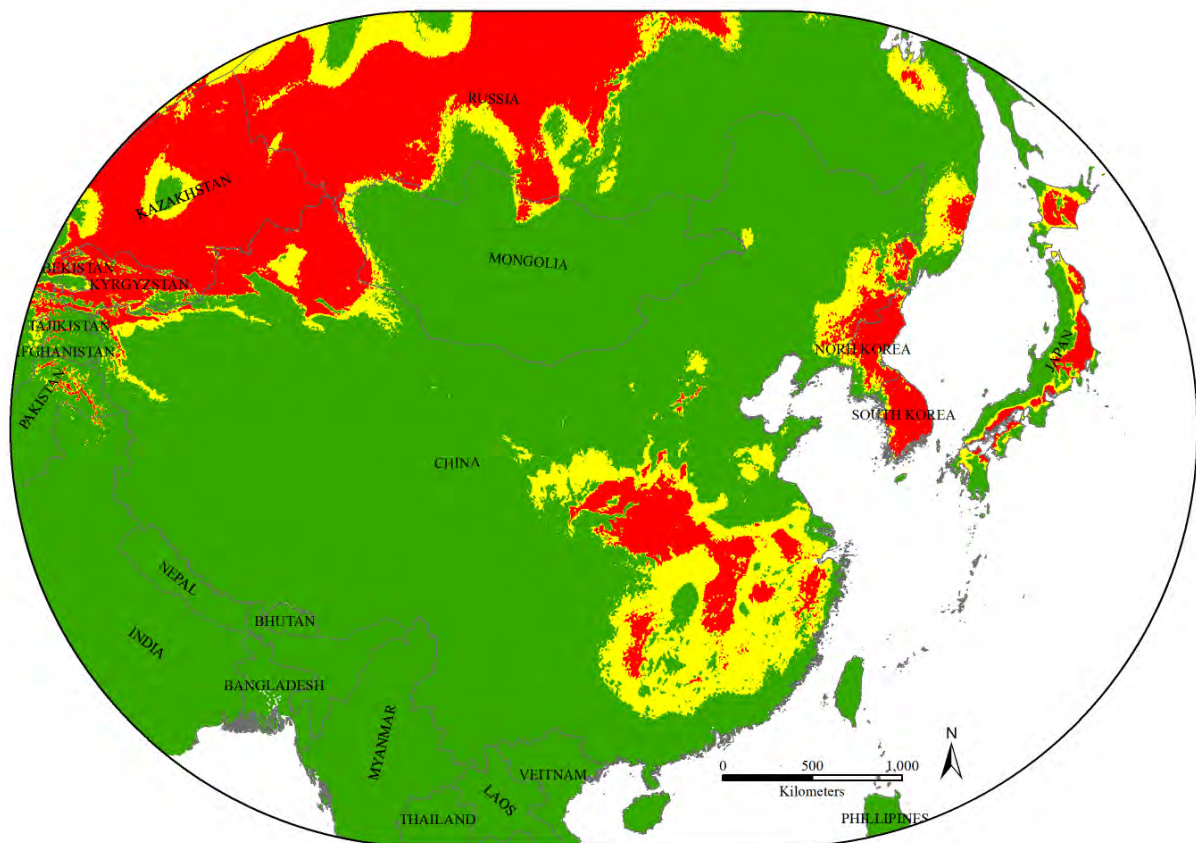
East Asia Region in 2018

Jiandong An

A list of 125 bumblebee species of China was published in 2018 based on the collection of over 50,000 specimens made between 2002–2017 and identified by Paul Williams of the NHM London. Species-richness analysis supports the mountains of central China as the centre of bumblebee diversity in China.



Sites with bumblebee records in the collection of the Institute of Apicultural Research (Chinese Academy of Agricultural Sciences) between 2002–2017 (Huang & An 2018).

