

Attracting Pollinators to Your Garden Using Native Plants



*Ruby-throated Hummingbird
feeding on trumpet honeysuckle
(Lonicera sempervirens)*

Native Plant and Pollinator Gardening Guide



What do hummingbirds, butterflies and bees have in common?

They all pollinate flowering plants.

Many of us enjoy the beauty of flowers in our backyard and community gardens. Growing native plants adds beauty and important habitats for wildlife, especially for pollinators. Even a small backyard garden can make a big difference. Gardening connects us to nature and helps us better understand how nature works. This guide will help you create a pollinator-friendly garden.

What is pollination?

Pollination is the process of moving pollen from one flower to another of the same species, which produces fertile seeds. Almost all flowering plants need to be pollinated. Some plants are pollinated by wind or water, and some are even self-pollinating. However, most flowering plants depend on bees, butterflies, and other animals for pollination.

Why use native plants in your garden?

Pollinators have evolved with native plants, which are best adapted to the local growing season, climate, and soils. Most pollinators feed on specific plant species – hummingbirds sip nectar from long, tubular flowers, while green sweat bees prefer more open-faced flowers. Non-native plants may not provide pollinators with enough nectar or pollen, or may be inedible to butterfly or moth caterpillars.



*Half-black bumble bee on eastern purple coneflower (*Echinacea purpurea*)*

Why Should We Care?

Keystone Species

When a bumble bee feeds on the nectar and pollen of blueberry flowers, it pollinates the flowers, which will produce fruit eaten by songbirds, black bears, and dozens of other animals, including humans. We call the bumble bee and other pollinators *keystone species* because they are species upon which others depend.

Pollinators are vital to maintaining healthy ecosystems. They are essential for plant reproduction, and produce genetic diversity in the plants they pollinate. The more diverse plants are, the better they can adapt to changes in the environment.

Best of all, pollinators such as hummingbirds, bees, and butterflies are beautiful and fascinating.

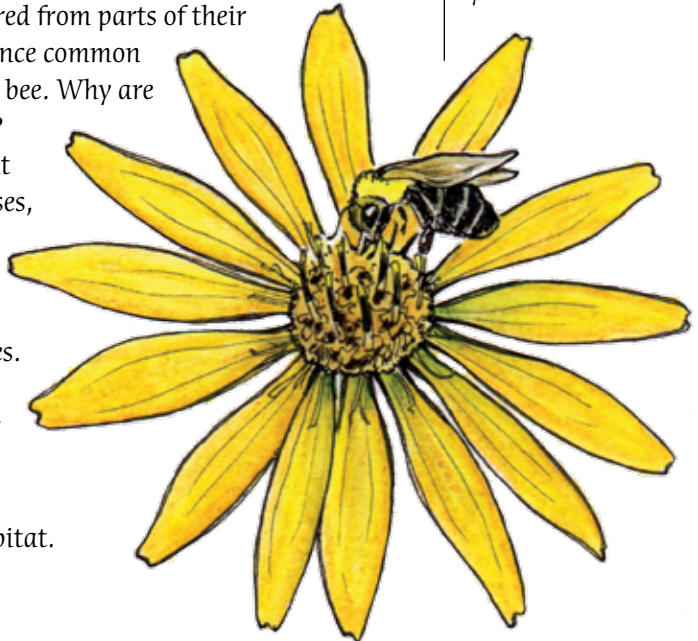
Pollinators need our help.

Biologists fear several butterfly and bumble bee species have disappeared from parts of their range, including the once common rusty-patched bumble bee. Why are pollinators in trouble? It appears that habitat loss, introduced diseases, pollution and pesticide poisoning account for much of the population declines. We can do our part to support pollinators by creating pollinator-friendly gardens and protecting wildlife habitat.

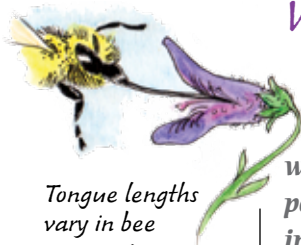
Eastern bumble bee on prairie dock (Silphium terebinthinaceum)



Insects and other animals pollinate one-third of the food we eat – all kinds of fruits, vegetables, grains, nuts, and beans. Even coffee and chocolate! The economic value of insect pollination worldwide has been estimated at \$217 billion.



