

A GROWING CRISIS

Canada's pollinators are under siege. This is very bad news for all. Here's why

Most life on this planet would be impossible without pollinators. They perform one of nature's essential processes: in transferring pollen among flowers, they help create life. In doing so, they provide the world with food, shelter, fuel, biomass and oxygen. Anything that hurts pollinators—habitat loss, pesticide use and global warming, among other threats—needs to be taken seriously. Now.

When pollen is moved from the male part of a flower, the anther, to the female part, the stigma, pollination happens. This is the initial phase in a process that ultimately generates seeds, fruit and the next generation of plants. While this can happen on some plants via wind and water, most plants require pollinating creatures to move pollen within the flower and from bloom to bloom. In Canada, the health of the national economy, in which agriculture plays a central role, depends in part on pollinators. Think apples, asparagus, cranberries and squash, to name a few, and many field crops, self-fertile but aided by pollinators, including canola and soybeans.

There are a few vertebrate pollinators in Canada (such as hummingbirds) but there are over 10,000 species of invertebrate pollinators in this country. According to dipterist Dr. Jeffrey Skevington, a research scientist at Agriculture and Agri-Food Canada and lead author of *Field Guide to the Flower Flies of Northeastern North America*, published by Princeton University Press in 2019, the most important native pollinating species (in descending order) are flower flies, other flies that pollinate (not all do), bumblebees, solitary bees, wasps, moths, butterflies, beetles and hummingbirds. (Honeybees, not native to Canada but rather imported from South America, are the go-to for-profit pollinator in Canada. An important pollinator for agricultural crops, they can outcompete wild pollinators for food resources.)

Together, flower flies and bees are responsible for more than 80 per cent of pollinating for Canada's agricultural crops. North of 50 degrees latitude, it is almost exclusively flies doing the pollination services. South of 50 degrees, various wild types of pollinating bees are the dominant pollinators; flower flies are second most important.

In other words, a world without pollinators is unimaginable. It is time for action.

Often misidentified as wasps or hornets, flower flies like this one are central to pollination in Canada



CANADA'S POLLINATORS

More than 10,000 different species of pollinators are native to Canada. While this number is dominated by flies and bees, some hummingbirds and beetles also contribute to pollination. Here are Canada's key native pollinators

BUMBLEBEE

Canada pollinator ranking: 3

There are about 850 species of native bees in Canada, including 42 species of our beloved bumblebees. Many native bees are solitary, but bumblebees are social, living in large collaborative colonies. Each of the numerous bumblebee variants in Canada (orange-belted bumblebee, rusty-patched bumble bee, yellow-banded bumblebee, and the western bumble bee, to name a few) has a slight variation in appearance. Generally, bumblebees are 13–25 mm long, with four wings, no discernible waist, a “stocky” build and hairy body, and corbicula (“pollen baskets”) on the hind legs. Appearing anywhere there are pollen- and nectar-rich plants, they are found throughout Canada, as far north as Ellesmere Island. Generalists, they gather nectar and pollen from a wide variety of flowers. Although bumblebees can detect violet or blue flowers most easily, they will visit flowers of other colours. Eight wild bee species are listed under Canada's species at risk registry: the rusty-patched bumblebee, cuckoo bee and the gypsy cuckoo bumblebee are classified as endangered; the sable island sweat bee and the western bumblebee subspecies are threatened; and three other subspecies are considered of special concern. The main threats to Canada's native bumblebees are believed to be habitat loss and fragmentation, the use of pesticides, and pathogen spillover from domestic bumblebees brought to Canada to pollinate crops grown in greenhouses.



