

Wild Bees

.....
of New Hampshire

THE UNSUNG
HEROES
OF THE
POLLINATOR
WORLD ARE
FACING
TRYING TIMES

BY SANDRA **REHAN**

Bees hold a special place in nature. The best known is the honey bee, prized for its wax, honey and pollination services. Despite its popularity, domestication and mass production for commercial agriculture and honey production, the honey bee is an introduced species, brought to North America around 200 years ago by European settlers. Wild bees are the unsung heroes of the pollinator world, with over 20,000 species worldwide, 4,000 in North America and an estimated 200 species in the Granite State. They vary in nesting habits and exhibit a range of behaviors, from solitary to social. Wild bees have lived in North America for thousands, if not millions, of years and are remarkably well adapted to their regional habitats.



ACCIDENTAL POLLINATORS

Bees need flowers for pollen and nectar, as this is their only source of protein and sugar. Pollination is an accidental action on the part of bees. Many plants require cross-pollination in order to produce fruit, and bees do this as they visit many flowers, depositing pollen on the different plants as they feed. Most bees are generalist pollinators and will visit many types of flowers. Others are specialists, relying on a single host plant for all of their nutrition.

Interestingly, wild bees do not make honey, but instead use the pollen and nectar they collect to form a pollen ball, which is all the food their offspring will need to develop from eggs to adults. Most bees are solitary and have no contact with their offspring other than providing a pollen ball for their eggs. A smaller number of species are social and remain at the nest to provide prolonged parental care and sometimes a second brood of offspring, with the help of their first. When mothers and daughters cooperate to form a colony, it is called “eusocial” (the honey bee is one example). This strategy can be very successful and result in large colonies composed of hundreds or even thousands of bees.

Given that most bees are solitary, not aggressive, do not produce honey, and do not form large colonies, these species have historically gone undocumented, and little is known about their pollination services and nesting habits. This lack of attention does not mean that wild bees are not important. Many farmers do not use commercial honey bees to pollinate their crops, instead relying on wild bees to provide this invaluable service. These diverse bees are imperative to most pollination and agriculture in the Northeast.

NAME THAT BEE

Among the wild bees, there are several common groups. The most diverse and locally abundant are the *sweat bees* (family *Halictidae*). Sweat bees are small (4-13 mm) metallic green or black species that live in the soil. They dig tunnels beneath the earth, a few inches to a few feet in depth. Sweat bees got their common name from biologists observing them in the field. These bees don't get enough salt from flowers, so they will land on humans to drink sweat. Sweat bees are mostly solitary, but some form small societies of 10-20 bees. They range from generalist to specialist foragers

and are common locally on many crops and flowering plant species, including apple, milkweed, coneflowers and clover. Sweat bees are found worldwide; approximately 70 species live in New Hampshire.

Leaf-cutter bees (family *Megachilidae*) are another locally common pollinator. This group's common name stems from their habit of cutting round discs of plant material with their mouthparts and using the leaf material to line their nests. Solitary leaf-cutter bees live above the ground in pre-existing cavities, including dead stems and branches. With lots of hairs on their undersides, they are highly efficient pollinators.

Mason bees (also family *Megachilidae*) are closely related to leaf-cutter bees and are similar in behavior and nesting habitat. Mason bees are so named because they make mud compartments within their nests. They often burrow in soil and hollow stems, and some species even live in old abandoned snail shells. These bees are also solitary and efficient pollinators due to their generalist floral preferences and the high number of flowers they visit. Collectively, there are an estimated 30 species in the leafcutter and mason bee family in New Hampshire.

Another common generalist pollinator found locally, and across eastern North America, are *carpenter bees* (family *Apidae*). Carpenter bees come in two varieties, large (15-20 mm) and small (5-9 mm). Carpenter bees received their name for their nesting habit of living in dead wood. Large carpenter bees are represented locally by a single black and yellow species that bores into hardwoods and is commonly observed in decks, benches and wooden sidings of residential homes. Males of this species are very territorial and hover around the nest entrance. Likely due to their large size and this hovering behavior, large carpenter bees are often spotted in residential areas. Male carpenter bees do not possess a stinger. Only females can sting, using their modified ovipositor, or reproductive egg-laying organ. Four species of small carpenter bees are found in New Hampshire, all of which are metallic blue-green in color. Small carpenter bees make nests in dead pithy stems, including rose, raspberry, blackberry and sumac. They are important pollinators of squash, melon, raspberry and coffee.

