



Wild Bees

Bees and other insect pollinators have become media stars in recent decades due to their highly publicized declines, usually portrayed through “Save the Bees” campaigns. While the European Honeybee (*Apis mellifera*) is one of the most well-known bee species, these bees are not native to North America and are primarily a livestock species that is managed by humans. However, there are over 20,000 other bee species worldwide, including 4,000 native bee species in North America. These wild bees come in a wide diversity of sizes and colors, which means that may not be readily recognized as bees. However, they are still incredibly important pollinators and contribute to the pollination of both wild and cultivated garden plants, as well as food crops. Though wild bees are experiencing population declines, there are many actions that we can take to conserve them to protect our food security and preserve our natural world for future generations.

LIFE HISTORY

Description: Bees are insects, which means that they have six jointed legs and bodies that are divided into three parts: a head with two antennae, a thorax (mid-section), and an abdomen (rear-section). Bees are close relatives of wasps, ants, and sawflies, which all fall into a large order of organisms called Hymenoptera. All bees have branched hairs and two pairs of wings. Only female bees have stingers, because the stinger evolved from an ovipositor (egg-laying anatomy) that only females have.

Range and Habitat: Bees can be found in every part of the world, except for Antarctica. There are an estimated 250 bee species in Rhode Island, which occupy a variety of ecosystems including meadows, riparian areas, woodlands, orchards, coastal areas, and urban and suburban areas. Wild bees live in a variety of different nest types, depending on the species. Approximately 30% of native bees are cavity nesters, meaning that they make nests in pre-existing cavities (e.g. hollow stems, rock crevices, and abandoned beetle holes). Approximately 70% of native bees are ground nesters, meaning that they make their nests by burrowing in bare soil. Bumblebees make their nests either underground (e.g. abandoned rodent burrows),

in tree hollows, or other protected areas (e.g. tussocky grasses and brush piles).

Food Habits: Bees originally evolved from wasps and are still closely related, however, while wasps only feed on plant material as adults, bees feed on plant material at every stage of their lifecycle. Female bees collect pollen and nectar to feed themselves and their larvae. Pollen is rich in protein and other nutrients and is therefore essential for larval growth. Nectar is high in sugars, which is what gives bees the energy to fly, forage, and take care of their larvae.

Behavior: Bees regularly visit flowers in order to collect nectar and pollen and, in doing so, also carry out the ecosystem service of pollination. When they visit flowers, pollen (male part of the flower) gets caught in their hairs and gets carried to other flowers. If a bee visits flowers of the same species and the pollen is transferred onto the flower’s stigma (female part of the flower), then this can result in fertilization, or the production of seeds and fruits.

DID YOU KNOW?

- Over 90% of bees are solitary bees.
- Some bees, such as bumblebees, can perform “buzz pollination,” in which the bee vibrates its flight muscles while attached to a flower to loosen the pollen, making it easier to collect.
- Some solitary bees build their nests out of unique materials, such as flower petals, abandoned snail shells, or tree resin.
- “Cuckoo bees” are bees that lay their eggs in other bees’ nests so that their offspring can feed on the other bees’ resources.
- The smallest bee species in the world, *Perdita minima*, is less than 2 millimeters long and the largest bee species, *Megachile pluto*, is nearly 4 centimeters long.

There are other insects (e.g. flies, wasps, and moths) and animals (e.g. birds and bats) that also carry out the service of animal pollination, but bees are especially important pollinators because they consume plant material at every stage of their life cycle and therefore visit flowers regularly.

Over 87% of plant species require animal pollination, making it a vital component of supporting healthy food webs since many birds and mammals feed on the seeds and fruits that result from pollination. The ecosystem service of pollination is also important for supporting our food security, since 75% of leading global food crops benefit from animal pollination.

IS IT A BEE?	
Bees	<ul style="list-style-type: none"> • Four wings • Long antennae • Eyes on sides of head • Hairy with branched hairs • Chunky bodies with a short “waist”
Wasps	<ul style="list-style-type: none"> • Four wings • Long antennae • Eyes on sides of head • Mostly hairless or with a few bristles • Slender bodies with a defined “waist”
Flies	<ul style="list-style-type: none"> • Two wings • Short antennae • Eyes on front of head • Can be hairy or hairless • No distinct “waist”

Reproduction: All bees begin life as eggs, which hatch into larvae before pupating (i.e. spinning a cocoon) and eventually emerging in their adult form. However, the timing of mating, nest establishment, and adult bee emergence varies between bee species.