Flower fly

FLOWER FLIES

Canada pollinator ranking: 1

With more than 550 species across the country and 6,000 around the world, flower flies (*Syrphidae*), also known as hover flies, are ubiquitous. Often mistaken for wasps or even bees, most are about 8–12 mm long; many are yellow-orange with a black abdomen, though there is great variation in colouring in this large insect family. To differentiate a flower fly from its many doppelgängers, look for one set of wings (bees have two), usually short antennae (bees and wasps have long filamentous antennae) and eyes with many little segments (unlike bees, whose eyes are similarly segmented but have a solid dark appearance). You will find them wherever there are pollen- and nectar-rich plants. Some species' larvae eat decaying plant and animal matter, and others prey on garden pests such as aphids, making them a great boon to any gardener. Flower flies are most easily recognized by their distinctive hovering before darting about in all directions. To encourage them to spend time in your garden, consider planting attractive native wildflowers like goldenrod (*Solidago*), Mountain Mint (*Pycnanthemum*) and shrubs such as Nannyberry (*Viburnum lentago*).

HUMMINGBIRDS

Canada pollinator ranking: 9

Although hummingbirds are mostly associated with the tropics, Canada has five species. Black-chinned hummingbirds (*A. alexandri*), Anna's hummingbirds (*Calypte anna*), tiny calliope hummingbirds (*Stellula calliope*) and, most commonly, rufous hummingbirds (*Selasphorus rufus*) are found only in the West. The ruby-throated hummingbird (*Archilocus colubris*), the only species that occurs in Eastern Canada, ranges from Nova Scotia and Prince Edward Island all the way west to southeastern Alberta.

Native across southeastern Alberta and through most of B.C., rufous hummingbirds are occasionally spotted in southern Yukon. This is particularly impressive because these 7–9 cm jewels winter thousands of kilometres to the south in Mexico. Males are cinnamon with a green crown and a deep-red throat patch; the larger female has a copperish colour with green and red markings on the throat. Long-tongued, rufous hummingbirds tend to like

trumpet-shaped flowers, large or small. The eastern-most populations of the similarly sized ruby-throated hummingbird (green, grey and black, with a much brighter red throat) cross the Gulf of Mexico each year to overwinter in central Mexico. Their nests, made of lichen, moss and bark, often bound with spider web, are camouflaged to resemble a bump on a branch.

Hummingbirds don't consume much pollen but manage to gather and carry considerable amounts on their heads and bodies as they search for nectar from flower to flower. Smaller insects (mosquitoes, midges, vinegar flies) and spiders are their primary source of protein, though flower nectar is a natural energy source for these frenetic creatures.

To attract hummingbirds to your garden, invite key insects by planting small-flowering native species such as goldenrod and asters and, of course, by avoiding the use of pesticides. For pollination, be sure to include plants with bell-shaped flowers whose bloom times vary to ensure a season-long supply of nectar in your garden.

OTHER FLIES

Canada pollinator ranking: 2

Numerous flying insects are busy pollinating across Canada. Among the more prevalent are bristle flies (*Tachinidae*), blow flies (*Calliphoridae*), flesh flies (*Sarcophagidae*) and house flies (*Muscidae*). Bristle flies comprise more than 800 species in Canada. Their larvae are internal parasites of other insects, including butterflies, moths, beetles and crickets, so in addition to being important pollinators as adults, their larvae are one of our most important natural controls of pest insects. As adults, some species look and act like wasps while feeding on plant nectar and insect honeydew but most look more or less like bristly house flies and are easy to overlook as they go about their pollination duties. They range widely in size (from just 2 mm to more than 20 mm), shape (from slender to bulky) and colour (from waspy yellow and black to metallic blue, shimmering purple and even brightly multicoloured). Because flies are hairy, they can easily transport pollen from flower to flower. Bristle flies are found virtually everywhere in Canada, including Yukon and Nunavut. Also important as pollinators are soldier flies (*Stratiomyidae*).

TERRY SOHL/ALAMY STOCK PHOTO. ISTOCK



EXISTENTIAL THREATS

Pollinator populations are declining everywhere. Why?

