

THE LAST BEST PLACE FOR **BUMBLE BEES**

Times are tough for native bumble bees across North America, but a volunteer army is helping uncover a bonanza buzzing in Big Sky Country.

BY PAUL J. DRISCOLL

FLOWER POWER A Lapland bumble bee (*Bombus sylvicola*) in the Beartooth Range packing a large wad of pollen with its corbicula, aka “pollen basket.” This polished cavity on a bee’s rear leg has a fringe of hairs that grips a wad of pollen grains gathered from flowers for transport. PHOTO BY CLAY BOLT



Though Michelle Toshack is one of Montana’s top bumble bee experts, two summers ago in her front yard in Livingston, she was baffled by a furry black-and-yellow bee.

“I thought, *What on earth is that weird-looking bee?*”

It turned out to be a two-spotted bumble bee, *Bombus bimaculatus*, common to the eastern United States and southeastern Canada and occasionally seen in eastern Montana. Her find is the farthest west the species has ever been recorded.

Toshack hopes this year will bring more surprises. She works for an international pollinator conservation nonprofit called the Xerces Society, which is building an army of volunteer bumble bee surveyors to help map the presence and diversity of these fuzzy insects for a project known as the Bumble Bee Atlas. Launched in the Pacific Northwest in 2018, this ambitious effort has spread to 21 states and enlisted nearly 30,000 surveyors.

Montana joined in 2024 with Toshack as lead. Since then she has trained 442 volunteers across the state who have conducted 628 bee surveys, categorizing more than 5,500 bumble bees to date. Administered by the Xerces Society, this project partners extensively with federal and state agencies, local nonprofits, plant societies, hiking groups, and any other interested parties to get as many people as possible engaged.

“Montana has some of the best bumble bee habitat on earth, and we sit right at the

Paul Driscoll is a volunteer for the Xerces Society and the Montana Bumble Bee Atlas. This is his fifth story for Montana Outdoors.

convergence point of eastern and western species, so we are incredibly important for the future of America’s bumble bees,” Toshack says. “In fact, we’re home to at least 29 of North America’s 50 native bees, tied for first place with South Dakota for the number of species we host. It’s possible the Montana Bumble Bee Atlas will help push us past 30.”

“**Montana has some of the best bumble bee habitat on earth.**”

FLYING PICKUPS

Montana’s extraordinary abundance of bumble bees comes courtesy of its large expanses of wild lands and wildly varied geography—prairies that attract species from Canada and the east, high alpine peaks and forests that invite bees from the north and west, and scrubby sagebrush steppe connecting arid basins to the south.

Bumble bees are cold blooded like all insects, but they come equipped to survive Montana weather with a coat of fuzzy insulating hair and a remarkable ability to thermo-regulate by “shivering”—vibrating



GIVE ME A C Some flowers only release pollen for bumble bees, waiting for the unique middle-C note of their buzzing wings to vibrate their anthers.

their flying muscles to increase their temperature to the 86 degrees F needed for flight. This allows them to forage in cold that leaves other bees grounded.

It’s not the only extraordinary thing their two-bladed wings can do. Bumble bees sweep them in a unique figure-eight pattern to hover like hummingbirds, and can fine tune their wingbeats to resonate at the exact frequency that coaxes certain flowers to release a shower of pollen dust, a phenomenon known as “buzz pollination.” In the world of native blooming plants, some flowers have evolved to transfer pollen exclusively to bumble bees.



DEFIER OF WEATHER AND PHYSICS Bumble bees are built to survive the fickle weather of alpine environments such as those found above timberline in Glacier National Park, where some of the greatest species diversity can be found. When temperatures plunge, bumble bees warm up by “shivering,” vibrating their flight muscles to generate heat. Scientists were once confounded by how bumble bees can fly with such large bodies and tiny wings, seeming to defy the laws of physics. The trick turns out to be how they move their wings—not up and down, but in a figure-eight pattern. Tiny changes in air pressure caused by those movements keep bumble bees aloft.

