WILDLIFE
IN MANAGED FORESTS

Native Bees

Oregon Forest
Resources Institute

Wildlife in Managed Forests – Project Overview

This publication is part of a series from the Oregon Forest Resources Institute that aims to synthesize current research findings and make information available to foresters, wildlife managers and interested parties such as conservation organizations, regulators and policymakers. As part of the Wildlife in Managed Forests outreach project, information is disseminated through publications such as this one, as well as workshops, tours and conferences.

PROJECT PARTNERS:

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Manulife Investment Management
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For copies of this report or further information, contact:

Oregon Forest Resources Institute
9755 SW Barnes Rd., Suite 210
Portland, OR 97225
(971) 673-2944

KnowYourForest.org
OregonForests.org

PREPARED FOR THE OREGON FOREST RESOURCES INSTITUTE BY:

Jon Cox, Cafferata Consulting
Fran Cafferata, Cafferata Consulting
Julie Woodward, Oregon Forest Resources Institute

CONTRIBUTORS FOR THE OREGON FOREST RESOURCES INSTITUTE:

Katie Moriarty, National Council for Air and Stream Improvement
Lauren Ponisio, University of Oregon
Jim Rivers, Oregon State University

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Contents

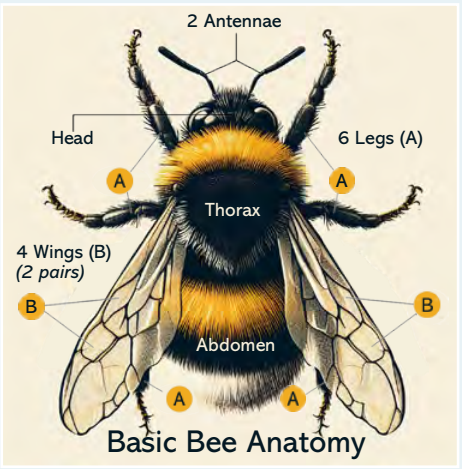
1.0 Introduction

Oregon's managed forestlands provide wood products and are home to many diverse wildlife species. But when people discuss the habitat value of these landscapes, we sometimes overlook the smaller wildlife. Insects are the most numerous and diverse group of animals. With about a million named species – and likely millions more yet undescribed – they comprise about 80% of known life (Stork, 2018). Insects are ecologically and economically essential, and no insects embody these traits quite like pollinators. Native bees are all-star pollinators, but they aren't the only animals that pollinate plants in Oregon. Hummingbirds, flies, wasps, beetles, butterflies, moths and others all engage in this ecological partnership. Non-bee pollinators are thought to collectively provide global crop-pollination services about on par with bees (Rader et al., 2016). However, since bees are the largest and most important pollinating group, they are the focus of this publication.

Oregon is home to an astounding variety of bees. More than 600 species from 55 genera in six taxonomic families are known to occur here, and many can be found in or near managed forests. Oregon's bees have a range of habitat needs, and new research is shedding light on the connection between working forests and pollinators. Researchers have observed strong use of these habitats by bees – particularly in forests regenerating after timber harvest or wildfires, and in open areas such as forested road edges.

In this publication, the reader will learn more about Oregon's bees, how they use forestlands and what land managers can do to help support these small, yet critically important, components of forest biodiversity.

Bees are a large and dazzlingly diverse group of insects.



(Bing AI, 2023)

WHAT IS A BEE?

Bees follow the typical insect body plan: head, thorax, abdomen and six legs. They are often covered in small, branched hairs like tiny feathers (called scopa) — a feature that distinguishes them from the many fly and wasp species that look similar. They are in the taxonomic order Hymenoptera and are closely related to ants and wasps. Scientists have described more than 20,000 bee species worldwide, with about 4,000 species in the United States alone. Across this large group, bees display an astonishing diversity of shape, size and color. Most bees live off nectar and pollen from flowering plants. Due to variation in morphology, emergence, peak activity, and floral preferences, different bee species are important for pollination of different plants and plant communities throughout the seasons, underscoring the importance of bee conservation.

OREGON BEE PROJECT

In recent years, major strides have been made to catalog and conserve bee populations and educate Oregonians about the state's managed and native bee fauna. This is thanks in large part to the Oregon Bee Project (OBP). Following a high-profile mass bee die-off caused by improperly used pesticides, the Oregon Legislature started a Pollinator Health Task Force in 2014. This task force recommended that the state invest in educational programs, which led Oregon to become the first state in the nation with a state-funded Pollinator Health Extension Program. In 2017, OBP developed a collaboration among the Oregon Department of Agriculture, the Oregon State University Extension Service and the Oregon Department of Forestry. In 2022, the state's Department of Transportation and Department of Fish and Wildlife started to consult with OBP on their pollinator health initiatives. OBP also has a large stakeholder committee comprised of growers, beekeepers, and other public and private entities. The largely volunteer-driven project strives to increase pollinator habitat, protect pollinators from pesticides and raise awareness of the important role of native bees across the state.