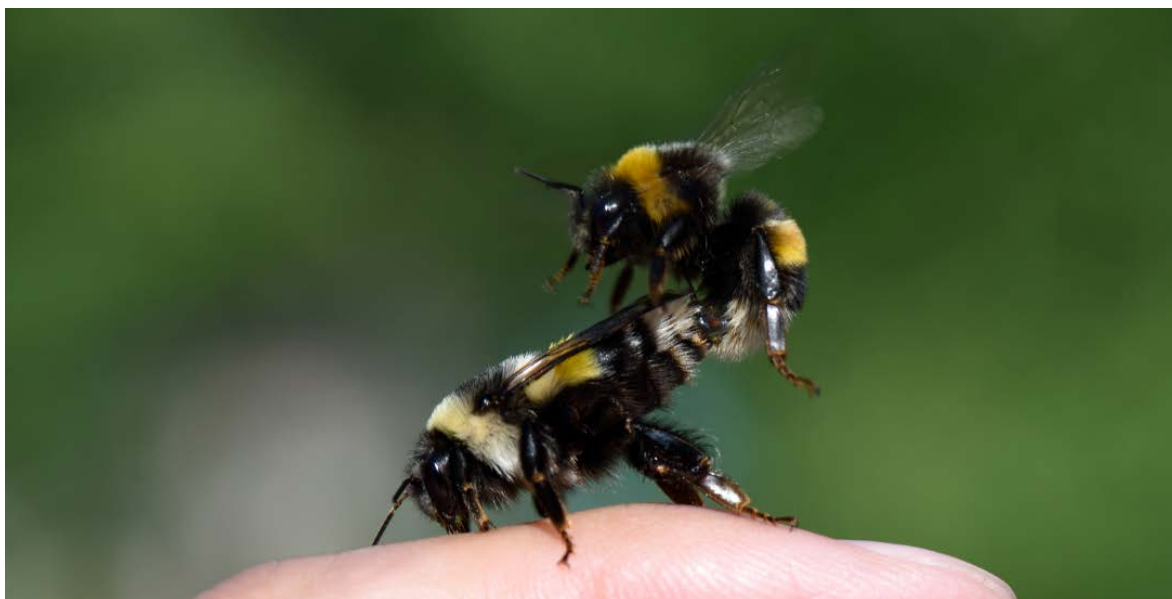


Potential distribution of *B. terrestris* in East Asia. Red represents highly suitable habitat, yellow represents suitable habitat, and green represents unsuitable habitat for *B. terrestris* (Naeem et al. 2018).

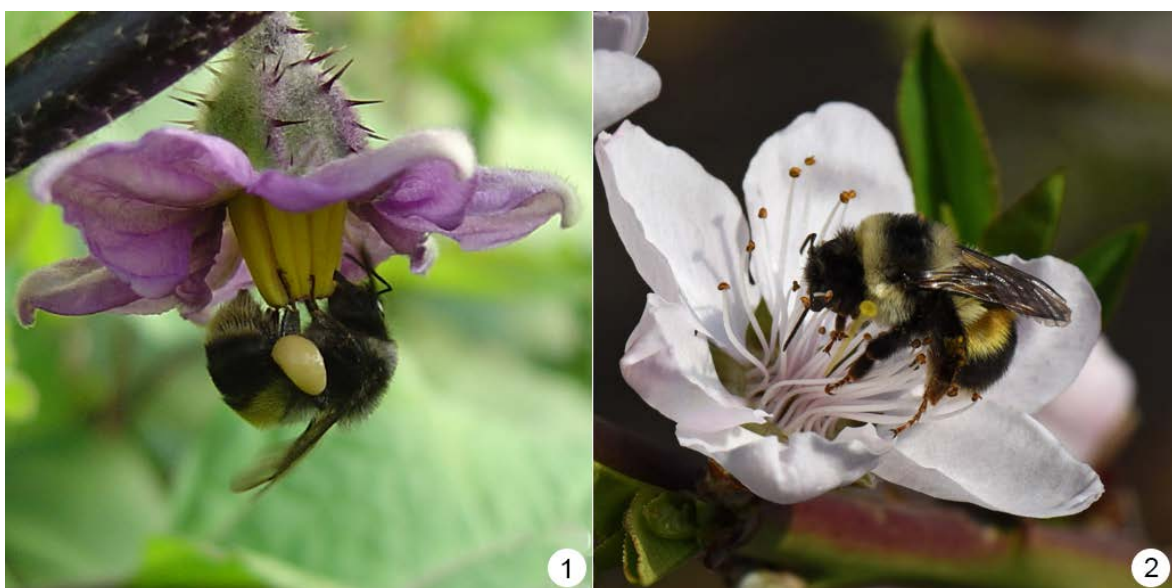
An assessment of risks to native bumblebees from introduced species indicated that all East Asian countries are under threat of competition by *B. terrestris*, with the highest habitat suitability occurring in China followed by Japan, North Korea, South Korea and Mongolia. Two new regions within China, central to the southeast and northeast, were predicted as being highly suitable for invasion by *B. terrestris*. Furthermore, because males of *B. terrestris* can mate with queens of *B. lantschouensis* under laboratory conditions, one of the Chinese bumblebee species important for crop pollination, this shows that native species may also be under threat of reproductive disturbance by alien species.

Studies on native species with good traits for rearing (such as species with more sperm in the queen's spermathecal, which usually exhibit larger colony size) are very important in order to stem the demand for imported invasive alien species, and to provide alternative pollination services for agriculture.

Future plans include improving pollinator conservation and the commercial use of native pollinators, as well as moving towards Red List assessments for the endemic Chinese species in the near future.



Hybrid mating of a male of *B. terrestris* with a queen of *B. lantschouensis* under laboratory conditions (Yuan et al. 2018). (Photo by Jiaxing Huang.)



Two indigenous bumblebee species have been used for pollination of crops in Chinese greenhouses: (1) a worker of *B. patagiatus* visiting an eggplant flower; and (2) a worker of *B. lantschouensis* visiting a peach flower. (Photos by Jiandong An, Jiaxing Huang.)

