

Bumble Bees in Montana

by Amelia C. Dolan, *Middle School Specialist at Athlos Academies, Boise, ID and former MSU Graduate Student*; Casey M. Delphia, *Research Scientist, Departments of Ecology and LRES*; and Lauren M. Kerzicnik, *Insect Diagnostician and Assistant IPM Specialist*

Bumble bees are important native pollinators in wildlands and agricultural systems. Creating habitat to support bumble bees in yards and gardens can be easy and is a great way to get involved in native bee conservation.

MT201611AG New 7/16

BUMBLE BEES ARE IMPORTANT NATIVE

pollinators in wildlands and agricultural systems. They are easily recognized by their large size and colorful, hairy bodies. Queens are active in the spring and workers can be seen throughout the summer into early fall. Creating habitat to support bumble bees in yards and gardens can be easy and is a great way to get involved in native bee conservation.

Bumble bees are in the family Apidae (includes honey bees, bumble bees, carpenter bees, cuckoo bees, sunflower bees, and digger bees) and the genus *Bombus*.

There are approximately 250 bumble bee species worldwide and over 45 in North America north of Mexico. To date, 28 species have been documented in Montana. For more information about these 28 species, or to obtain a key for identifying bumble bees to species, please visit the Bumble Bees of Montana section of the Montana Entomology Collection website (mtent.org) and click on the “Bumble Bees of Montana” link.

Bumble Bees as Pollinators

While crop pollination services are normally attributed to honey bees, most people do not realize there are thousands of wild, native bees, including bumble bees, which play an important role in pollinating both wild and cultivated plants. In fact, native bees are often more efficient than honey bees at pollinating many plants.

Bumble bees are one group of bees that are able to “buzz pollinate,” which is important for certain types of plants such as blueberries and tomatoes. Within the flowers of these types of plants, pollen is held in small tube-like anthers (i.e. poricidal anthers), and is not released unless the anthers are vibrated. Bumble bees buzz pollinate by landing on the flower, grabbing the anthers with their jaws (i.e. mandibles), and then quickly vibrating their flight muscles. The vibration effect is similar to an electric toothbrush and the pollen is released. In many plants, pollination occurs as the

pollen falls from the anthers to the stigma, thus fertilizing the flower. Pollination can also occur when pollen grains fall onto the bumble bee’s body hairs and are transferred to other flowers as the bee moves from one plant to the next.

Life Cycle and Social Structure

Similar to honey bees, bumble bees live in colonies with overlapping generations, social castes, and division of labor (i.e. they are a eusocial species). In a bumble bee nest,

there will be only one queen, an individual that is often significantly larger than the other bees in the colony. The queen is solely responsible for laying eggs for colony growth. Throughout the summer, several generations of female workers are produced. In late summer the queen produces large females destined to be next year’s queens and males whose sole purpose is reproduction.



Bombus huntii



Bombus bifarius



Bombus occidentalis



Bombus rufocinctus

Individual bumble bee queens spend the winter hibernating in compost piles, leaf litter, or other protected areas. In spring, queens emerge and begin foraging for sugary nectar that provides important carbohydrates needed for energy and protein-rich pollen. They also start searching for nesting sites. Nests can be found above ground in abandoned bird houses, grass tufts, and underneath wood, brush or rock piles. But, they are most commonly found underground in abandoned rodent nests or other types of hollow cavities.

Once the queen has located a suitable nesting site, she begins constructing the nest by creating a small “honey pot” made out of wax secreted from her abdomen and filling the honey pot with nectar. Next to the honey pot, she constructs a second wax cell, or “brood clump,” fills it with a pollen/nectar mixture, and lays the first eggs of the colony into this cell. She will incubate these eggs while drinking nectar from the honey pot. The eggs will hatch in about five days and the larvae will feed together on this pollen mass. In some species, the queen will feed the newly emerged larvae individually by regurgitating a pollen/nectar mixture.

The larvae progress through four larval instars (i.e. feeding stages). The first generation of workers emerges as adults after four to five weeks. These often smaller-than-normal workers will take over the jobs of foraging for nectar and pollen, building and maintaining the nest, caring for the eggs and larvae, and defending the nest. Once there are enough workers to sustain the colony, the queen’s only job is laying more eggs. By the end of the summer there can be anywhere from 50–500 workers, depending on the species. Near the end of summer, new queens and males emerge from the colony. The new queens will feed on nectar, mate and then find a place to hibernate for the winter. All the remaining members of the colony, including the original queen (i.e. foundress), die at the end of the summer (unlike honey bees whose colonies are perennial and overwinter and survive for many years).