The Oregon Bee Atlas is OBP's volunteer-driven effort to catalog the state's bees.

➔ Learn more at oregonbeeproject.org

Public outreach helps to get people thinking about bees.

Most bees are solitary, like this carpenter bee.

SOCIAL VS. SOLITARY

While many bee species are eusocial, which means they live socially (i.e., living and working together to manage a hive), most species are not. More than 90% of native North American bees are solitary (Xerces Society, 2022b). Also, there are many degrees of sociality between truly social (eusocial) and truly solitary insects.

European honey bees are a highly social species.

EUSOCIAL

Eusocial insect societies usually function within a caste system, where individuals specialize to fulfill an essential role in the colony. For bees, this system typically includes a single reproductive queen, sterile female workers and male drones. Some eusocial bee species, such as most bumble bees, form colonies that last only one season. Then the entire colony dies except for the mated queen, who over-winters and starts a new colony the following year. Other bee species, such as European honey bees, have colonies that can last several years.

Some species are more social than others. Examples of eusocial bees include some bumble bee species and honey bees. Some sweat bees are social, and some bumble bees are only primitively social compared to honey bees.

Mason bee nests, each one the work of a single female.

SOLITARY

The success of solitary bee species is driven by females that nest alone, usually in soil, crevices, pre-existing animal burrows, or hollow stems. They forage, build nests, lay eggs and provide their young with food all on their own. After mating and nesting, adult solitary bees in North America don't usually survive the winter. Patches of good nesting habitat can attract many individual solitary bees that create separate nesting areas (similar to apartment living), and these aggregations may give the false impression of a colony.

Examples of solitary bees inlcude mason bees, mining bees, carpenter bees, leaf-cutting bees, sweat bees and plasterer bees.

2.0 Bees of Oregon

An impressive diversity of bees is found in Oregon, with six of the world's seven taxonomic bee families represented in the state. Below is a brief overview of the bee families that call Oregon home, plus a few highlighted genera and species from within those families.

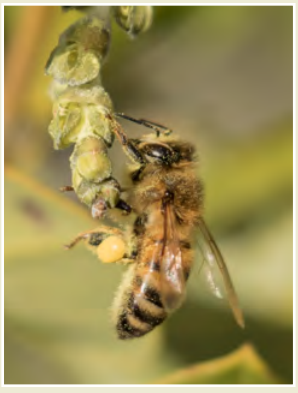
➔ Interested in learning more? Check out this bee guide from the ODA. oregon.gov/oda/shared/Documents/Publications/IPPM/ODABeeGuide.pdf

Apidae is the largest bee family. Apidae contains some social bee species, as well as thousands of solitary species. Members include bumble bees (*Bombus*), carpenter bees (*Xylocopa*), small carpenter bees (*Ceratina*) and a multitude of other native bees. The European honey bee (*Apis mellifera*) is also a member of family Apidae.

Horsefly-like carpenter bees *(Xylocopa tabaniformis).*

NATIVE BEES VS. HONEY BEES

The European honey bee (*A. mellifera*) is a ubiquitous and economically valuable pollinator across all continents except Antarctica. This species is native to Europe, Africa and Asia, but has been widely introduced to supplement agricultural pollination and to produce honey and wax. While these services are important, honey bees likely have negative impacts on wild bee populations due to resource competition and spreading of pathogens (Mallinger et al., 2017). European honey bees have perennial colonies, or colonies that can last more than a year. In short, honey bees are important and useful for human food production, but they are likely detrimental to native bee populations. Since they are not native to Oregon, focusing on native bees should be top priority.



Honey bees are not native to North America.

Yellow-faced bumblebees *(Bombus vosnesenskii)* are very common in Oregon.

The exciting discovery and excavation of a western bumblebee *(Bombus occidentalis)* nest.

BUMBLE BEES

The fuzzy bees of genus Bombus are a familiar sight throughout Oregon, where more than 20 species can be found. They range in size from slightly smaller than a honey bee to much larger. Bumble bees are typically colored in patterns of black and yellow, but some have shades of orange, brown and white. They can forage in cooler temperatures than other pollinators. They can also fly in lower light levels than many other bees, and fly farther than smaller bees (Xerces Society, 2022a).

Nesting and social behavior

Most bumble bee species are social. They form annual colonies, usually underground in pre-existing structures, that range in size from fewer than 100 individuals up to several hundred. In the late summer and early fall, the colony produces drones (males) and queens. New queens mate with drones from other colonies and overwinter while the rest die off. Then, in spring, the mated queens emerge to start new colonies.

