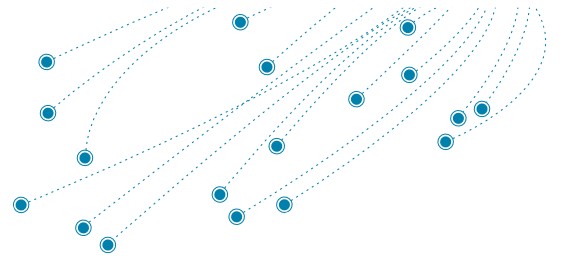


COMMON EASTERN BUMBLEBEE



UPDATED: JULY 2019

Invasive insects are a huge biosecurity challenge. We profile some of the most harmful insect invaders overseas to show why we must keep them out of Australia.

Species

Common Eastern Bumblebee / *Bombus impatiens*.

Main impacts

Competes with other pollinators, likely to increase weed problems.

Native range

Eastern Canada, eastern United States.

Invasive range

Canada, western United States.

Main pathways of global spread

Trade in bees for the horticultural industry.

ENVIRONMENTAL IMPACTS OVERSEAS

North American scientists fear this bumblebee will compete with native bees and have other harmful environmental impacts¹⁻³. Imported to British Columbia in Canada in the early 2000s for greenhouse pollination, it became established in the wild near Vancouver by 2003. By 2018 it was in localities 60 km from the initial detection site¹. At one location where at least four bumblebee species were present, this species outnumbered all the native species combined¹. Other evidence of invasiveness comes from the eastern side of Canada, where this bee has also escaped from farms, expanding its range north to New Brunswick, Nova Scotia and Prince Edward Island³.

HUMAN AND ECONOMIC IMPACTS OVERSEAS

This bee stings if stepped on or provoked, and unlike honeybees it can sting multiple times⁴. It readily nests around houses and is more irritable than other American bumblebees⁵. Some people have serious allergic reactions to bumblebee stings⁵.



WHAT TO LOOK OUT FOR

There are no bumblebees on mainland Australia, so a new invader should stand out. Most are large, furry bees with pollen baskets on their hindlegs. *Bombus impatiens* workers are 9–16 mm long, black with a pale yellow thorax and first abdominal segment, and have a long rectangular body.

Photo: Matthew Beziat | CC BY-NC 2.0

AUSTRALIAN CONCERNS

The common eastern bumblebee could achieve a wide distribution in Australia, judging by its native distribution, which extends from Canada to southern Florida, and inland to Oklahoma and Nebraska.

It is a serious concern for Australia given the impacts of this and other introduced bumblebee species, including in Tasmania. Many Australian horticulturists want bumblebees as pollinators, and there is a risk that someone will smuggle in fertilised queens. Hives are commercially available from European companies that operate on several continents. There are suspicions that the large earth bumblebee (*Bombus terrestris*) was illegally imported to Tasmania for pollination⁶, this being the

other species that is widely used in crop pollination.

Large earth bumblebees spread rapidly across Tasmania after they were detected in Hobart in 1992. A survey 13 years later found them within 10 national parks, including sites deep in the Tasmanian Wilderness World Heritage Area remote from human settlement⁷. This species uses habitats as diverse as saltmarshes and alpine heathland⁸ and feeds on a wide range of native flowers, including eucalypts, tea trees, banksias, heaths and daisies^{9,10}. In one large hive excavated in Maria Island National Park, larval cocoons showed the nest had produced at least 304 queen bees, and 939 workers and drones, indicating a high reproductive output in a natural environment¹⁰.

Bumblebees feed readily on the flowers of Tasmanian blue gums (*Eucalyptus globulus*) and black gums (*E. ovata*), which are the main breeding-season foods of the critically endangered swift parrot¹¹. The national recovery plan for the swift parrot notes that bumblebees may compete for nectar with this parrot, and mentions the risk of bumblebees spreading to the mainland (where swift parrots feed in winter) as a threatening process¹². Research on swift parrot habitat around Hobart shows that bumblebees reduce nectar yields on these trees. On one black gum studied, they made up more than 90% of visitors to the flowers¹¹. Introduced honeybees also reduce nectar yields on these trees, becoming active in the morning when temperatures reach about 15°C. Swift parrots can feed early in the morning before honeybees become active, but large earth bumblebees have lower temperature tolerances than honeybees, becoming active at about 6°C, so they remove the window of bee-free foraging time¹¹. Bumblebees could be competing with a wide range of native pollinators, including honeyeaters, native bees and other insects. This could alter plant pollination rates – swift parrots are far more effective pollinators of Tasmanian blue gums than bumblebees¹¹.