FROM TOP: ILLUSTRATION COURTESY OF POLLINATOR PARTNERSHIP; ART BY STEVE BUCHANAN; PAUL QUENEAU

FROM TOP: TAMARA HATCH; CLAY BOLT

These flowers may put a high value on a bumble bee's ability to haul huge loads of pollen. The "flying pickup truck" of the insect world, bumble bees can carry nearly their own weight using specialized "pollen baskets" on their hind legs called corbiculae, and an expandable sac in their abdomen to store nectar.

The tongues (called proboscis) of each species vary from 5 to 18 millimeters depending on the shapes of local flowers, allowing some to gather nectar from tube-shaped mountain huckleberry blooms and others from more open flowers like wild geranium. Bumble bees rank among the most effective pollinators on earth, ranging for miles at times to find whichever blooms hold the richest bounty on a given day.

"They are kind of like the mountaineers of the bee world, able to fly in cooler temperatures and earlier or later in the day than other bees, especially at higher elevations," Toshack says.

That hard work is energy intensive, and a foraging bee can starve to death in a matter of hours if fresh blooms aren't found. While nectar can be converted to quick energy,

More than 75 percent of flowering plants — wild and cultivated — rely on pollinators.

pollen is carried back to their underground nests as protein to feed the colony. Research has shown that compared to honey bees introduced here from Europe, bumble bees are far more efficient at moving large amounts of pollen between more flowers and over greater distances.

A GLOBAL CHALLENGE

Unfortunately, bumble bees worldwide are in steep decline due to a combination of disease, habitat loss, pesticides, invasive plants, and the warming climate. That drop isn't just bad news for flowers; it has a cascade of negative consequences that ripple across entire ecosystems.

"As plant distribution shifts or declines, animals that rely on plants for food are also affected, from insects to birds to large mammals such as deer and even humans," says Tabitha Graves, a research ecologist in Columbia Falls with the U.S. Geological Survey (USGS).

Almost 90 percent of wild flowering plants and 75 percent of food crops around the world depend on pollination for successful seed and fruit production. According to the USGS pollinator strategy, even wind-pollinated crops such as corn and soybeans benefit from visits by bees. Through the work they do to support our country's food supply, pollinators contribute billions of dollars annually to our economy.

Though Montana is especially rich in bumble bee species, it is home to at least four in decline, including the western, Morrison, American, and Suckley's cuckoo bumble bee—a parasitic bee that relies on the western bumble bee. It was last recorded in Montana in 2015 and has not been seen since. Toshack hopes surveys will turn up more.

In 2025, Montana Bumble Bee Atlas surveyors recorded 44 western bumble bees,

an increase from 32 the previous year. Just 40 years ago this species was common across its expansive range but today is increasingly hard to find.

"These surveys do wonders to help us understand species distribution across the state," Toshack says. "It helps us know where species are, which habitats they're using, and which flowers they rely on to help inform on-the-ground conservation efforts." For some bee species, scientists don't have enough information to assess trends. "That's why it's so important to get this kind of baseline information about pollinators."

Understanding bumble bee population trends is essential. If numbers are rising, that could mean habitat and other environmental conditions are improving and conservation efforts are succeeding. If populations are declining, habitats may be degraded and require repair and improvement.

Native bumble bees also have an uneasy coexistence with commercially farmed European honey bees. Though they don't interbreed with commercial honey bees, they do compete for pollen and nectar. Wild bumble bees also visit some of the blooming crops that honey bees circulate among, creating a vector for diseases.

In the early 1960s, a honey bee parasite common to Europe was inadvertently introduced into North America and made its way into wild bee colonies. Known as the *Varroa destructor* mite, it is a serious nuisance for honey bee keepers but can be effectively controlled with pesticides such as amitraz. For wild bumble bees, though, the mite carries other diseases including a parasitic fungus that damages the digestive tract and appears to diminish foraging abilities, shortening the already brief life of worker bumble bees.

THE MORE YOU KNOW

Montana bumble bee documentation and collection began in earnest when early biologists helped establish the Montana Entomology Collection in 1898. This collection of more than 3,000 bumble bee specimens resides in Bozeman at Montana State University (MSU).

