Bees like this eastern carpenter bee (Xylocopa virginica), here taking a shortcut to nectar by slicing through the side of a hosta flower, are among hundreds of bee species native to North America.

HONEY BEES (Apis mellifera) may garner more of the limelight, but North America is also home to approximately 4,000 known native bee species that are just as agriculturally, horticulturally, and ecologically important. While they don’t form large, honey-making colonies like their better known but non-native counterparts, these indigenous bees are among the most essential pollinators in our natural areas, farm fields, and gardens.

Some North American species even appear to do a better job of pollinating crops than honey bees. For example, researchers have found that blue orchard mason bees (Osmia lignaria) are far more effective pollinators of cherry orchards, resulting in over twice the fruit yields of honey bee pollinated orchards. This is not surprising given that many native bees are often more tolerant of cool or moist conditions and have longer foraging times—giving them the pollination edge.

However, like honey bees, native bee populations have been declining over the last several years. This decline “speaks towards land use and the lack of diversity of our vegetation,” says Deborah Delaney, bee specialist and assistant professor of entomology at the University of Delaware in Newark. Factors such as habitat loss, wide-scale pesticide use, and climate change all have impact, but gardeners can help.

APPRCIEATING DIVERSITY
American bee species “come in a jewel box of different colors—from metallic green to bottle blue, gold, brown, and glossy black,” says Scott Hoffman Black, the executive director of the Xerces Society, an organization dedicated to invertebrate conservation. Sizes vary from the enormous one-inch valley carpenter bee (Xylocopa vasipunctata) to one of the world’s smallest bees, Perdita minimus, which is under two millimeters long. Those in different shapes, hair types, tongue lengths, and other characteristics, and their diversity is staggering.

When it comes to nesting, about 90 percent of these species are solitary, while the rest are social and hive-forming. Nests may be underground or above ground in cavities; depending on the species, nests may be constructed from mud (mason and plasterer bees), plants (leafcutter bees), earth (mining bees), or excavated wood (carpenter bees). Solitary bees tend to produce few young (often one to ten) in underground nests, while some bumble bees and sweat bees nest in aboveground crevices and produce small colonies.

There is a direct correlation between bee size and flight distances, larger species like bumble bees can fly up to a mile or more when foraging, while medium to small bees...
may only forage a couple hundred feet from their nests. Most native bees are polylectic, which means they pollinate a wide variety of plant species. Others may be oligolecic (pollinating a few, closely-related plant species) or specialized even further to be monolectic (pollinating one plant species).

**NURTURING NATIVES**

With these basic facts in mind, there are several things gardeners can do to support native bees. “If every gardener tried to create a haven for bees, it would increase habitat exponentially,” notes Black. Protecting and providing nesting areas and food sources are key. Equally important is safeguarding bees from pesticides. All broad-spectrum pesticides can kill bees, but research shows that neonicotinoid pesticides used in agriculture and horticulture—such as clothianidin, thiamethoxam, and imidacloprid—are the most harmful. Because neonicotinoids maintain residues in pollen, they can poison pollinators long after application.

To encourage native ground-dwelling bees to nest, avoid disturbing areas of bare, friable earth around plants as much as possible, and avoid applying bark mulch. Choose compost or leaf mold instead. If this is not feasible for you, try doing this in just a small area of your yard that you leave “wild.” For above-ground nests, you can create artificial nest sites. For example, layers of clay-mud blocks may encourage certain southwestern bee species adapted to arid conditions to nest in the cool cracks between blocks. “Nest blocks,” either purchased or homemade from wooden blocks drilled with numerous holes like the one above provides many native solitary bees with ideal nesting sites.

**BASIC BEE CHARACTERISTICS**

Bees are closely related to wasps, so share several features such as large compound eyes on the sides of their heads and two pairs of wings. However, a number of characteristics distinguish the two insects. Physically, the most obvious difference between the two is that bees tend to be much hairier than wasps. These soft hairs are feathered or branched, whereas any wasp hairs are straight. While most wasps are carnivorous, all bees are vegetarians.

Wasp do not collect pollen, and only female bees collect and transport pollen to nests to feed their young. For this purpose, they often have specific structures on their hind legs or abdomen adapted for carrying pollen. These structures are either corbiculae (“pollen baskets” consisting of a smooth concave area with fringes of curved long hairs) that hold pollen, or scopae (patches of stiff hairs) to which pollen can adhere.