Who Are Our Pollinators?



Tongue lengths vary in bee species. Long tongues fit long, tubular flowers like penstemons and short tongues fit short-tubed flowers like sunflowers.

Bees, butterflies, moths, hummingbirds, beetles, wasps and even flies pollinate flowers, but bee species pollinate flowers more often than any other group, including birds and butterflies.

Busy as a Bee

Bees are by far the most effective pollinators because they feed only on flowers. Flowers attract and reward bees for their pollination service. Bees gather two kinds of foods from flowers: sugar-rich nectar to fuel their flight and protein-rich pollen, or *bee bread*, to feed their young brood. Bees use their tongues to lap or lick up nectar from flowers.

Bees are a diverse group of insects that include four thousand species native to North America. They can be organized into two groups based on their nesting lifestyle: solitary or social. About three-quarters of native bees in North America are solitary nest builders.

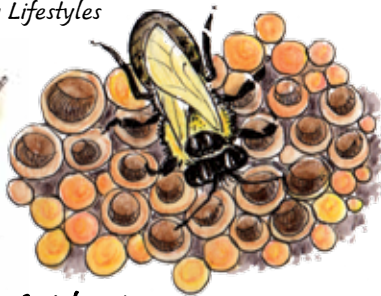


The European honey bee (*Apis mellifera*) is a social bee.

Nesting Lifestyles




Solitary leaf-cutter bee (*Megachile*) nest



Social nesting bumble bee (*Bombus*)

Tomatoes, peppers, and cranberries require a special bee behavior called "buzz pollination", in which the bumble bee grabs the flower in her jaws and vibrates her wings to dislodge pollen trapped in the flower's anthers.


 **GARDENING** Bees prefer blue, purple, white, orange and yellow flowers, and sweet fragrances. They see ultraviolet colors – found on the flowers of buttercup and black-eyed Susan.

Social Bees

Bumble Bee (*Bombus*)

There are forty-seven species of bumble bees in North America. Bumble bees are the B-1 bombers of bees. Because of their chunky size, they can fly in cooler temperatures and at lower light levels than many other bees including the honey bee. Thus, queen bumble bees are the earliest to emerge in spring in search of the first flowers of the season.

Lifestyle: An individual queen starts a colony in the spring after she wakes from hibernation. She produces wax from glands in her body to make pot-like cells in which to lay her eggs and to store nectar and pollen for her brood. The young emerge in a few weeks as female worker bees. As fall arrives, most bees die and only newly mated queens overwinter to establish new colonies.

 **GARDENING** Maple, willow, and serviceberry flower early in spring and attract bumble bees and mason bees.

Brown-belted bumble bee
(*Bombus griseocollis*)
on *Butterflyweed*
(*Asclepias tuberosa*)



Bumble bees groom pollen from their body hairs into "pollen baskets," or corbicula, for transport to the nest.

Solitary Bees



A female leaf-cutter bee will cut circular leaf pieces to line her nesting chambers.

Green Sweat Bee (*Agapostemon*)

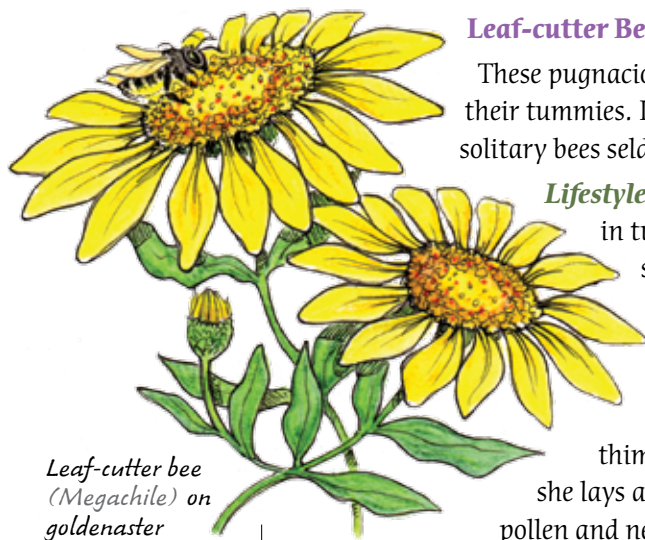
These small, brilliantly colored, metallic green bees are hard to miss in a garden. They're commonly called sweat bees because they occasionally land on people to lick up salty human sweat.