Like many insects, bumble bee species can be tough to differentiate because hair color and other characteristics can vary across their ranges. That is another reason



BEE BANK Montana State University entomologists Casey Delphia (at left) and Michael Ivie used a collection of more than 3,000 bumble bee specimens collected across Montana since 1898 to help grow the number of known species in the state.

TUMBLING BUMBLE BEES Though Montana is especially rich in bumble bee species, it is home to at least four species in decline:



DEATH BY A THOUSAND CUTS

In Montana and across the globe, bumble bees and other pollinators face a mounting list of challenges that put populations in peril and, in some cases, on the brink of extinction. Stressors include land conversion, pollution, and invasive species, as well as factors intensified by the warming climate such as droughts, wildfires, and storms.

Pesticides also do enormous harm.

Neonicotinoids, the most widely used pesticides on earth, kill not only pest insects but also bumble bees, butterflies, and other beneficial bugs, and remain deadly in the environment for up to three years. Yet they are one problem everyone can help alleviate by choosing organic products and avoiding yard and garden treatments that contain imidacloprid, acetamiprid, dinotefuran, clothianidin, or thiamethoxam. When purchasing plants, ask for those not treated with neonicotinoids. For more information and a list of products to avoid, visit xerces.org/pesticides/.



ILLUSTRATION BY VIRGINIA WAGNER; FIRST PUBLISHED IN *PNAS: INSECT DECLINE IN THE ANTHROPOCENE* BY DL WAGNER

CLOCKWISE FROM TOP: PHOTO BY ADRIAN SANCHEZ-GONZALEZ; CLAY BOLT; KEVIN SCHAEFER; CLAY BOLT; CLAY BOLT

why accurate and repeated field surveys are so important.

Before 2014, Casey Delphia, an entomologist and research scientist at MSU, called wild bee data for the state a "black hole." Four counties, three in the eastern part of the state, had no bumble bee data at all. Delphia and Michael Ivie, entomology curator at MSU, and graduate student Amy Dolan set out to better catalog the state's bumble bee species.

Delphia and Dolan examined bees from the university's collection, then requested Montana bumble bee specimens from 25 museums, federal agencies, and universities. Some specimens dated to the 1880s. In 2015, they spearheaded a new collection effort, focusing first on Montana counties

with little or no bumble bee data. Biologists, volunteers, and students collected and identified 15,000 bumble bees, which helped grow Montana's known species to 29.

That led to publication of *Bumble Bees of Montana* in 2017, and since then the team has added 13,405 bumble bee records.

Graves and her team at USGS also conduct population surveys and studies over a multi-state region including Montana. USGS works with the U.S. Fish & Wildlife Service, the Bureau of Land Management, Glacier National Park, tribes, and ranchers to conduct this research, which guides management and restoration and tracks bumble bee population trends. The western bumble bee is one of their focus species, as it is for the Montana Bumble Bee Atlas.



Bumble bee on Phacelia flower



USGS's Tabitha Graves surveying for bumble bees in eastern Montana



TRAINED EYES Michelle Toshack (above) and Marirose Kuhlman (opposite page) helped launch the Montana Bumble Bee Atlas in 2024. They have so far trained more than 400 volunteers how to catch bees with nets, scoot them into glass vials, then place them in a cooler for 10 minutes where bees go into a deep sleep so they can be handled and identified. It's safe for the bees, and volunteers essentially never get stung.

MONTANA BUMBLE BEE ATLAS RESULTS TO DATE

5,572
bumble bees identified

22 of Montana's 29
known species detected

442 participants

628
surveys completed

"We used data from 14,000 surveys between 1998 and 2020 and found a 57 percent decline throughout its historic range," Graves says. "Montana's mountain ranges are strongholds, and notably, the Greater Yellowstone Ecosystem had the smallest decline of anywhere on the continent—around 15 percent."

The Northern Rockies and isolated mountain ranges in Montana have seen declines around 36 percent, while the plains of eastern Montana fell 53 percent. Some states have fared even worse, such as California, which declined 83 percent.