CUCKOO BEES

Cleptoparasitic bees, or "cuckoo bees," are social-parasitic bees that secretly enter other bees' nests and lay their eggs in or near the host's pollen balls. This behavior is an important component of bee communities that can even be used as a gauge of bee community health (Sheffield et al., 2013). Cleptoparasitic bees play a stabilizing role within bee communities and represent the apex of bee communities; they are the first to respond to disturbances, are easily distinguished and are diverse enough to be representative of entire bee communities (Sheffield et al., 2013).

Longhorn cuckoo bee *(Triepeolus sp.)*

Megachilidae is a family of solitary bees with robust bodies and large, powerful jaws. They're known to exhibit a wide range of nesting habits across species and are unique in that they carry pollen not on their hind legs, like other bees, but on special hairs under their abdomens. Prominent members of the Megachilidae family include leaf-cutting bees (genus *Megachile*) and mason bees (genus *Osmia*) (University of Minnesota Bee Lab, 2023).

Alfalfa leafcutting bee *(Megachile rotundata).*

MASON BEES

Named for their habit of using mud to craft nest cells, these bees are fairly small — the largest is similar in size to a honey bee. Mason bees (*Osmia*) shine in metallic blues, greens and blacks. Many gardeners and farmers enjoy the presence of these highly effective pollinators, and create nesting spaces for them. Often, mason bees are better pollinators than honey bees. In some orchards, two mason bees can pollinate as many flowers as nearly 100 honey bees (Wilson et al., 2023). About 70 mason bee species are found across Oregon, but the blue orchard mason bee (*Osmia lignaria*) is the species most commonly promoted in agriculture. They become active in early spring, before many other pollinators.

Blue orchard mason bees *(Osmia lignaria)* are an Oregon native that excels at pollinating fruit crops, and they are managed commercially for this purpose.

Nesting and social behavior

Mason bees are solitary. They usually nest in pre-existing holes and crevices that they line with mud or leaf material, but some also nest in soil. Females lay eggs within chambers in their nest holes, and the larvae become adults by fall. The new adults remain in the nest holes and lay dormant through winter, chewing their way out when the weather warms. They quickly find mates, and the females begin foraging and building their own nests.

Blue orchard mason bee *(O. lignaria).*

Halictidae is made up of ground-nesters with a wide range of sociality. Collectively called "sweat bees," these bees are often tiny and range from nondescript to very colorful. They get their nickname because they are attracted to sweat and will lick humans to get the salt off their skin. Common genera of sweat bees include *Halictus*, *Lasioglossum* and the metallic *Agapostemon*. The family Halictidae also includes the alkali bee (*Nomia melanderi*), which is a highly effective alfalfa pollinator and the only solitary ground-nesting bee managed for agriculture (University of Minnesota Bee Lab, 2023).

Ligated furrow bee *(Halictus ligatus).*

Prunus miner bee *(Andrena prunorum).*

Andrenidae is a family of solitary ground-nesters that come in a variety of shapes and sizes. Most of the bees in this family are within the genus *Andrena*, commonly known as "mining bees." They are some of the first pollinators to become active in very early spring and seem to be prominent visitors to flowering hardwoods (University of Minnesota Bee Lab, 2023). These bees commonly inhabit large communal nesting areas of thousands of bees.

MINING BEES

The mining bee group (*Andrena*) is large and diverse, with over 100 species in Oregon alone. They range in size from just a few millimeters to a bit longer than a honey bee, and generally have a slender appearance.

Nesting and social behavior

Mining bees are solitary. In early spring, females seek out patches of bare, well-drained soil, where they dig vertical tunnels a few inches deep. Off each main tunnel, they create several chambers where they will lay eggs after mating, and they store food in these chambers for their hatched larvae to feed on. The larvae pupate and become adults by fall, but remain underground until spring, when they finally emerge to begin the cycle again.

Mining bees *(Andrena sp.)* nest in tunnels in the ground.

Aster cellophane bee *(Colletes compactus).*

Colletidae are generally referred to as "plasterer bees" or "cellophane bees" in reference to their method of smoothing their nests' walls with secretions from their mouthparts. Common genera of Colletidae include genus *Colletes*, which can look similar to mining bees or sweat bees, and the hairless, wasp-like genus *Hylaeus*, known as "yellow-faced bees" (University of Minnesota Bee Lab, 2023).

Hesperapis carinata, a member of the Melittidae family found in Oregon.

Melittidae is a small family of solitary, ground-nesting bees. These bees are rarely encountered in Oregon and are known only from a couple specimens from the Oregon Bee Atlas. The single documented species is *Hesperapis carinata*, a sunflower specialist found in eastern Oregon in late summer. These are not known to inhabit forests in Oregon.