Lifestyle: Some sweat bees nest socially, but most are solitary ground-nesters.

Much of what we know about the evolution of social behavior among insects has been learned from sweat bees because they show different degrees of sociality. In some species, females build and nest alone; in others, females nest communally and share a common nest entrance but construct individual nest cells (like apartment buildings.)



Green sweat bee
(*Agapostemon*)
on blanketflower
(*Gaillardia aristata*)



Leaf-cutter bee
(*Megachile*) on
goldenaster
(*Heterotheca*
camporum)

Leaf-cutter Bee (*Megachile*)

These pugnacious bees carry pollen on their tummies. Leaf-cutter bees and other solitary bees seldom sting.

Lifestyle: They construct their nests in tunnels in the ground, under stones, or in existing holes in dead wood. A female bee cuts circular leaf pieces to line her nest chambers, which are shaped like thimbles end to end. In each, she lays an egg and provisions it with pollen and nectar for her eggs.



GARDENING Green sweat bees and leaf-cutter bees like composites – blanketflower, sunflower, and aster.

Solitary Bees

Orchard Mason Bee (*Osmia lignaria*)

These robust, metallic blue bees most commonly appear early in spring when trees and shrubs flower. Females carry pollen on the undersides of their abdomens.

Lifestyle: Orchard mason bees build nest cells in pre-existing narrow tunnels such as beetle burrows in trees or hollow centers of plant stems. In the nest tunnel, the female builds a series of horizontal cells provisioning each with pollen, nectar, and an egg and then seals the cell with mud.

By the end of summer, the bee will transform into an adult in its cocoon and overwinter in the chamber until it emerges in spring.

GARDENING

Important pollinators of fruit trees, just 250 mason bees can pollinate an acre of apple trees. It would take 10,000-250,000 honey bees to do the same work.

Mason bees like penstemon, and native flowering trees such as chokecherry, hawthorn, and serviceberry.

Orchard mason bees (*Osmia lignaria*)
on great blue lobelia (*Lobelia siphilitica*)

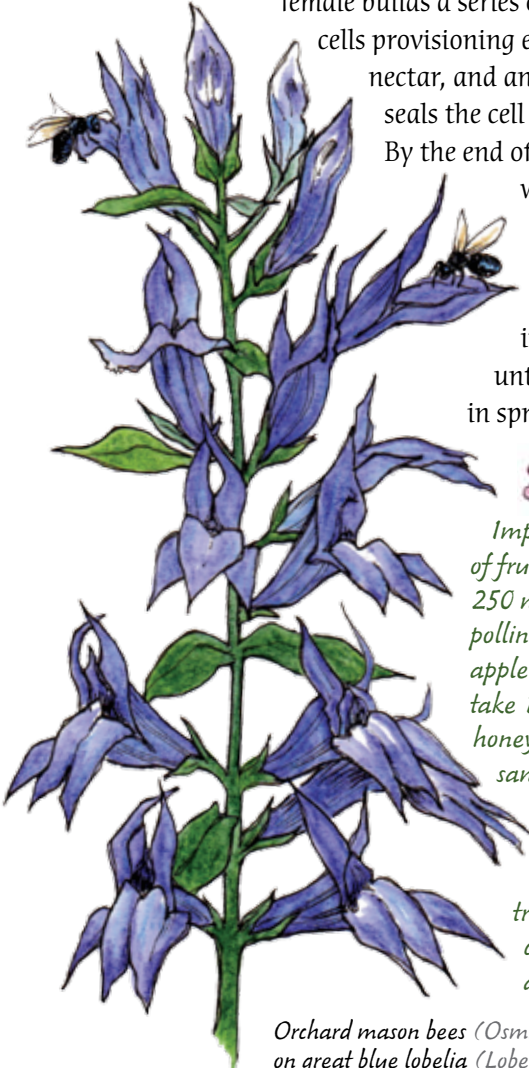


Mason bee houses provide nest sites for these important pollinators.



Orchard mason bee (*Osmia lignaria*)

If you see a bee carrying pollen on its belly or hind legs, it's a female bee.