Threats to Bumble Bees

Natural Enemies. Like any other animal, there are many natural threats to bumble bee colonies, including pathogens, parasites, predators, and parasitoids. Pathogens include viruses, bacteria, and fungi. Parasites include mites and cuckoo bumble bees. Cuckoo bumble bees are social parasites, meaning a queen will “hijack” an established colony of another bumble bee species, kill the queen, and rely on the already present workers to rear her offspring. Insects, spiders, birds, and mammals are all known predators of bumble bees. Certain fly species, wasps, and some nematodes are known parasitoids of bumble bees.

Human-caused Stressors. Populations of some bumble bee species are in decline, and in some areas, bumble bees’ native ranges are shrinking. These declines are likely due to a variety of factors. Urbanization and agricultural intensification have fragmented bumble bee habitat and caused a shortage of high quality food. Pathogens and parasites from nonnative and commercial bees have been shown to spread to native bee populations. Competition from non-native bees may also increase stress on a colony. Chemicals in the environment like pesticides can have sub-lethal effects on bees, including reduced immunity, foraging capabilities, and overall health. Currently, there is a great deal of research being conducted on specific pesticides’ effects on bees. If pesticides must be used make sure to follow all labels directions carefully and spray in the evening when bees are less active. Changes in local climate may also impact bumble bee health in the future. Especially at risk from climate change are certain species, like *B. kirbiellus* and *B. sylvicola*, known to only inhabit high-altitude or arctic environments.

Creating Habitat for Bumble Bees

Home-made bumble bee houses are typically not effective at attracting bumble bee tenants. However, there are some things homeowners, gardeners, and landscapers can do to attract and support these native pollinators. Namely, plant some of their favorite flowers. Bumble bees forage on a

diverse array of plants that include flowering trees, shrubs, herbaceous perennials, and annuals (See Table 1 on page 4). It's important to choose several plant species with different bloom times in order to provide a continuous supply of food resources from early spring until late fall. Additionally, leaving the yard and surrounding landscape a bit “messy” can create essential nesting and overwintering habitat (e.g. compost, leaf, and brush piles). It is also important to provide access to fresh water either in a bird bath or shallow dish filled with pebbles.

Fear of Bees?

Human's fear of bees is often unwarranted. Despite their large size and loud buzzing, bumble bees are important pollinators and should not be feared. Only female bumble bees have the ability to sting, but they are usually not aggressive and rarely sting unless threatened. Honey bees have much larger colonies and tend to be more aggressive when defending their nests and honey stores. In addition, some social wasps like yellow jackets, which are often mistaken for bees, are more aggressive because they are scavengers often found interacting with humans. However, caution should be taken near all bees in case of allergic reactions to bee stings.

Additional Resources

Bumble Bees of Montana

[http://mtent.org/Projects/Bees%20of%20Montana/bumble bees/bumble bees home.html](http://mtent.org/Projects/Bees%20of%20Montana/bumble%20bees/bumble%20bees%20home.html)

Bumble Bees of the Western United States

www.fs.fed.us/wildflowers/pollinators/documents/BumbleBeeGuideWestern2012.pdf

Bumble Bees of the Eastern United States

www.fs.fed.us/wildflowers/pollinators/documents/BumbleBeeGuideEast2011.pdf

Montana Bee Identification Guide

www.pollinator.org/PDFs/MontanaBeeGuide-Final.pdf



One example of a bumble bee friendly garden



Nest of *Bombus impatiens*

FUN FACTS

Bumble bees are able to thermoregulate better than most other insects. When temperatures are too low for flight, they warm their bodies up by “shivering.” Basically, they vibrate their thoracic flight muscles until enough heat is generated to allow for flight.

Some scientists once claimed that bumble bees defy the laws of physics by being able to fly with their large bodies and tiny wings. Obviously bumble bees can fly, even though they are not the most graceful of aeronauts. The trick is in the way the wings move – it's not an up/down motion, but more of a figure 8. The tiny changes in air pressure caused by these wing movements are what keep the bumble bees aloft.

While honey bees are the most economically important commercial pollinators, they are not native to North America. Colonists brought them from Europe in the early 1600s.

TABLE 1. Floral resources for bumble bees. The following list includes Montana native plants as well as non-native plants that grow well in our region and are not considered invasive in Montana. Some of the plants on this list are toxic to livestock, and are therefore recommended for use in the home garden or other similar landscapes.