3.0 Threats to native bees

Like a lot of wildlife, native bees are facing a perfect storm of threats in the modern world, and many species are known or thought to be declining. According to the Xerces Society (2022b), major stressors on bee populations include habitat loss, alteration and fragmentation; pesticide use, including insecticides but also herbicides that kill native flowering food sources; climate change; and disease. Competition and predation from non-native species, such as managed bees and parasitic mites, as well as diseases spread by those species, also harm native bees.

4.0 Threatened and endangered bee species

The U.S. Endangered Species Act (ESA), administered by the U.S. Fish and Wildlife Service (FWS), didn't protect any bee species until 2016. The first listed group contained seven species of yellow-faced bee (of the genera *Hylaeus*) endemic to Hawaii. In 2017, the first bumble bee joined the list: the rusty-patched bumble bee (*Bombus affinis*) of the eastern and midwestern U.S. and southern Canada. Franklin's bumble bee (*Bombus franklinii*) was listed in 2021, and three other bumble bee species are currently under review for protected species status under the ESA – the American bumble bee (*Bombus pensylvanicus*), Suckley's bumble bee (*Bombus suckleyi*) and western bumble bee (*Bombus occidentalis*). The Franklin's, American, Suckley's and western bumble bees' ranges have all been known to include parts of Oregon. Franklin's bumble bee has an especially small range in southern Oregon and northern California, but hasn't been detected since 2006. The American bumble bee hasn't been seen in Oregon in the last 50 years.

WESTERN BUMBLE BEE *(B. occidentalis)*

The western bumble bee was once common across western North America, but it has declined precipitously in the past few decades and has become increasingly rare. A 2020 study suggests more than 90% of the population of this species has disappeared (Graves et al., 2020). Recent efforts to document western bumble bees have detected them in some of Oregon's drier high-elevation forests and meadows, in and east of the Cascade Range. Suckley's bumble bee, a social-parasitic species known to use western bumble bee colonies as hosts, has declined in concert. FWS is currently reviewing both species for listing under the ESA.

The western bumblebee *(Bombus occidentalis)* was historically common, but has become quite rare.

U.S. Forest Service surveying for western bumblebees in Washington state.

OREGON BEE SPECIES CURRENTLY LISTED OR UNDER REVIEW

SPECIES	STATUS	DISTRIBUTION WITHIN OREGON
American bumble bee (*B. pensylvanicus)*	Under federal review (2021)	Open-field species. Widespread but not seen in Oregon in the past 50 years.
Franklin's bumble bee *(B. franklinii)*	Federally endangered (2021), possibly extinct	Small range in southern Oregon. Not detected since 2006.
Suckley's bumble bee *(B. suckleyi)*	Under federal review (2021)	Rarely seen. Last found in Wallowa-Whitman National Forest in 2017.
Western bumble bee *(B. occidentalis)*	Under federal review (2016)	Historically occurred across the state.

Source: U.S. Fish and Wildlife Service, current as of print date.

Abundant floral resources attract bees to young forests.

5.0 How bees and other pollinators use forestlands

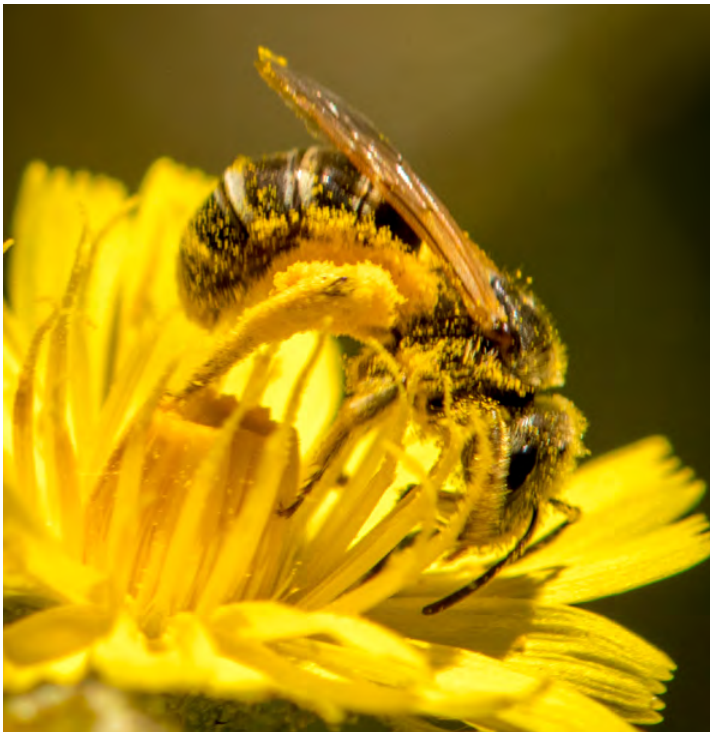
Strong scientific evidence supports the idea that managed conifer forests support a diversity of bees, especially in the early seral years following timber harvest when floral resources are most abundant. Rivers and Betts (2021) surveyed wild bees in clearcut Douglas-fir stands in western Oregon and found that diversity and abundance of bees peaked a few years after harvest, then steadily declined as canopies closed over 15 years. Additional work by Zitomer et al. (2023) confirmed this pattern across managed industrial forestlands. In another study linking bees to managed forests, Rivers et al. (2018) found that early successional conifer forests that undergo removal of slash and tree boles (and resulting soil compaction) still harbor many bee species.