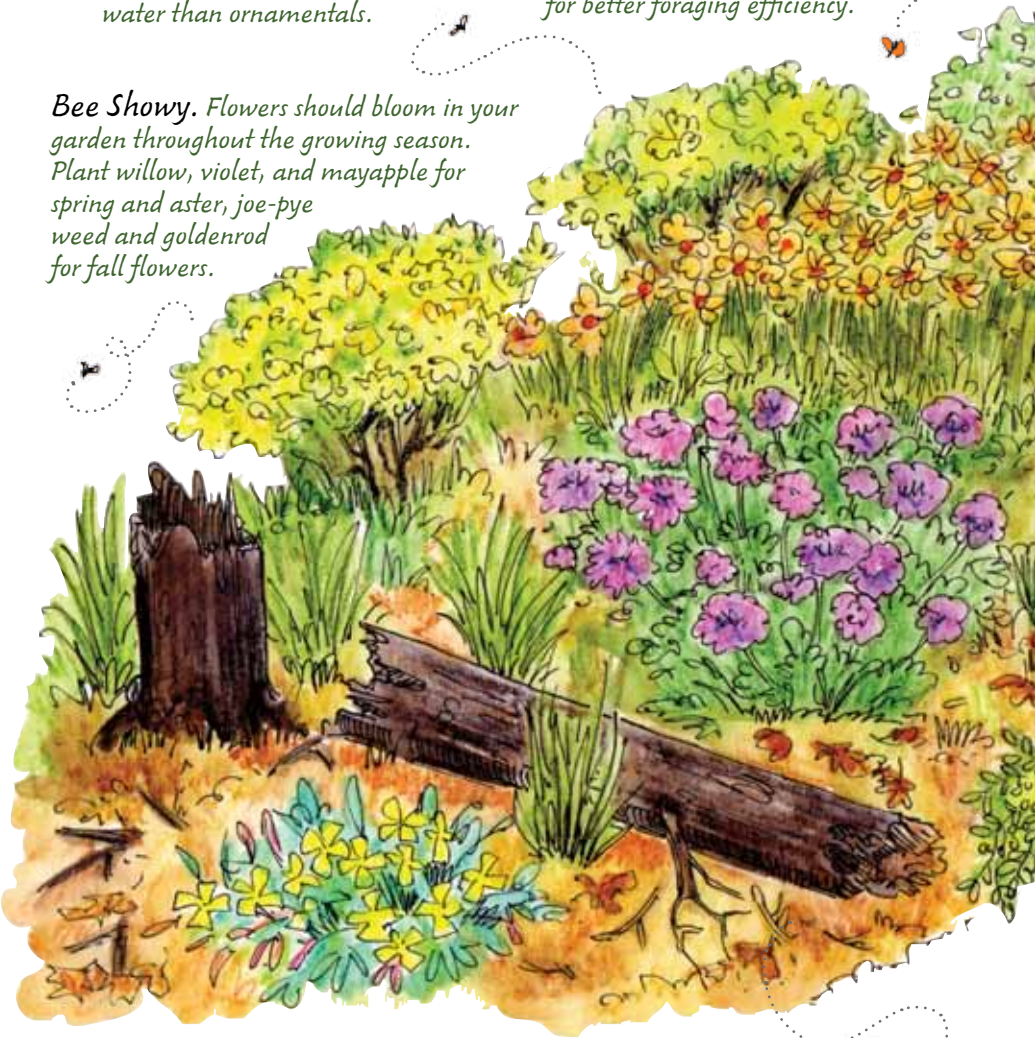


Planning your garden – think like a pollinator.