Bumblebee Reproduction: Bumblebees are the only true social bees native to North America. Bumblebee colonies are made up of a queen, her female workers, and stingless males. Colonies can contain 50-500 bees. Bumblebee queens emerge from hibernation in early spring and immediately start looking for a suitable nest site. Once a queen has established a nest site, she begins gathering nectar and pollen and start laying eggs, which will hatch into female worker bees. After the workers have hatched, they take over foraging duties while the queen remains in the nest to continue laying and taking care of her eggs. In the late summer,

the queen begins producing gynes (new queens) and males, which will leave the nest to mate. In the fall, the old queen, workers, and males die and the new mated gynes find suitable hibernation locations, such as shallow burrows, leaf litter, or rotting wood. The new queens will hibernate throughout the winter and then emerge in spring.

Solitary Bee Reproduction: Solitary bees, as their name suggests, do not live in a colony with a queen and workers like social honeybees or bumblebees. A single female solitary bee will establish her nest and provision food for her offspring without any help. In the spring, adult male and female solitary bees emerge from hibernation. They mate and then the females begin establishing their nests. Nest type varies greatly between solitary bee species (see: “Range and Habitat”). The females construct cells within her nest out of mud, leaves, or plant resin, depending on the species. She fills each cell with pollen, lays an egg on the pollen ball, and then seals the cell. She repeats this until all of the cells are sealed. Most solitary bee adults only live for a few weeks, so by fall all solitary bee adults have died. The larvae then hatch out of their eggs and eat the pollen that their mother collected for them. Young bees will then spin a cocoon to become pupae and overwinter in their cells. In the spring, they emerge as adults.

THREATS

Habitat Loss: One of the biggest threats to bees is land use change due to increased urbanization or agricultural intensification. This means that bees may not have access to suitable nesting or foraging areas.

Parasites and Diseases: In the United States, the spread of parasites and disease is prevalent in managed honeybees because they are usually kept and transported across the country in high densities. Unfortunately, these parasites and diseases can also spread to wild bees when managed and wild bees visit the same flowers.

Pesticide Use: The ingredients in chemical insecticides, herbicides, and fungicides, including the ones you can buy at the hardware store, can harm bees in a variety of ways. They can alter bee behavior, which might make it harder for them to collect food and care for their larvae and can also kill bees outright. Herbicides can also reduce the number of flowers in the landscape, reducing food for bees.

Climate Change: Climate change can alter the emergence time of both flowers and the bees themselves. This means that when bees emerge from hibernation there may not be enough flowers for them to feed on.

CONSERVING WILD BEES

How to help the bees without a yard, garden, or a green thumb:

- Talk to friends, family, and fellow community members about the importance of bees and encourage them to consider the bees' needs in their landscaping choices.
- Join a local Community Supported Agriculture (CSA) initiative or try to purchase local, seasonal, organic produce.
- Become a community scientist and join a project that focuses on native bees.
- Support organizations and initiatives that are helping to conserve bees and other pollinators.

Improving bee nesting habitat:

- Consider mulching with compost or leaves instead of wood chips to make the ground more accessible for ground-nesting bees.
- Plant [RI native plants](#) that have hollow, pithy stems that cavity-nesting bees can use for nests, such as native raspberries and Joe-Pye weeds. You can also plant native grasses to provide bumblebees with nesting and winter habitat. Examples include little bluestem, big bluestem, and switchgrass.
- Leave piles of twigs, branches, or logs on your property for cavity-nesting bees, wood-boring bees, and bumblebees.
- Leave the leaves and dried, perennial stems in the fall to provide cover and protection for overwintering bees.

Improving bee food availability:

- Allow [RI native wildflowers](#) to grow on your lawn, such as wild violets and asters. Grow native flowers, shrubs, and trees in your garden, and avoid cultivars of those species, which are not as nutritious for bees.
- If you are growing food for yourself or your community, consider planting RI native food plants frequented by bees, such as summer grape, low and highbush blueberries, American plum trees, and black cherry trees.
- If you don't have a garden, fill a window box or flowerpots with RI native flowers, such as violets, wild strawberries, goldenrods, and milkweeds.