Bumble bees are probably the best known and most appreciated of the wild bees in North America. They are important pollinators of blueberry, cranberry, eggplant and tomatoes. Bumble bees form

BEE RESEARCH



The UNH Bee Lab, established in 2013, is actively surveying bee populations to determine the status of pollinators in New Hampshire. Sandra Rehan and her students are studying wild bee distributions, habitat preferences, floral associations and nutritional requirements to conserve and protect native pollinators. Recent efforts have documented new and introduced species to New Hampshire, range expansions of bees historically found in southern states, and local extinction of formerly abundant species. The lab is located on the Durham campus of the University of New Hampshire and works closely with the N.H. Fish and Game Department on the conservation of the state's bees.



"Bee hotels," like this one at the UNH Bee Lab, provide habitat for wild bees.

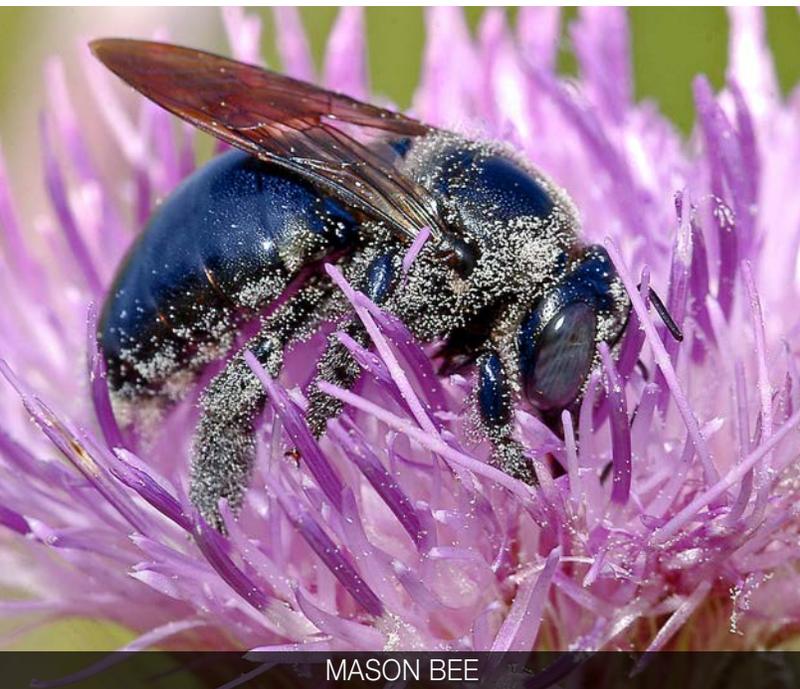


SWEAT BEE



© STEVENANZ.COM

LEAF CUTTER BEE



MASON BEE



© BRAD THOMPSON / DREAMTIME.COM

LARGE CARPENTER BEE



SMALL CARPENTER BEE



© ROGER IRWIN

EASTERN (LEFT) AND TRI-COLORED BUMBLE BEES

Bees are vital to our food supply, as they pollinate 87 of our agricultural crops, accounting for 35% of our current food production.



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large colonies beneath the ground or make burrows in abandoned hay bales or mouse burrows. Colonies typically are made up of 50 bees. Bumble bees are remarkably similar in size and appearance to large carpenter bees, but bumble bees are much hairier. New Hampshire currently has ten species of bumble bees, but historic records suggest that fifty years ago, there were many more species present in the state. Many bumble bee species are in decline here and disappearing worldwide, and it is for this reason that four species have been listed as species of Greatest Conservation Need in New Hampshire's Wildlife Action Plan.

BEES IN TROUBLE

Based on evidence from global, national and regional surveys, bees are not doing well. Species that were once common are no longer present in many areas, and new species are being introduced because of climate change and human transport. Many invasive species have come from Europe and Asia through accidental human introduction. It is unknown what effect these introduced species might have on wild bee populations and what diseases they might carry. A major cause of bee decline is pathogens. This is best documented for honey bees, which are infected by a wide range of viruses, bacteria and fungi. Recent evidence suggests that

pathogens from honey bee populations are spilling over onto wild bees, possibly because of cross-contamination from visiting the same flowers.

Another major cause of bee decline is pesticides. There is ongoing controversy as to what specific pesticides are worse than others, but in general, the habitual use of chemicals is harmful to bees. Insecticides, designed to kill pest insect species, can harm wild bees. Fungicides and herbicides also have negative effects on bee health.

Perhaps the most devastating factor responsible for bee decline is land use change and the lack of floral resources. Bees, like any animal, need food to survive. When land is cleared or mowed, then bees cannot gain access to flowers, or they have to fly much farther to find food. The lack of abundant floral resources leads to small clutch sizes and brood mortality. Likewise, climate change is an important consideration. Wild bees have flower preferences, and as temperatures change and become more unpredictable, some flowers are not available when bees are searching for food. Overall, there are many factors at play, most of which have negative effects on bee health.