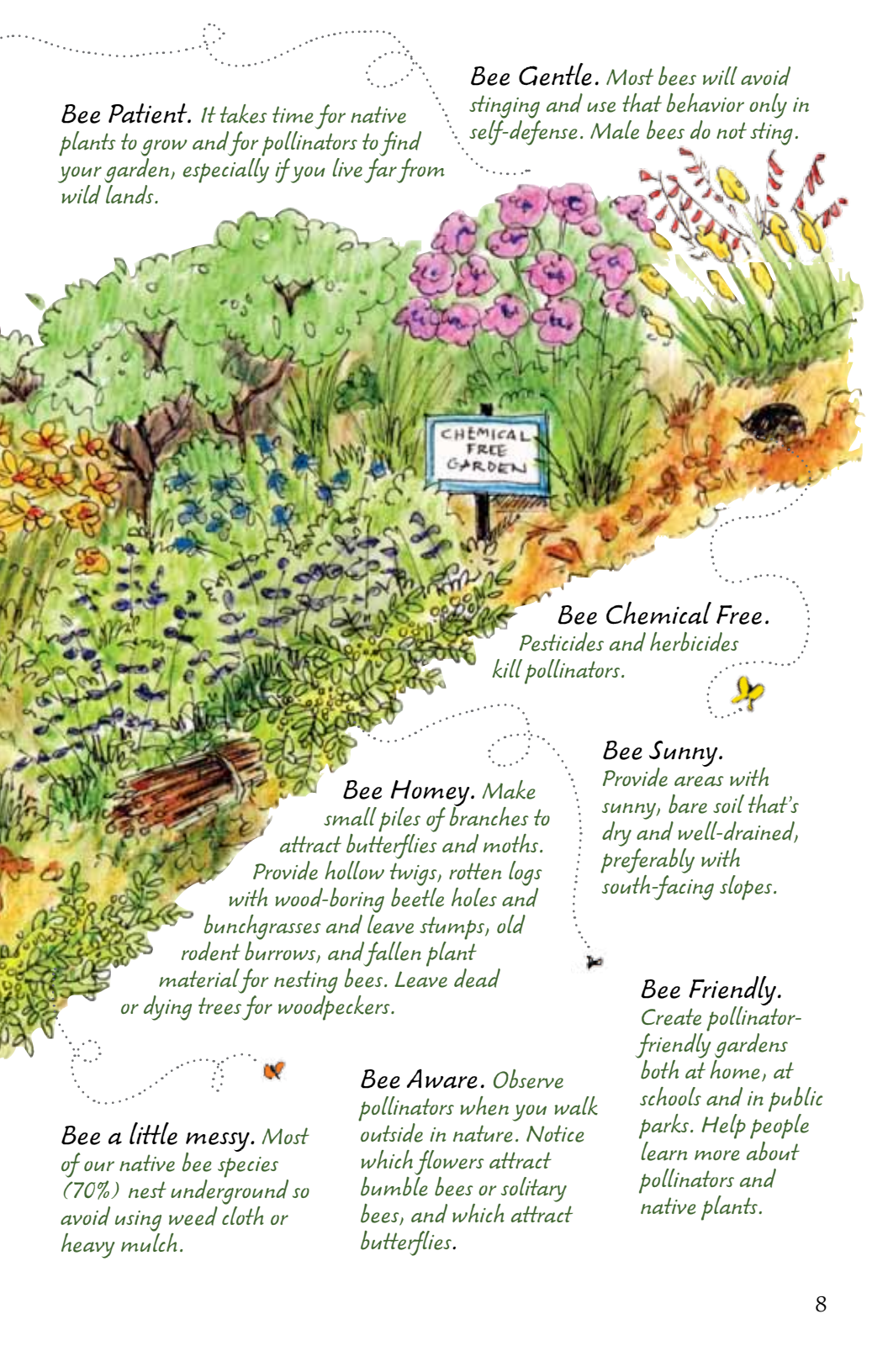
Go Native. Pollinators are “best” adapted to local, native plants, which often need less water than ornamentals.

Bee Bountiful. Plant big patches of each plant species for better foraging efficiency.

Bee Showy. Flowers should bloom in your garden throughout the growing season. Plant willow, violet, and mayapple for spring and aster, joe-pye weed and goldenrod for fall flowers.



Bee Diverse. Plant a diversity of flowering species with abundant pollen and nectar and specific plants for feeding butterfly and moth caterpillars.



Bee Patient. It takes time for native plants to grow and for pollinators to find your garden, especially if you live far from wild lands.

Bee Gentle. Most bees will avoid stinging and use that behavior only in self-defense. Male bees do not sting.

Bee Chemical Free.
Pesticides and herbicides kill pollinators.

Bee Homey. Make small piles of branches to attract butterflies and moths. Provide hollow twigs, rotten logs with wood-boring beetle holes and bunchgrasses and leave stumps, old rodent burrows, and fallen plant material for nesting bees. Leave dead or dying trees for woodpeckers.

Bee Sunny.
Provide areas with sunny, bare soil that's dry and well-drained, preferably with south-facing slopes.