References

- Huang J, An J (2018) Species diversity, pollination application and strategy for conservation of the bumblebees of China. *Biodiversity Science* 26:486–497. <https://doi.org/10.17520/biods.2018068>
- Naeem M, Yuan X, Huang J, An J (2018) Habitat suitability for the invasion of *Bombus terrestris* in East Asian countries: A case study of spatial overlap with local Chinese bumblebees. *Scientific Reports* 8:11035. <https://doi.org/10.1038/s41598-018-29414-6>
- Yuan X, Naeem M, Zhang H, Liang C, Huang J, An J (2018) Evaluation of reproductive disturbance of Chinese bumblebees by European bumblebee *Bombus terrestris* (Hymenoptera: Apidae). *Acta Entomologica Sinica* 61:348–359. <https://doi.org/10.16380/j.kcxb.2018.03.010>
- Zhang H, Zhou Z, Huang J, Yuan X, Ding G, An J (2018) Queen traits and colony size of four bumblebee species of China. *Insectes Sociaux* 65: 537–547. <https://doi.org/10.1007/s00040-018-0639-2>

HIMALAYA

Approximately 52 species are currently recognised. No species have yet been assessed for Red List status within the Himalaya. Of the total, nine species are considered endemic, so 43 need to be assessed beyond the Himalaya (most in East Asia). There are many records in collections and in the literature that could be mobilised if funding were available, but field surveys are urgently needed.

Himalaya Region in 2018

Malkiat Saini / Rifat Raina



Razdhan Pass 3500 m, Kashmir.



Bombus novus male.

(Photos by Malkiat Saini, Rifat Raina.)

Williams (1991) reported 12 species of bumblebees from the Mount Affarwat area (reaching 4100 m, above Gulmarg) situated in north west Kashmir. However, our continuing survey of that area during the last ten years (2008–2018) reveals that out of those 12 species, the four species *B. novus*, *B. biroi*, *B. himalayanus* and *B. skorikovi* have not been found again, although they have been found at Razdhan Pass (3500 m) and Baltal (4000 m). Their population appears to have declined considerably and there is every possibility that they may shift to some other suitable sites at lower altitude.



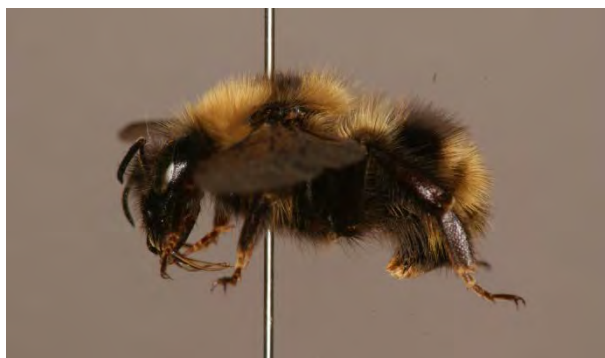
Bombus himalayanus queen (dark pattern).



Bombus biroi queen (dark pattern).



Bombus novus female.



Bombus skorikovi female.

(Photos of specimens collected by Paul Williams on Affarwat above 3000 m between 1980–1986.)

Reference

Williams PH (1991) The bumble bees of the Kashmir Himalaya (Hymenoptera: Apidae, Bombini). *Bulletin of the British Museum (Natural History) (Entomology)* 60: 1–204

SOUTH EAST ASIA

Approximately 27 species are currently recognised. No species have yet been assessed for Red List status within South East Asia. Of the total, five species are considered endemic, so 22 need to be assessed beyond South East Asia. Many of these non-endemic species are restricted to the border regions with the East Asia region. Within South East Asia, plans are being made for recording and databasing of bumblebee distributions.

South East Asia Region in 2018

Panuwan Chantawannakul / Jonathan Koch / Pham Hong Thai / Paul Williams

We have further surveyed bumblebee diversity in South East Asia and one of our leading scientist has published an article on bumble bees (*B. flavescens* and *B. irisanensis*) habitat suitability across protected areas in the Philippines (Koch & General 2018). The objective of the study is to summarize the geographic distribution of bumblebee habitat suitability in the Philippines across protected and unprotected areas.

In Thailand, Chiang Mai university also organized a meeting on linking indigenous, local and scientific knowledge and practices in Thailand to global policymaking through an IPBES (Intergovernmental Panel on Biodiversity and Ecosystem Services) assessment on pollinators, pollination, and food production. Dr Chantawannakul participated in the meeting as an invited speaker and bee expert in the region. This is another way forward to have more research on pollinators and pollinator health in South East Asia.

In London, Chawatat Thanooosing has started PhD research into the evolution and ecology of bumblebees in South East Asia.

Reference

Koch JB, General D (2018) A preliminary assessment of bumble bee (Hymenoptera: Apidae, *Bombus*) habitat suitability across protected areas in the Philippines. *Annals of the Entomological Society of America* <https://doi.org/10.1093/aesa/say046>

THE BBSG IN 2019

We are making good progress with species assessments in some regions of the world. This is a good time to share experiences on how best to overcome problems in applying IUCN Red List criteria to bumblebee data. We are especially looking forward to exploring ways to combine our quantitative analyses from different regions into global Red List assessments for the widespread species. As ever, let us know what you need and we will try to find a way to help.



London 15 March 2019