- Avoid using weedkillers and insect sprays in your garden and on your lawn, as these can limit the availability of flowers available for bees to feed on and/or can poison the nectar and pollen that bees collect, which may kill or impair the bees and their offspring.
- Remove [invasive plants](#) like bittersweet, garlic mustard, and dog-strangling vine, which can outcompete and choke out native plants that are beneficial for bees.

For European Honeybee beekeepers:

- [Register your apiary](#) with the RIDEM Division of Agriculture and request regular inspections of your hive to help track potential disease outbreaks, which can be spread to wild bees.
- Join a local [beekeeping community](#) to stay up to date with the latest protocols on how to monitor and protect your hives from diseases and pests.
- Try not to place your hives in or near conservation areas to avoid resource competition with wild bees.

LEARN MORE

In addition to the bees listed in this guide, all of Rhode Island's bumblebee species can be identified by eye with practice! Check out the [RI Bumblebee Guide Video](#) on the RIDEM YouTube page to learn how to identify all Rhody bumblebee species.

For those interested in learning more about our region's bees, [The Bees in Your Backyard: A Guide to North America's Bees](#) and [Common Bees of Eastern North America](#) by O.M. Carril and J.S. Wilson are excellent guides.

DID YOU KNOW?

Many bee species rely on young forest habitat. Visit youngforest.org to learn more about how RI is part of a regional effort to conserve this critical habitat!

Wild Bee Species Profiles

Most of Rhode Island's bees are fairly difficult to identify. However, there are several common species of Rhode bees that can be identified by eye if you know where to look and what to look for. Remember to be respectful of wildlife when observing or taking pictures!



COMMON EASTERN BUMBLEBEE (*Bombus impatiens*)

Group: Bumblebees (genus *Bombus*)

Habitat: A common species found in a variety of habitats, including meadows, forests, riparian areas, and urban and suburban areas. This species likes to nest underground, especially in abandoned underground burrows left behind by other animals.

Behavior: Active from early spring to fall and can be found visiting a variety of common wildflowers and garden plants. Like other bumblebee species, *Bombus impatiens* females can perform “buzz pollination” to help them collect pollen from flower species like blueberries, tomatoes, and cranberries.

Identification: Both males and females of this species are distinctive from other Rhode Island bumblebees because they only have one band of yellow on the first segment of their abdomen.

Average length: Queens: ~2 cm; Workers and males: ~1.5 cm



EASTERN CARPENTER BEE (*Xylocopa virginica*)

Group: Carpenter Bees (genus *Xylocopa* and *Ceratina*)

Habitat: This species prefers to nest in dry, coniferous wood, such as dead trees, logs, and stumps. They are commonly found in forests and in urban and suburban areas.

Behavior: Active from early spring to fall and can be found foraging on a variety of common wildflowers and garden plants. Females can be observed creating holes in logs or dead trees, as well as fences, decks, and other wooden structures. Males may also be seen hovering outside of nest entrances to defend their mating territory.

Identification: Both females and males of this species are distinctive from other Rhode Island Bees due to the short, yellow hairs and black spot on their thorax in combination with a shiny, bare black abdomen. Males also have a white, shiny patch on their face.

Average length: ~2 cm

Wild Bee Species Profiles



MILWAUKEE MINING BEE (*Andrena milwaukeensis*)

Group: Mining bees (family Andrenidae)

Habitat: This species prefers to nest in the understories of forest edges and in shrubby areas. Similar to other mining bees, this bee is a ground-nesting species and nests in tunnels underground.

Behavior: Active from early spring to early summer and can be found feeding on flowering understory shrubs.

Identification: This species has long, dense hair that is orange and black. Both males and females of this species are distinctive from other mining bees in Rhode Island due to the orange hairs on the first two segments of their abdomen.

Average length: ~1 cm



BICOLORED STRIPED SWEAT BEE (*Agapostemon virescens*)

Group: Sweat bees (family Halictidae)

Habitat: This species is often found on lawns and in gardens nesting in burrows in communal, nesting aggregations.

Behavior: Active from the late spring until the early fall. This bee can be found foraging on a variety of garden plants, particularly asters (family Asteraceae).