Bees are known to utilize both foraging and nesting habitat within and adjacent to forests of multiple compositions and age classes (Hanula et al., 2016). While all forests have the potential to provide bee habitat, research suggests that young stands, such as those regenerating after timber harvest or fire, are particularly useful to bees. Disturbance agents open the canopy, expose bare soil and leave behind woody debris that bees can use for nesting. Open areas are important to bees in forests of any age class because they allow sunlight to reach the forest floor, improving conditions for seed germination, flower production and ground nesting. Natural forest clearings, roads, skid trails, log landings and burned slash piles will often have a larger variety of flowering plants than areas under closed canopies. Disturbance also drives habitat heterogeneity, which leads to more diverse floral and nesting resources that accommodate a greater diversity of pollinators (Rodríguez and Kouki, 2017). Older, closed-canopy forests are home to pollinators as well, though diversity and abundance are generally lower.

Most of the world's bees nest in the ground.

NESTING

Bees need appropriate conditions to make nests and rear their young. Most of the world's bees nest in the ground – about 70%. Nesting habitat exists primarily in the form of exposed soil, pithy stems and woody material. Some bees chew tunnels or use pre-existing tunnels in stumps and logs. Bees that nest below ground make structures for themselves or use structures created by something else, such as a rodent or another insect. Bare, sunny ground with loamy soil is particularly attractive to bees that nest in tunnels.



The nectar and pollen produced by flowers make them a one-stop shop for bees.

FORAGING AND POLLINATION

Food is essential to animal survival, and when we talk about bee food, that means flowers – specifically, their nectar and pollen. The most abundant and diverse groups of plants are those that flower. Most flowering plants rely on animals such as bees for pollination. Flowers are a one-stop shop for bees. Nectar provides sugar and some of the water and amino acids adult bees need, while pollen provides the protein and fat females require to produce eggs and nourish developing pupae. In forests, a large variety of herbaceous plants, woody shrubs and trees supply nectar and pollen when they flower. Forests with a broad suite of floral resources will better support a diverse group of bees.

Different floral traits appeal to different pollinators.

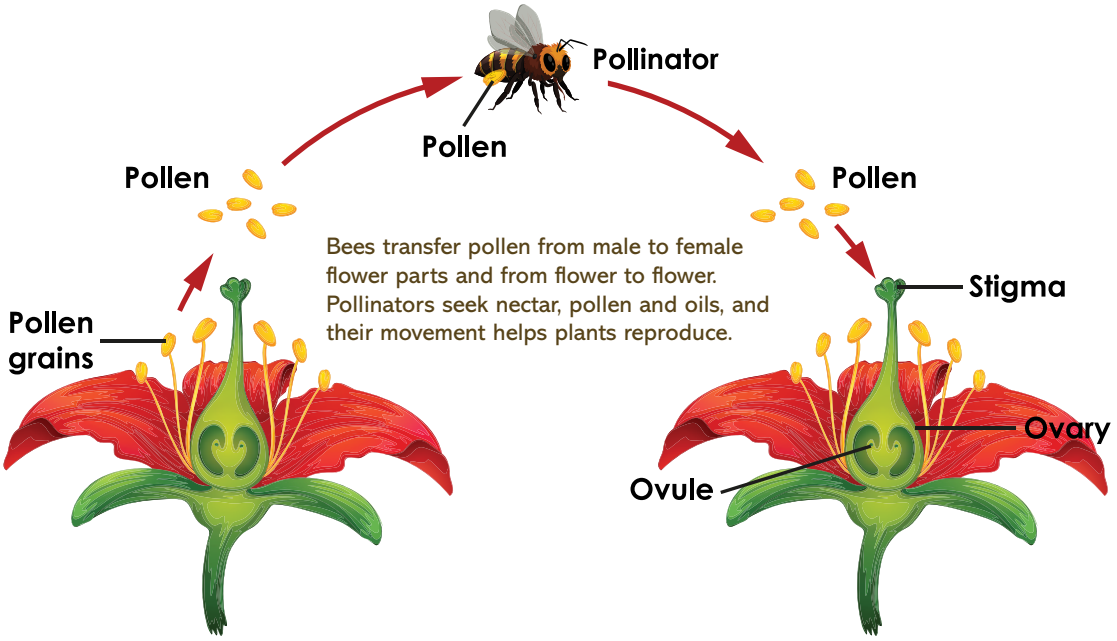
WHAT TYPES OF FLOWERS DO BEES VISIT?