Another risk of bumblebees is their potential to worsen weed problems by serving as superior pollinators for northern hemisphere plants adapted for bumblebee pollination¹³. Scientists have noted 'clear evidence for a positive link between the spread of weeds and the presence of introduced bees'¹³. Bumblebees are desired crop pollinators for tomatoes and capsicums because they are better than honeybees at moving pollen between the flowers of these plants, and that holds true for some weeds as well. Australia has many plants with the potential to become serious weeds that are currently minor weeds or not weeds at all because they lack the bumblebee pollinators with which they evolved. Also, major weeds such as blackberry (*Rubus fruticosus*), foxglove (*Digitalis purpurea*), gorse (*Ulex europaeus*), Paterson's curse (*Echium plantagineum*) and broom (*Cytisus scoparius*) could benefit from pollination by bumblebees¹⁴.

Agapanthus (*Agapanthus praecox*) has been increasing as a weed in Tasmania since bumblebees arrived, and a study of agapanthus flower visitors found that bumblebees were by far the most common visitors and carried three times as much pollen as honeybees¹⁵. Very few native insects were detected on the flowers.

Introduced bumblebees have caused



The common eastern bumblebee has been introduced into new areas as a horticultural pollinator. Here is one on a squash flower. Photo: Kent McFarland

ecological harm elsewhere in the world, providing further reasons for concern about any bumblebee introductions. In Chile and Argentina, the Patagonian bumblebee (*Bombus dahlbomii*) has been listed as endangered, following displacement from much of its range by two species of bumblebee imported as pollinators, which compete with this species and infect it with a pathogen¹⁶. In Japan, large earth bumblebees now outnumber native bumblebees in some settings, and are blamed for a decline in one native species (*B. hypocrita sapporoensis*)¹⁷.

SOURCES

- Looney C, Strange JP, Freeman M, Jennings D (2019): The expanding Pacific Northwest range of *Bombus impatiens* Cresson and its establishment in Washington State. *Biological Invasions*. 21: 1879–1885.
- Ratti CM, Colla SR (2010): Discussion of the presence of an eastern bumble bee species (*Bombus impatiens* Cresson) in western Canada. *The Pan-Pacific Entomologist*. 86: 29–32.
- 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.
- Huang Z (nd): *Bugs Around Your House*. 3. *Bumble Bees*. Michigan State University. Retrieved from <http://www.cyberbee.net/column/stinging/bumblebee.shtml>.
- Hoffman DR, Jacobson RS (1996): Allergens in Hymenoptera venom XXVII: Bumblebee venom allergy and allergens. *Journal of allergy and clinical immunology*. 97: 812–821.
- Schmid-Hempel P, Schmid-Hempel R, Brunner PC, Seeman OD, Allen GR (2007): Invasion success of the bumblebee, *Bombus terrestris*, despite a drastic genetic bottleneck. *Heredity*. 99: 414.
- Hingston AB (2006): Is the exotic bumblebee *Bombus terrestris* really invading Tasmanian native vegetation? *Journal of Insect Conservation*. 10: 289–293.
- Environment and Communications References Committee (2017): *Risks and opportunities associated with the use of the bumblebee population in Tasmania for commercial pollination purposes*. Australian Government.
- Hingston AB (2005): Does the introduced bumblebee, *Bombus terrestris* (Apidae), prefer flowers of introduced or native plants in Australia? *Australian Journal of Zoology*. 53: 29–34.
- Hingston AB, Herrmann W, Jordan GJ (2006): Reproductive success of a colony of the introduced bumblebee *Bombus terrestris* (L.) (Hymenoptera: Apidae) in a Tasmanian National Park. *Australian Journal of Entomology*. 45: 137–141.
- Hingston AB, Potts BM, McQuillan PB (2004): The swift parrot *Lathamus discolor* (Psittacidae), social bees (Apidae), and native insects as pollinators of *Eucalyptus globulus* ssp. *globulus* (Myrtaceae). *Australian Journal of Botany*. 52: 371–379.
- Saunders D, Tzaros C (2011): *National recovery plan for the swift parrot Lathamus discolor*. Birds Australia.
- Hanley ME, Goulson D (2003): Introduced weeds pollinated by introduced bees: Cause or effect? *Weed Biology and Management*. 3: 204–212.
- Goulson D, Rotheray EL (2012): Population dynamics of the invasive weed *Lupinus arboreus* in Tasmania, and interactions with two non-native pollinators. *Weed research*. 52: 535–541.
- Hingston AB (2006): Is the introduced Bumblebee (*Bombus terrestris*) assisting the naturalization of *Agapanthus praecox* ssp. *orientalis* in Tasmania? *Ecological Management & Restoration*. 7: 236–240.
- Morales C, Montalva J, Arbetman M, Aizen M, Smith-Ramirez C, Vieli L, Hatfield R (2016): *Bombus dahlbomii*. The IUCN Red List of Threatened Species 2016: e.T21215142A100240441. International Union for the Conservation of Nature.
- Inoue MN, Yokoyama J, Washitani I (2008): Displacement of Japanese native bumblebees by the recently introduced *Bombus terrestris* (L.) (Hymenoptera: Apidae). *Journal of Insect Conservation*. 12: 135–146.

ABOUT THIS PROJECT

The Invasive Insects: Risks and Pathways Project is a partnership between Monash University and the Invasive Species Council. To find out more visit invasives.org.au/risks-and-pathways.