HABITAT DEGRADATION, FRAGMENTATION AND LOSS

Landscape connectivity is crucial. Where once pollinators roamed and floated through endless virgin wilderness teeming with a vast variety of native flowering plants, present generations are faced with a shrinking patchwork of gardens, parks, rights-of-way, weedy patches and wild areas surrounded and isolated by immense swathes of concrete, roads and rail lines. As a result of large-scale agriculture, industrial forestry, and urban and suburban development, pollinator habitat has been degraded, diminished and fragmented, much of it lost forever. Especially in southern Canada where human activity dominates the landscape, what remains are small, detached and widely spaced patches incapable of providing for all pollinators' needs or of offering the connectedness tiny pollinators require to move. Instead they are dead-ended, doomed by the absence of "pollinator pathways." Even the sprawling crop fields that characterize Canada's agribusiness are bad news for pollinators. These expanses of one single plant type maturing at the same time before being rapidly and thoroughly harvested mean essential sustenance—the nectar and pollen—is available for only a short period. Without habitat for feeding, mating and nesting on the edges of the fields and along roadways, the numbers and overall diversity of pollinators drop.

PESTICIDES AND HERBICIDES

The heavy use of systemic chemicals to control pests and weeds is proving devastating to pollinators. Since their introduction in the 1990s, insecticides known as neonicotinoids, or "neonics," have been applied as a seed coating, as a soil solution or as a spray on leaves and stems. Highly toxic and extremely persistent, they are now pervasive in the environment, affecting aquatic invertebrates, birds and beneficial insects. Even when they are not immediately fatal, neonics affect pollinators' ability to navigate, collect food and reproduce, dooming populations to slow collapse. A recent study indicated that while neonics are a significant worldwide threat to biodiversity and ecosystems, they are not as effective as once assumed and could be replaced by less toxic alternatives of no greater cost. There are five main types of neonicotinoids currently approved for agricultural use in Canada, three of which have been proposed to be phased out by the federal government. A final decision on this has been delayed.

CHANGES IN CLIMATE

Like virtually every other living thing, pollinators and the plants that depend on them are being affected by increasing CO₂ levels, rising temperatures and the changes they have brought. Increased carbon in the atmosphere is altering insect-plant interactions. Meanwhile warmer temperatures cause flowers in affected areas to bloom a month earlier than they did just a few decades ago. What's more, the migration of flowering plants to cooler climes, a well-documented phenomenon that involves both northward creep and movement to higher elevations, is leaving pollinators behind as they fail to adapt at the same rate as flowering plants. Bees are being particularly affected by higher temperatures.

Male ruby-throated hummingbird



Bristle fly



STEPHEN BROWN/ALAMY STOCK PHOTO



Bee devastation; spraying pesticides by plane



PROTECTING POLLINATORS

A worldwide movement to protect pollinators is taking shape now. In North America, the Commission for Environmental Cooperation, a trilateral organization that facilitates collaboration among Canada, Mexico and the United States, has begun work to foster best ecological practices on a continental scale. It hosted a pollinator conservation workshop in Mexico in February 2020 (just prior to the COVID-19 crisis reaching North America) that brought together representatives of the three national governments, NGOs (including a representative from the Canadian Wildlife Federation), researchers and farmers in local communities involved in pollinator conservation. The goal: to establish the first North America-wide framework for pollinator conservation. It is scheduled to be launched later this year. The main areas of focus, “the three Ps” are: pesticide reduction, pathway creation and public action. Visit cec.org and check the projects page for more information.

NIX THE NEONICS

Any plan to address the decline in pollinator populations must include concerted action to tightly control the use of neonicotinoid insecticides. Their effects on insects and

countless other species have been devastating. The best place for you to start making a change is in your own garden. To make a difference, stop using pesticides and introduce naturally resistant native plants and pollinator-friendly species. (Visit HelpthePollinators.ca for plenty of advice on how to make your garden wildlife- and pollinator-friendly.) To make changes on a larger scale, let your elected officials at every level of government know that banning neonics has to be a priority, add your name to a petition, and talk to your friends, acquaintances and fellow gardeners about the issue.

WAY FOR POLLINATORS

There is a growing movement to bring communities together to create connected corridors of habitat that will allow pollinators to navigate easily among them, benefiting from all the resources while offering their own essential benefits to the flowering plants. In cities, that will mean planting pollinator-friendly plants everywhere and then ensuring easy pollinator movement among individual gardens via city parks, private and public sector green roofs, roadsides and rights-of-way, and every other green space. In suburban areas, the edges of

mall parking lots, highway medians, rail lines and empty fields offer fertile possibilities for pollinator corridors. Rural areas too offer myriad opportunities, including hedgerows, rights-of-way, edges of farmers’ fields and, of course, conservation areas and large-scale parks. It is within the realm of possibility for us to create the Great Canadian Pollinator Pathway across Canada. You can help by choosing the right plants for your garden.