Pollinator groups tend to favor flowers with specific characteristics. This intimate, evolutionary relationship is sometimes known as "pollinator syndrome." Bees will often visit many of the same kind of flower in an area, so planting several of the same species can be helpful. A bee's vision is based on green, blue and ultraviolet, so they're generally very good at locating blue, violet, white or yellow flowers. Bees can't distinguish shades of red, but other factors may attract them to red flowers – such as their shape, their odor, or ultraviolet markings that are invisible to the human eye.

Flowers' shapes and sizes heavily drive which types of pollinators, and even which specific bee species, can successfully forage on them. For example, since the length of a bee's tongue varies across species, the depth at which nectar is stored in the flower dictates which bees can access it. Similarly, large bees need large spaces to land on, and some flowers' nectar is inaccessible unless a bee is large and strong enough to get to it or has the ability to use buzz pollination (described on page 13).

The U.S. Forest Service's Bee Pollination webpage lists the following as traits of a typical bee-visited flower:

- lots of nectar
- often tubular in shape, with nectar at base of tube
- have landing platforms
- bilaterally symmetrical (halves of the flower are mirror images of one another)
- ultraviolet markings to attract bees
- brightly colored blue or yellow, or a mixture of these colors
- sweetly aromatic
- open during the day



6.0 Pollination – a helpful side effect

Pollination is the fertilization of flowering plants, achieved by the transfer of pollen from male to female flower parts. By and large, pollination is not an intentional act by the pollinator – it's more like a helpful side effect. To reproduce, flowering plants need to distribute and receive pollen to and from other members of their species. Instead of self-fertilizing or relying on abiotic pollination methods such as wind, these plants evolved to entice visitors to their flowers with the reward of nectar. Pollinators seek nectar, pollen and oils, and their movements help plants reproduce. These are different goals, but together they form a mutualistic relationship that both bees and plants depend on.

Buzz pollination is required by some flowers to access their pollen.

BUZZ POLLINATION

"Buzz pollination" refers to the interaction that occurs when a bee rapidly vibrates its wing muscles while on a flower, causing pollen to shake loose. This action also produces a loud, high-pitched buzz from the bee. Buzz pollinators are known to be highly effective on some crops and native plants, and even necessary for certain plant species to reproduce properly. Bumble bees are perhaps the best-known buzz pollinators, but more than half of bee species can buzz pollinate.

7.0 Providing for bees

Recommendations in this section are based on Oregon State University Extension's "Bees in the Woods" series. Ideal forest bee habitat sites should include a diverse community of flowering plants that provide blooms throughout the year, with areas of bare soil and some woody and pithy debris for nesting. Foraging and nesting habitats should be within a reasonable distance of each other.

START WITH AN INVENTORY

When making the decision to promote bees and other pollinators on a property, it's helpful to start by taking stock of both the amount and connectedness of current foraging and nesting habitat (assess which flowering plants are already doing well). Bees' nesting habitat is hard to identify, but they use bare ground and pithy dead stems, which are easy to find. The inventory step will illuminate current needs and provide a baseline to build from. To get an accurate baseline for foraging habitat, visit the site several times throughout the growing season to identify plants with differing bloom times.

Burned slash piles make great seeding sites for native flowering plants.

SEEDING

One of the most direct ways to manage forests with bees in mind is to grow the flowering plants they need. When choosing which pollinator plants to seed, a mix of native annuals and perennials with various bloom times and flower shapes is ideal (including flowering shrubs and trees). A good seed mix ensures that staggered, diverse blooms are available from early spring to late fall to meet the needs of pollinators of many shapes, sizes and life histories. Since some pollinators prefer to focus their foraging efforts on a single blooming plant species, a behavior called "flower constancy," you might choose to seed plant species in separate clumps or strips, and to limit the total species seeded within an area to under a dozen or so. But planting a mix is fine, too! The best time to spread seeds is late fall, before freezing

"BEES IN THE WOODS" OREGON STATE UNIVERSITY EXTENSION VIDEO SERIES

A 2022 video series from the Oregon State University Extension Service, called "Bees in the Woods," provides a great deal of information and guidance for forest landowners and managers who want to promote bee habitat on their forestlands.