Bee a little messy. Most of our native bee species (70%) nest underground so avoid using weed cloth or heavy mulch.

Bee Aware. Observe pollinators when you walk outside in nature. Notice which flowers attract bumble bees or solitary bees, and which attract butterflies.

Bee Friendly.
Create pollinator-friendly gardens both at home, at schools and in public parks. Help people learn more about pollinators and native plants.

Butterflies

By growing a bounty of native flowering plants in your garden, you can attract a variety of butterflies.


Eastern Tiger Swallowtail (*Papilio glaucus*)

This large butterfly (up to 6" wingspan) can be found from May through August.

Males can often be seen patrolling for females along streams, canyons and narrow roadways.

Lifestyle: A good pollinator garden contains food not just for adult butterflies, but for their caterpillars.

Female butterflies select specific plants on which to lay their eggs; this ensures that when their eggs hatch, the caterpillars will be able to eat the plant's leaves while growing into adult butterflies. Eastern tiger swallowtails lay their eggs on ash, chokecherry and other leaves.

 **GARDENING** Butterflies favor platform-shaped sunflower and aster, but will feed on a diversity of nectar-rich flowers from violet to serviceberry. They prefer red, purple, or yellow flowers with sweet scents. Butterflies love warm, sunny, and windless weather.

When disturbed, a swallowtail caterpillar rears up and extends two red horns (osmeteria) from its head to frighten off potential predators.

*Eastern tiger swallowtail (*Papilio glaucus*) on common serviceberry (*Amelanchier arborea*), one of its larval plants.*

Butterflies

Eastern Tailed-blue Butterfly (*Cupido comyntas*)

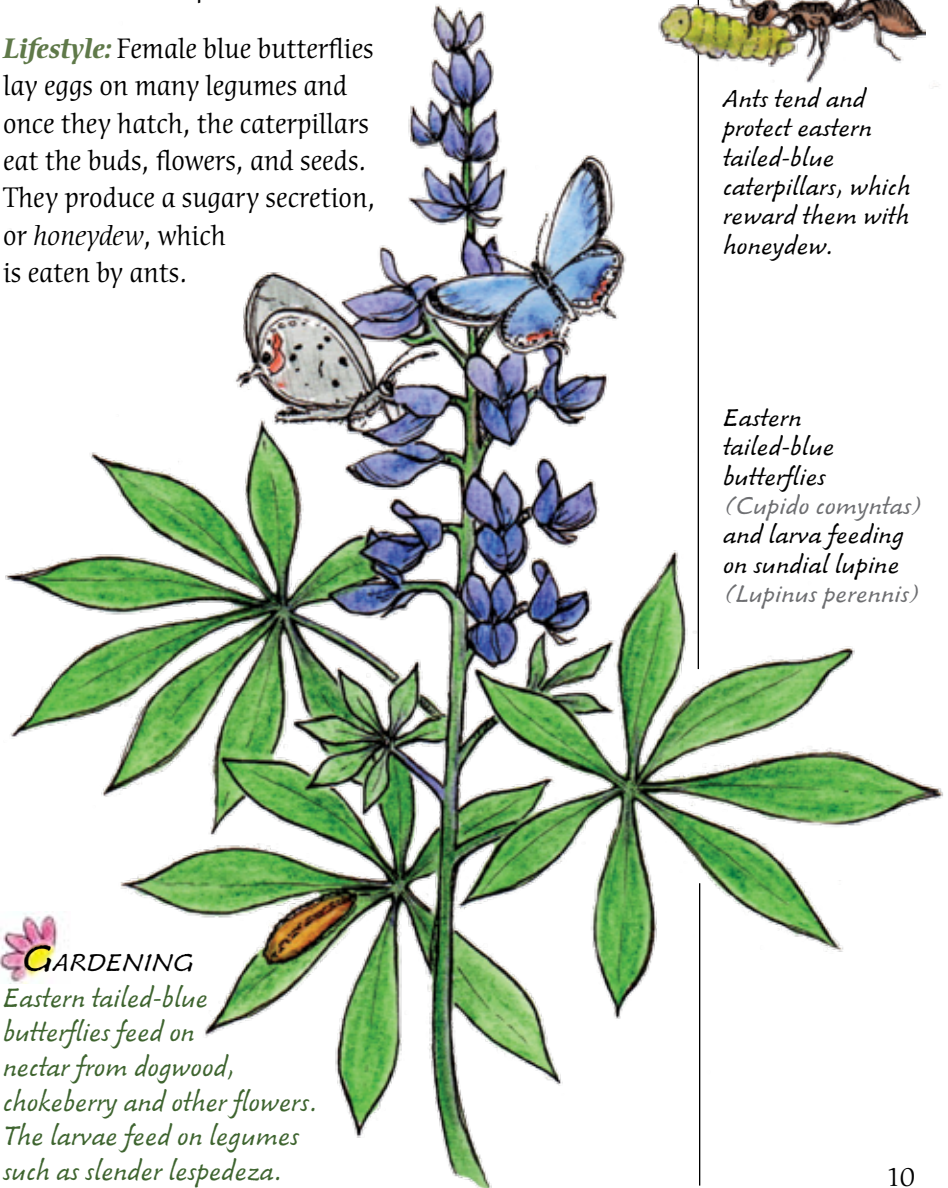
Adult eastern tailed-blue butterflies appear from the end of April to November. Male butterflies can often be seen *puddling*, which is sipping up soil salts and minerals in mud puddles.