Identification: Females of this species are distinctive from other sweat bees in Rhode Island due to the combination of their green thorax and their black and white striped abdomen (as opposed to black and yellow).

Average length: ~1 cm

Wild Bee Species Profiles



ORANGE-TIPPED WOOD DIGGER BEE (*Anthophora terminalis*)

Group: Tribe Anthophorini

Habitat: This species is often found near shrubby woodlands. They build their nests in hollowed out pithy stems or in rotting wood.

Behavior: Active from the late spring until the fall and can be found feeding on long-tubed flowers, such as jewelweed, penstemon, and mints.

Identification: The females of this species have distinctive orange hairs on the tip of their abdomen and the males of this species have a yellow “mustache” on the lower portion of their face. This furry bee has dust-colored hair with faint hair bands on the abdomen.

Average length: ~1.5 cm



TWO-SPOTTED LONG-HORNED BEE (*Melissodes bimaculatus*)

Group: Long-horned bees (tribe Eucerini)

Habitat: This ground-nesting species is often found in agricultural areas, as well as in urban and suburban areas.

Behavior: Active from the late spring until the late summer and often found visiting garden plants, particularly garden vegetables such as beans, cucumbers, and corn

Identification: Both males and females of this species are distinctive from other Rhode Island bees because they are all-black and hairy. The females have two small white dots on the end of their abdomen and white hairs on their hind legs. The males may have some faint, pale hairs on their abdomen and thorax and have a white face.

Average length: ~1.5 cm

Wild Bee Species Profiles



PRUINOSE SQUASH BEE *(Peponapis pruinosa)*

Group: Long-horned bees (tribe Eucerini)

Habitat: This ground-nesting species typically nests near its host plant, so it is often found in agricultural areas, as well as in urban and suburban areas.

Behavior: Active from summer to early fall and almost exclusively found in flowers of the squash family, such as pumpkins, winter squash, or zucchini.

Identification: Though these bees look similar to other Rhode Island long-horned bees, they are the only long-horned bee that visits squash flowers regularly. They also look similar to honeybees, which also visit squash, but are larger and more densely hairy and have white bands on their abdomen.

Average length: ~1.5 cm

Wild Bee Groups of Rhode Island

COMMON NAME	SCIENTIFIC NAME	SOCIALITY	APPEARANCE	NEST TYPE
Bumblebees	Genus <i>Bombus</i>	Social	Large bees with round bodies that are covered in a long, soft hair (called “pile”)	Nests underground usually, but also nests in tree hollows, in bunch grasses, or brush piles
Carpenter bees	Genus <i>Xylocopa</i> and <i>Ceratina</i>	Semi-social (loose social structure)	<i>Xylocopa</i> are large bees while <i>Ceratina</i> tend to be small; Usually black or dark-colored and shining	Nests in dead wood, such as dead trees, logs, and stumps
Long-horned bees	Tribe Eucerini	Solitary	Most males of this species have unusually long antennae	Underground burrows, usually in large aggregations
Digger bees	Tribe Anthophorini	Solitary	Usually robust with a banded abdomen; Males commonly have white or yellow facial markings	Underground burrows, usually in large aggregations
Cuckoo bees	Subfamily Nomadinae	Kleptoparasitic	Wasp-like in appearance with no pollen-carrying hairs	Does not build a nest; lays eggs in the nests of other bees
Mining bees	Family Andrenidae	Solitary	Small to moderate-sized bee; usually black or brown in color; abdomen usually longer than head and thorax combined	Ground-nesting bee
Sweat bees	Family Halictidae	Varies	Most are dark-colored (frequently brown or black) and metallic; several are all or partly green	Usually ground-nesting
Plasterer bees	Family Colletidae	Solitary	Small to medium in size; coloration varies considerably	Nests underground or in shallow cavities; nests lined with a waterproof, cellophane-like lining
Leafcutter bees	Genus <i>Megachile</i>	Solitary	Females collect pollen under their abdomen; usually dark in coloration with some lighter hairs	Usually ground-nesting; can nest in hollow twigs or other natural cavities; nests lined with flower petals or leaves
Mason bees	Genus <i>Osmia</i>	Solitary	Females collect pollen under their abdomen; most are shiny blue, but some are darker colored	Nests in naturally-occurring gaps, such as hollow stems or cracks in rocks; use mud to construct their nests