Some wasps—such as yellow jackets or bald-faced hornets—can be aggressive when defending themselves, but there is little to fear from native bees in general. “Most solitary bees don’t or can’t sting,” says Scott Hoffman Black, executive director of the Xerces Society, a nonprofit organization dedicated to invertebrate conservation. “Bumble bees can sting but they rarely do,” he adds. Male bees do not have stingers at all.

**PLANTS THAT ATTRACT BEES**

As a general guideline for deciding which plants to include in your garden to attract native bees, it’s helpful to keep in mind that flowering plants that depend on bee pollinators to reproduce have specific suites of floral traits adapted to attract them. These traits include “landing pads” for bees to rest upon while collecting and feeding, sweet fragrance, and sugary nectar. The flowers tend to be shades of yellow, blue, or white with special markings that guide bees to nectar. Many are tubular with bilateral symme-

**SWEET BEES**

Sweat bees, like the one here visiting a black-eyed Susan, are efficient pollinators. They produce young at different times, so ideally your planting scheme should ensure that something is in bloom during all the seasons, even winter. “I recommend planting three good bee plants for spring, three for summer, and three for fall,” says Black, “so there is a buffet of flowers throughout the growing season.”

Gordon Frankie, professor of urban entomology at the University of California, Berkeley and director of the Urban Bee Lab, concurs with this strategy. He suggests that gardeners aim for at least 20 different plant species overall to bring the bees, based on bee population sampling he has conducted around California. No matter the season, Frankie found the richness of bee species in Berkeley and Santa Cruz. By contrast, he found “little diversity of bee species in San Diego,” he says. He attributes the difference to the regional plant palates—landscapes featuring a few plant species with limited wildlife value correlated with very low bee diversity and numbers in general. “The more bee-plant biodiversity you have, the more diverse the bees you will attract,” he notes.

**HAIRINESS**

Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right. Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right. Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right. Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right. Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right.

Hairiness is one conspicuous characteristic that differentiates bees like this mining bee (Andrena dunningi), left, from wasp cousins like this paper wasp (Polistes sp.), right.
try, like salvia and snapdragon flowers, or in heads, as with daisies and sunflowers. Because native bee and plant species evolved together, growing native flowering plants is a good way to attract local bee species to your garden. For example, the scented, golden flowers of vernal witch hazel (Hamamelis vernalis) will lure early-emerging native bees as will pussy willows (Salix discolor). Woodland wildflowers such as sharp-lobed hepatica (Hepatica acutiloba), violets (Viola spp.), and rue anemone (Thalictrum thalictroides) also draw spring-emerging solitary bees. Waves of spring beauties (Claytonia virginica) that appear in open woodlands and lawns are favored by a diminutive and rewarded bee (Andrena originais). The bright white flowers of bloodroot (Sanguinaria canadensis) are pollinated almost entirely by Carlin’s andrena bee (Andrena carlini).

Later in the spring, natives such as false indigos (Baptisia spp.), lupines (Lupinus spp.), and California poppies (Eschscholzia spp.) attract a variety of bees. Spring-blooming trees and shrubs, such as American linden (Tilia americana), serviceberries (Amelanchier spp.), goldenrods (Solidago spp.), and hawthorns (Crataegus spp.), are also essential nectar and pollen providers. In summer, perennials such as blanketflowers (Gaillardia spp.), penstemons (Penstemon spp.); and corelows (Echi nacea spp.) attract all sorts of different native bees. The violet-purple spikes of giant blue hyssop (Agastache foeniculum) are favored by bumble bees (Bombus spp.), digger bees (Melissodes spp.), and leaf-cutter bees (Megachile spp.). Summer and winter squash are sure to attract tiny squash bees (Paramelissodes spp.). Native roses (Rosa spp.) are almost exclusively bee pollinated, and though milkweeds are often associated with butterflies, several species are important to native bees as well—particularly showy milkweed (Asclepias speciosa) and common milkweed (A. syriaca). Fall-blooming asters (Symphyotrichum spp.), perennial sunflowers (Helianthus spp.), goldenrods (Solidago spp.), and Joe Pye weeds (Eupatorium spp.); supply bees with the requisite food stores to overwinter. The flowers of many non-native plants also can feed bees, including lavenders (Lavandula spp.) and other aromatic herbs. Fragrant, showy-flowered species that be-