Common name	Genus
TREES	
American plum	<i>Prunus americana</i>
Apple, crabapple	<i>Malus</i> spp.
Cherry	<i>Prunus</i> spp.
Chokecherry	<i>Prunus virginiana</i>
Maple	<i>Acer</i> spp.
Pear	<i>Pyrus</i> spp.
Serviceberry	<i>Amelanchier alnifolia</i>
Willow	<i>Salix</i> spp.
SHRUBS	
Cotoneaster	<i>Cotoneaster</i> spp.
Elderberry	<i>Sambucus</i> spp.
Golden currant	<i>Ribes aureum</i>
Ninebark	<i>Physocarpus</i> spp.
Redosier dogwood	<i>Cornus sericea</i>
Shrubby cinquefoil	<i>Dasiphora fruticosa</i>
Siberian pea tree	<i>Caragana arborescens</i>
Snowberry	<i>Symphoricarpos</i> spp.
Spirea	<i>Spiraea</i> spp.
Sumac	<i>Rhus</i> spp.
Western sandcherry	<i>Prunus besseyi</i>
Wood's rose	<i>Rosa woodsii</i>
ANNUALS	
Calendula	<i>Calendula officinalis</i>
California bluebells	<i>Phacelia campanularia</i>
California poppy	<i>Eschscholzia californica</i>
Cosmos	<i>Cosmos bipinnatus</i>
Lacy phacelia	<i>Phacelia tanacetifolia</i>
Plains coreopsis	<i>Coreopsis tinctoria</i>
Sunflower	<i>Helianthus annuus</i>
Rocky Mountain bee plant	<i>Cleome serrulata</i>

Common name	Genus
PERENNIALS	
Bee balm	<i>Monarda fistulosa</i>
Blazing star	<i>Liatris</i> spp.
Buckwheat	<i>Eriogonum</i> spp.
Catmint	<i>Nepeta</i> spp.
Chives	<i>Allium</i> spp.
Columbine	<i>Aquilegia</i> spp.
Coneflower	<i>Echinacea</i> spp.
Coral bells	<i>Heuchera</i> spp.
Fireweed	<i>Chamerion angustifolium</i>
Fleabane	<i>Erigeron</i> spp.
Goldenrod	<i>Solidago</i> spp.
Harebell	<i>Campanula rotundifolia</i>
Hyssop/Horsemint	<i>Agastache</i> spp.
Jacob's ladder	<i>Polemonium</i> spp.
Larkspur	<i>Delphinium</i> spp.
Lupine	<i>Lupinus</i> spp.
Maximilian sunflower	<i>Helianthus maximiliani</i>
Milkvetch	<i>Astragalus</i> spp.
Northern sweetvetch	<i>Hedysarum boreale</i>
Oregano	<i>Origanum</i> spp.
Penstemon/Beardtongue	<i>Penstemon</i> spp.
Pincushion flower	<i>Scabiosa</i> spp.
Prairie Clover	<i>Dalea</i> spp.
Rabbitbrush	<i>Chrysothamnus</i> spp.
Raspberry, blackberry	<i>Rubus</i> spp.
Red clover	<i>Trifolium pratense</i>
Russian sage	<i>Perovskia atriplicifolia</i>
Sage	<i>Salvia</i> spp.
Showy milkweed	<i>Asclepias speciosa</i>
Silverleaf phacelia	<i>Phacelia hastata</i>
Sticky geranium	<i>Geranium viscosissimum</i>
Thyme	<i>Thymus</i> spp.
Waterleaf	<i>Hydrophyllum</i> spp.
White clover	<i>Trifolium repens</i>



To order additional publications, please contact your county or reservation MSU Extension office, visit our online catalog at store.msuextension.org or e-mail orderpubs@montana.edu

Copyright © 2016 MSU Extension

We encourage the use of this document for nonprofit educational purposes. This document may be reprinted for nonprofit educational purposes if no endorsement of a commercial product, service or company is stated or implied, and if appropriate credit is given to the author and MSU Extension. To use these documents in electronic formats, permission must be sought from the Extension Communications Coordinator, 135 Culbertson Hall, Montana State University, Bozeman, MT 59717; E-mail: publications@montana.edu

The U.S. Department of Agriculture (USDA), Montana State University and Montana State University Extension prohibit discrimination in all of their programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital and family status. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeff Bader, Director of Extension, Montana State University, Bozeman, MT 59717.