YIMBY!

Say yes to pollinators in your own backyard. Visit CWF’s website to learn which flowers you can plant to support pollinators. Make your garden a welcoming space for them. Place logs and rocks in your yard for pollinator habitat. Buy plant material and products that do not contain neonics and other harmful chemicals. Make sure to design your garden so that there is a continuous succession of plants flowering from spring through fall. Reduce or, better, eliminate the use of pesticides in your garden. And don’t forget to contact local and regional politicians to let them know that now is the time for action.

Visit cwf-fcf.org to learn more.

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LEPIDOPTERA: MOTHS

Canada pollinator ranking: 6

With 5,099 species of moths in Canada, there are about 10 times as many species as there are birds, and most are pollinators. They come in a fantastic array of guises, some so colourful and distinctive that we assume they must be butterflies. They’re not. There are a few ways to tell: their bodies tend to be hairier; their antennae are feathery or toothed like a saw, while the smooth antennae of butterflies usually have a bulb at the end; moths nestle their wings in a way that covers the abdominal area, while butterflies fold their wings over their backs. And unlike butterflies, most moths fly at night, which, experts say, explains why they are such efficient pollinators. Because most operate in the dark, moths tend to pollinate white or pale-coloured flowers with strong scents that open late in the day.

While there is insufficient data, it is clear that some moth populations have declined precipitously and others are likely now extinct. Pesticides and insecticides are a threat. Because moths are highly sensitive to changes in their environments and are so widespread in different types of habitats, they serve as a useful measure of environmental pressures, such as air pollution and global heating. One type deserves special mention: the hummingbird clearwing moth (*Hemaris thysbe*), which is native throughout Canada except for Nunavut. As the name suggests, this moth is often mistaken for a hummingbird.

SUE BISHOP/ALAMY STOCK PHOTO, ROBERT KEENAN/ALAMY STOCK PHOTO, ISTOCK



Clearwing moth



Sweat bee

Bald-faced hornet



WASPS

Canada pollinator ranking: 5

Wasps can be identified by their thin waists, long antennae and distinctive ovoid eyes. Many, but not all, are black and yellow. Unlike bees, most wasps have smooth bodies. They can be between 10 and 25 mm long. While wasps are primarily carnivores that eat small insects for food, they are nonetheless drawn to flowers, for two reasons. First, flowers are where they find their prey. Second, they snack on flower nectar, a waspish energy drink of sorts.

The wasps you are most likely to encounter throughout southern Canada are yellowjackets, but they are not the most important pollinators. More interesting and active variants include bald-faced hornets (misnomer because it is really a wasp, *Dolichovespula maculata*), distinguished by black-and-white colouring and a white head; thread-waisted wasps (Sphecidae family); and so-called black-and-yellow mud daubers (*Sceliphron caementarium*).

Typically, social wasps live in colonies that mostly die out each winter (except mated females) and then build up again over the summer. If you see many wasps of the same kind in your garden, especially late in the season, they are probably one of the social wasps. Solitary wasps make their shelter in holes in the ground or in rotting logs.

All wasps have an important and largely beneficial role to play in your garden. They eat flies and caterpillars, they are a source of food for birds, spiders and small mammals, and they pollinate as they visit flowers for nectar. They can be riled though, and their sting hurts.

SOLITARY BEES

Canada pollinator ranking: 4

Most bees native to Canada are solitary: they do not produce honey, they do not live in hives, and they do not have a queen. They live alone in tiny burrows in mud or tree cavities, often clustered closely with fellow loner bees. Unlike social bees (e.g. common eastern bumblebees), which share activities and duties with amazing precision, a female solitary bee prepares her own nest, provisions it with food (nectar and pollen) for her offspring and lays her own eggs.