HELP WANTED IN EASTERN MONTANA

The Montana Bumble Bee Atlas aims to conduct more surveys in the eastern portion of the state in 2026, where many grid cells have not yet been adopted by volunteers (see map on opposite page). This project is funded largely through the U.S. Forest Service, but that grant runs out at the end of the year.

Toshack offers training to land managers

Montana is the last best place for pollinators."

and volunteers primarily in the spring. They then head out to survey bumble bee populations. Volunteers adopt grid cells where they conduct 45-minute surveys, catching bumble bees in nets and transferring them to small vials that are placed in a cooler for 10 minutes. This puts bees to sleep so they can be easily handled and photographed for identification. Afterward, bees slowly wake up and, after several more minutes, fly away unharmed. Volunteers submit information about the species of bees and the flowers they found them on to bumblebeewatch.org.

After handling thousands of bumble bees using this method, Toshack has only once been stung. "Surveyors basically never get

stung, which always surprises people."

The streams of new data coming in is exciting news for Kristina Smucker, FWP's Nongame Wildlife Bureau chief.

"Montana is the last best place for pollinators and the top western state for bumble bee diversity. The Bumble Bee Atlas is exactly the kind of well-organized, statewide effort we need right now," she says.

FWP updates its State Wildlife Action Plan every 10 years, and the 2025 edition identified several bumble bees as "species of greatest conservation need."

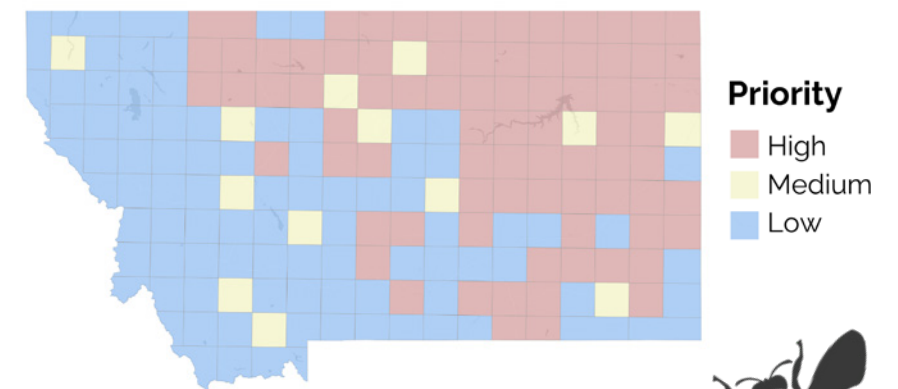
One big way every Montana homeowner can help is just outside their front door. After Toshack made her 2024 front yard discovery of a two-spotted bumble bee, she created a native garden for pollinators. Pollinator gardens provide an enormous benefit for bees and other pollinators, says Marirose Kuhlman, habitat coordinator for Missoula County's ecology department.

Working with Toshack, Kuhlman helped launch the Montana Bumble Bee Atlas and is a proponent of "rewilding your backyard"

[see "Pollinator Playground," page 42]. She offers four-hour workshops on small-scale pollinator landscaping and judicious use of pesticides. Kuhlman, who advises people to check the Montana Native Plant Society website for information on local or regional pollinator-friendly plants, says the Montana Department of Natural Resources and Conservation nursery in Missoula is also a great source for perennial plant-plugs.

By planting a pollinator garden, you never know what might show up. Last year when Toshack was home in Livingston between trips traveling the state to train new volunteers, her eyes caught a familiar form buzzing through native wildflowers in her garden.

"There in my yard I saw another two-spotted bumble bee, which is so very cool," she says. "With just two records in the Livingston area, we can't document a true range shift, but it helps us start to see patterns. We were flying blind for many decades when it came to bumble bees, but with all the new surveys going on, I'm thrilled we finally are getting the data to do right by them."



The Montana Bumble Bee Atlas divides the state into survey grid cells (above), with red cells marking the highest-priority, under-surveyed areas, showing the need for more volunteers in the state's eastern half.

For training and instructions on how to adopt a cell, visit: bumblebeeatlas.org/pages/mountain-states/.