➔ Watch the entire series at extension.oregonstate.edu/collection/bees-woods

temperatures set in and after a timber harvest or other disturbance. Skid trails, landings and burned slash piles are great places to seed native flowering plants that provide bee forage. These sites tend to be open and spacious, so plants are less likely to compete for resources. Burn pile sites in particular make ideal seed beds, since the area has been cleared and there will be bee nesting habitat around the edge of the site. Use flags to mark pollinator plots where seeds have been planted; this will allow you to locate them easily for monitoring and to avoid future disturbance.

A diverse suite of flowering plants will provide for a broad range of pollinators.

HAMPTON LUMBER: PIONEERS IN HELPING POLLINATORS

Portland-based Hampton Lumber and Family Forests was an early adopter of the idea that enhancing commercially managed forestlands can play a part in fighting the decline of native pollinators. Since 2017, they have been implementing and experimenting with treatment methods on their forestlands to develop standardized practices that are both effective and replicable across the landscape. Hampton's efforts focus on seeding native plants in clearcuts and creating and maintaining pollinator nesting habitat, while monitoring the results of this work. In collaboration with the Oregon Bee Project, Hampton will continue to refine their methods and expand their pollinator habitat enhancement project in Oregon and Washington.

A few key takeaways from their work so far:

1. Germination of intentionally planted native flower seeds seems to be best when seeding takes place in late fall and mimics natural seed falling.
2. Burn pile scars are great places to plant seeds. They tend to be nutrient-rich and are free of competing vegetation. These sites are favorable even in concert with herbicide use when the application of these chemicals takes place before burning. Focusing on seeding native flowers in burn pile scars is more cost-effective and successful than broadcasting native flower seeds across an entire timber harvest unit.
3. For their project area near the town of Knappa in Oregon's Coast Range, Hampton's research has narrowed down the best-performing pollinator plants to yarrow (*Achillea millefolium), blue gilia (Gilia capitata*), bicolor lupine (*Lupinus bicolor*), large-leaved lupine (*Lupinus polyphyllus*) and farewell-to-spring (*Clarkia amoena*). Note that the plants that work well for one region of the state won't work well everywhere.

➔ Visit Hampton's website to learn more: hamptonlumber.com/sustainability/sustainable-forests/pollinator-project/

POLLINATOR PLANT GUIDES AND RESOURCES

The following lists can help landowners learn which plants may be most beneficial to bees and other pollinators in their specific regions, and develop a planting mix that will provide a long season of diverse blooms.

Regional lists

Maritime Northwest:
xerces.org/sites/default/files/publications/22-023_02_NPPBI%E2%80%94MaritimeNW_web.pdf

Pacific Lowlands (includes Willamette Valley and Puget Sound Valley):
nwcb.wa.gov/pdfs/PacificLowlandrx8.pdf

Intermountain West (includes eastern Oregon):
tfid.org/DocumentCenter/View/4084/Plants-for-Pollinators-in-the-Intermountain-West

Southern Oregon:
oregonbeeproject.org/s/native-plant-pollinators-3-31-2016-w7df.pdf

Additional lists

Low-maintenance native Oregon plants and trees for pollinators:
oregonbeeproject.org/s/ODF-NativeTreesPlants.pdf

Native plant picks for bees:
extension.oregonstate.edu/pub/em-9363

Plants for pollinators:
extension.oregonstate.edu/sites/default/files/documents/12281/pollinatorplants.pdf

Native plant growers

- Heritage Seedlings and Liners (native seeds)
- Seven Oaks Native Nursery (bareroot and potted shrubs, perennials and bulbs)
- Doak Creek Native Plant Nursery (potted shrubs, perennials and bulbs)

Prescribed burning can be a useful tool for enhancing bee habitat.

PRESCRIBED BURNS

Prescribed burns have been observed to positively affect bee communities (Mason et al., 2021). Not only does fire open up forest canopies and promote growth of flowering plants, but it can also expose mineral soil, which is great habitat for ground-nesting bees. Prescribed burns are an effective tool for forest managers to enhance bee forage and nesting habitat. Because soil is a poor heat conductor, prescribed burns do not present high enough temperatures nor reach deep within the soil to negatively impact most ground-nesting bees.

INSECTICIDES AND HERBICIDES

Careful application of herbicide can reduce invasive plant species that compete with native plants important for bees. Herbicides are used to help establish stands of trees and get them "free-to-grow." When using herbicides, be considerate of how and where chemical products are used near pollinator habitats. Always read labels and follow directions to the letter. Lawrence (2015) with Washington State University Extension recommends the following precautions when using pesticides:

- Time pesticide spraying seasonally, so it occurs well before or after flowers bloom.
- Limit pesticide spraying to times when pollinators are less active, such as in the evening or early morning.
- Avoid spraying in a way that could hit non-target species, such as nearby flowers and water sources – bees use water for drinking and plastering mud nests.
- Avoid spraying in foggy or dewy conditions. The chemicals in pesticides may remain longer when they can't dry.