In Canada, smallish mining bees (*Andrena milwaukeensis*) and sweat bees (*Agapostemon texanus*) make up more than one third of the total population; other solitary species include mason, leafcutter and squash bees. Many types are confused with wasps, flower flies and honeybees. Interestingly, with no honey to protect, they have no instinct to be aggressive. They are efficient pollinators, largely because of inefficiency: they do not have pollen baskets common to many bees, so with each visit to a flower, they tend to scatter far more pollen willy-nilly.

LEPIDOPTERA: BUTTERFLIES

Canada pollinator ranking: 7

There are 306 butterfly species in North America. Active during the day, butterflies are less efficient than other pollinators because their long legs and slender bodies limit how much pollen they pick up. However, what they lack when it comes to efficiency they make up with enthusiasm. Most are generalists, drawn to bright clustered flowers (particularly red, yellow and orange) that offer ready landing platforms, are open in daylight and are generous nectar producers.

Butterflies are particularly sensitive to changes in the environment—there is a lot of evidence of butterflies rapidly adapting to rising temperatures by moving further north and higher in altitude. As a crucial food source (both as butterflies and as caterpillars), their declining numbers can have a broad effect on bird and insect populations. To help slow the decline—and to introduce a charming element to any garden—plant butterfly-friendly flowers (check out the Canadian Wildlife Federation website at cwf-fcf.org for suggestions) and offer patches of warming sunlight and some shallow water. You will be doing your garden and the ecosphere a favour.

Painted lady butterfly

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BEETLES

Canada pollinator ranking: 8

You might be surprised to learn 8,302 species of beetles (*Coleoptera*) are found in Canada, in every province and territory. Or that beetles make up roughly 45 per cent of the planet's known insects, a mind-boggling fact. To find the pollinating types of beetle (generally hairier than their non-pollinating cousins), peer into the heads of large, heavily scented flowers, including magnolia, spicebush and water lilies. Because of their body shape and particular patterns of behaviour, they are generally found in bowl-shaped flowers with many stamens and pistils. These beetles are not seeking nectar; they consume pollen for sustenance. For some beetle species, the adults' time of emergence is effectively synchronized with specific "target" flowers, so they play a crucial role in the health of specific species. Interestingly, in 2017 a young researcher discovered what was estimated to be a 99-million-year old bit of amber with a beetle trapped inside: it has 62 grains of pollen visible on its body. Its discovery caused scientists to overhaul their estimate of the first pollination by over 50 million years and raised the profile of beetles as pollinators.

Another, collateral benefit is that, when abandoned, the nests of beetle larvae serve as nests for other crucial pollinators such as leafcutters, mason bees and other wood-nesting bees.

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Soldier beetle



BUZZ KILL

Insect decline is becoming obvious; just look at your windshield

We know insect decline is real, even if we cannot yet quantify the problem. There has been little effective population monitoring in Canada beyond species identified as being at risk. Still, the anecdotal evidence is alarming.

To better understand the current situation, think back to the summer road trips of your childhood. If you are over 35, then perhaps you remember the mess of squished and splattered bugs on the car's front grill and windshield after just a few hours on the highway. By trip's end, the front-end would be a splattered mess, the windshield stuck with the remains of countless unidentifiable bugs, their guts wiper-smearred in gross, opaque arcs. Fast forward to today: in most places in Canada at the end of a long summer's day drive, there would be only a smattering of spattering on windward surfaces, nothing like the past. It has changed over the last 20 years. But is the number of bugs squished by a car truly an important indicator?

The answer, at least according to research in the U.K. and Denmark, is a resounding yes. In both countries, entomologists use "splatometers" to track pollinator populations: commuters and distance drivers are participating in insect surveys by sticking uniform white plastic rectangles to the fronts of their vehicles. After driving for a specific time and range, the driver removes the splatometer and returns it for analysis. The results, say the experts, present a clear picture of the state of bugs in a given area. Splatometers have become a useful lens on a hard-to-track world. The anecdotal evidence suggests, there have been drastic declines in insect populations. 🐞