Lifestyle: Female blue butterflies lay eggs on many legumes and once they hatch, the caterpillars eat the buds, flowers, and seeds. They produce a sugary secretion, or *honeydew*, which is eaten by ants.



Ants tend and protect eastern tailed-blue caterpillars, which reward them with honeydew.

Eastern tailed-blue butterflies (*Cupido comyntas*) and larva feeding on sundial lupine (*Lupinus perennis*)



GARDENING

Eastern tailed-blue butterflies feed on nectar from dogwood, chokeberry and other flowers. The larvae feed on legumes such as slender lespedeza.

Moths

Can you tell a butterfly from a moth?

Butterflies are brightly colored and moths are more often colored in muted grays and browns.



A butterfly antenna (top) is a single filament with a club at the tip, while a moth antenna (bottom) can be broad and feathery or tapered to a point.

White-lined sphinx moth (*Hyles lineata*) feeding on yellow evening primrose (*Oenothera* sp.)

These night-flying pollinators often evade detection, but there's one that flies by day to sip nectar from flowers – the sphinx moth.

White-lined Sphinx Moth (*Hyles lineata*)

Although many moth species pollinate flowers, the sphinx or hawk moth is probably the one most familiar because it's active by day.

Lifestyle: They're great flyers and some have tongues longer than their bodies. These large moths fly upwind, tracking the airborne fragrance trail to a cluster of flowers. Their caterpillars, called tobacco and tomato hornworms, are well known to gardeners.



GARDENING

Sphinx moths, also called "hummingbird" moths, prefer pale or white flowers that open in the evening and that have a strong, sweet smell. They pick up pollen on their legs and wings. Adults nectar on columbine and honeysuckle. Caterpillars feed on evening primrose.

Hummingbirds

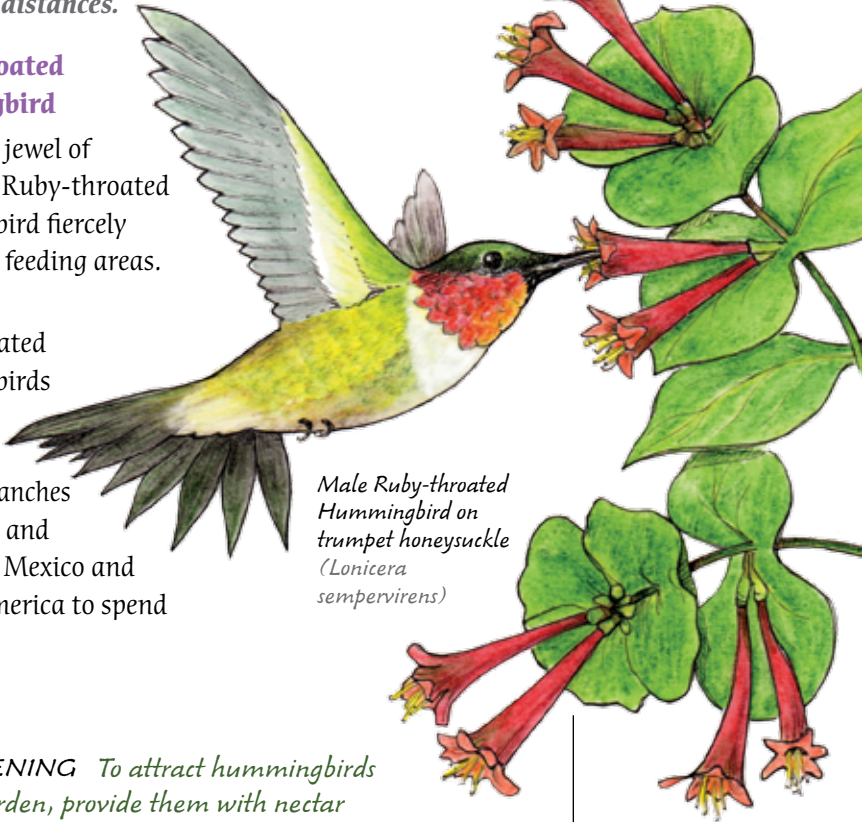
Because hummingbirds specialize on nectar feeding, they play an important role in pollination. These colorful, migratory birds serve as a link between plant populations by visiting flowers and moving pollen over great distances.