Spot-spraying around seedlings can effectively keep tree plantings weed-free while leaving much of the remaining vegetation to grow and provide forage to pollinators. Similarly, larger areas can be skipped over for spraying, leaving a patch of pollinator habitat to grow. This technique can work well around wildlife leave trees, aquatic habitats and other wildlife habitat features. Note that frequent broad-scale application of pre-emergent herbicides can inhibit wildflower germination and limit food resources for bees.

WILDFIRES AND BEES RESEARCH

Wildfires open the forest canopy, promoting flowers and bees (Mason et al., 2021). Multiple studies across western forests have shown that wildfire, specifically high-severity fire, has a positive effect on bee abundance and species richness. Researchers have observed this in the Sierra Nevada Mountains (Ponisio et al., 2016), the Klamath-Siskiyous (Galbraith et al., 2019), and the Rockies (LaManna et al., 2020). In addition, the patchiness of fire severities also promotes bee species richness (Ponisio et al., 2016). Another study indicates that burned areas promote bee reproduction (Galbraith et al., 2021).

Fire is believed to have positive impacts on forest bee populations.

8.0 Conclusion

Many species of bees are found and thrive in young forests in Oregon. Oregon's managed forests play a critical role in providing habitat for bees. Oregon's bees have a range of habitat needs, and many of these are found in regenerating forests after logging or wildfire, or in open areas such as forested road edges. There is strong scientific evidence that supports the idea that managed forests support a diversity of bees, especially in the early seral years following timber harvest when floral resources are most abundant. Rivers et al. (2018) found that early successional conifer forests that undergo removal of slash and tree boles (and resulting soil compaction) still harbor many bee species. One of the best ways to provide habitat for bees is to maintain or grow floral resources on the landscape. Knowledge gaps still exist surrounding bees and forests; this issue is highlighted by a literature review done by Oregon State University (Rivers et al., 2018). Fortunately, efforts to promote native bees are becoming better understood.

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Pollinator species and flowering plants depend on each other.

MORE INFO

- **Pollinators and Forestry fact sheet**
  https://oregonforests.org/sites/default/files/2018-01/WIMF_data_Pollinators_web.pdf
- **Master Melittologist Program**
  https://extension.oregonstate.edu/bee-atlas
- **Bees in the Woods**
  https://extension.oregonstate.edu/collection/bees-woods
- **Resources for building bee pollinator habitat in managed forests**
  https://extension.oregonstate.edu/forests/health-managment/resources-building-bee-pollinator-habitat-managed-forests
- **Bees and pollinators**
  https://extension.oregonstate.edu/gardening/pollinators
- **How do we know what flowers bees like?**
  https://blogs.oregonstate.edu/gardenecologylab/2020/03/14/how-do-we-know-what-flowers-bees-like/
- **Pollinator Syndromes**
  https://www.fs.usda.gov/wildflowers/pollinators/What_is_Pollination/syndromes.shtml
- **Common Bee Pollinators of Oregon Crops**
  https://www.oregon.gov/oda/shared/Documents/Publications/IPPM/ODABeeGuide.pdf
- **The Bees of the Willamette Valley**
  https://orsba.org/wp-content/uploads/2020/05/Bee-Guide-reduced.pdf
- **The Vallejo-Marin Lab: Buzz pollination**
  https://plant-evolution.org/wp/research/buzz-pollination/
- **Oregon Bee Project**
  https://www.oregonbeeproject.org/
- **Forest Bee Pollinators**
  https://woodlandfishandwildlife.com/publications/insect/forest-bee-pollinators/

Native bee populations are under threat, but can benefit from certain forest management decisions that promote flower diversity and abundance.

Efforts to promote native bees will benefit many other pollinators.

Oregon Forest Resources Institute

About the Oregon Forest Resources Institute (OFRI)

The Oregon Forest Resources Institute supports the forest sector and the stewardship of natural resources by advancing Oregonians' understanding of the social, environmental and economic benefits of our forests.

Thank you to all our contributors

OFRI is grateful to the many people who gave their time, expertise, insights and comments during the development of this publication: *Jenniffer Bakke, Manulife Investment Management; Seth Barnes, Oregon Forest Industries Council; Lincoln Best, Oregon Bee Atlas; Christine Buhl, Oregon Department of Forestry; Jessica Homyack, Weyerhaeuser; Kristin Rasmussen, Hampton Lumber and Family Forests; Claudine Reynolds, Port Blakely; James Rivers, Oregon State University; Mike Rochelle, Weyerhaeuser; Laura Six, Weyerhaeuser; Jake Verschuyl, National Council for Air and Stream Improvement; Jennifer Weikel, Oregon Department of Forestry; Rebecca Windle, Giustina Land and Timber.*

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