Without sustained populations of pollinators, we will not have the gardens and green spaces we love. Bees are vital to our food supply, as they pollinate 87 of our agricultural crops, accounting for 35% of our current food production.

WHAT YOU CAN DO

There are important actions we can take to conserve wild bees. The simplest action is refraining from disturbing bee habitat. Restricted mowing, tilling, pesticide use and land clearing would all benefit pollinators by giving them a chance to forage, nest and reproduce. Planting pollinator gardens is a way to compensate for the lack of natural land and forage for bees. It is important to consider a mix of flower species that bloom all season long, as different bees require pollen and nectar at different times and also benefit from a diverse diet.

A great way to encourage bees to nest in your yard is to construct a bee hotel. Bee hotels can be large or small and made from a combination of scrap wood and dead broken stems, as well as bricks and stones. Leaf-cutter, mason and carpenter bees will all readily take to these habitats, regardless of the time of year they are installed. Most bees, however, live in the soil, so leaving bare soil patches and not over-tilling or paving the land is key to retaining their nesting sites.

Bees are truly remarkable creatures, and we have much to learn about their nesting habits and flower requirements. The first step to saving the bees is gaining a better understanding of their natural state. The next time you find a bee buzzing in your garden, take a moment to reflect on how much we rely upon their work. 

Sandra Rehan is an Assistant Professor in the Department of Biological Sciences at the University of New Hampshire. She is director of the UNH Bee Lab and a passionate advocate for wild bee conservation.

TAKE ACTION FOR BUMBLE BEES

Four species of bumble bees are listed in the Wildlife Action Plan as Species of Greatest Conservation Need. Rusty-patched, yellow, yellow-banded and American bumble bees have all declined throughout their ranges due to a combination of habitat loss, pesticide use (including neonicotinoids), and the introduction of a disease by bumble bees raised in captivity to pollinate greenhouse-grown tomatoes. You can help bumble bees by planting flower gardens that bloom from early spring through late fall. Ask your plant supplier if plants or seeds were treated with neonicotinoids before you buy them, as the pesticide remains in the plant for a very long time.



For more information about wild bees in New Hampshire, visit nativebeesofnewengland.com. To learn more about the UNH Bee Lab, visit unhbeelab.com.



YELLOW-BANDED BUMBLE BEE

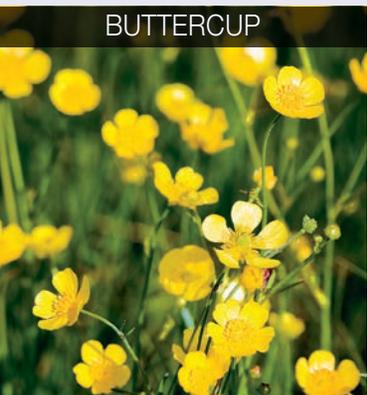
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A HOME FOR WILD BEES

There are many things you can do to help out New Hampshire's wild bees. Building a bee hotel or bee box (left) and placing it on the south side of a fencepost, tree or building is a great way to provide nesting opportunities for wild bees. This will attract leaf-cutter, mason and carpenter bees. There are many websites with instructions for how to build a bee box. Another great way to encourage bees to take up residence in your yard is to plant a pollinator garden. Select a mix of flowers that will produce blossoms all season long. The flowers shown below are just a sampling of the many species that are ideal for providing forage opportunities for bees.

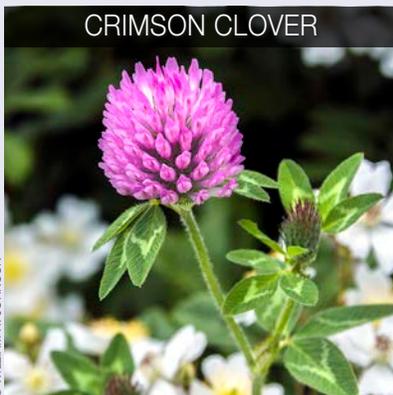


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BUTTERCUP

© WILLIAM H. JOHNSON



CRIMSON CLOVER

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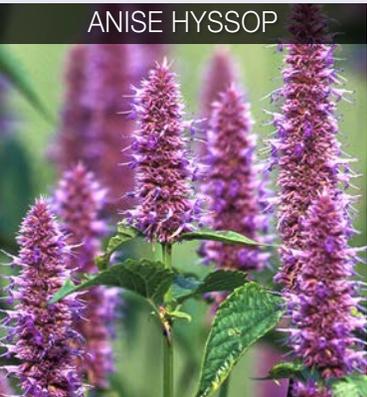


HAWKWEED

© JOHN GILL



LUPINE



ANISE HYSSOP

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BLACK-EYED SUSAN

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PURPLE CONEFLOWER

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SUNFLOWER