Ruby-throated Hummingbird


A tiny jewel of a bird, the Ruby-throated Hummingbird fiercely defends its feeding areas.

Lifestyle:

Ruby-throated Hummingbirds nest on tree limbs or shrub branches in summer and migrate to Mexico and Central America to spend the winter.



Male Ruby-throated Hummingbird on trumpet honeysuckle (*Lonicera sempervirens*)

 **GARDENING** To attract hummingbirds to your garden, provide them with nectar starting in early spring. It's thought that hummingbirds prefer red-colored flowers; however, they will feed on any flower that produces abundant nectar.

Sap wells created by Yellow-bellied Sapsuckers supply many animals with a quick energy boost. Hummingbirds need lots of insects (protein) in their diet, and will nab insects stuck in sap wells.



There are many species of hummingbirds in the United States including Anna's, Rufous and Black-chinned.

Beetles, Flies and Wasps



Flower beetle
(*Typocerus*)

Flower Beetle (*Typocerus*)

Beetles present the greatest diversity of insects and pollinators. Regular flower visitors include soldier beetles and flower beetles. They feed on pollen and even chew on flowers, but in this “mess and soil” pollination process they pick up pollen and carry it to other flowers.



GARDENING These beetles are commonly seen on yarrow and sunflower.



Hover fly
(*Syrphid*)

Hover Fly (*Syrphid*)

Because they're so abundant, flies are important pollinators even though they transport less pollen than bees. Hover flies mimic bees and wasps in coloration and behavior to avoid predators.



GARDENING Hover flies feed on the same flowers preferred by bees, such as purple coneflower, sneezewood, and sunflower.



Pollen wasp
(*Pseudomasaris*)

Pollen Wasp (*Pseudomasaris*)

Don't be frightened if you see this wasp, it doesn't eat insects or sting humans, but seeks out flowers for pollen. A yellow jacket look-a-like, pollen wasps can be identified from other wasps by their clubbed antennae. They're solitary nesters and you might find their hard mud nests attached to rocks or twigs.



GARDENING Pollen wasps pollinate penstemon and phacelia.

How do I find pollinator-friendly native plants for my garden?

The Pollinator Partnership offers 31 different planting guides tailored to specific ecoregions in the United States. Each guide is chock-full of native plant and pollinator information.

To get the guide specific to your ecoregion:

1. Visit the Pollinator Partnership website: www.pollinator.org
2. Click on *Planting Guides*.
3. Enter your 5-digit zip code.

You'll find the *Selecting Plants for Pollinators* guide that fits your region. Check out the charts that list which native plants grow best in your area so that you can attract more pollinators to your garden.



Your Source for Pollinator Action and Information.

For more information on pollinators and native plants, check out *The Xerces Society* website: www.xerces.org.



*Mourning cloak
(Nymphalis antiopa)*

How do butterflies survive the winter?

Mourning cloak, Milbert's tortoiseshell, and anglewing spend the winter as adults, but most butterflies overwinter as eggs, caterpillars or pupae. In your garden, tree cavities, leaf litter and branch piles shelter over-wintering butterflies from predators and cold weather.



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