

Managing Public Lands for Pollinators

**POLLINATOR
PARTNERSHIP**





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Pollinators and Land Health

Land management with pollinators in mind can help attain land health and improve ecosystem functionality. Public Land managers have the unique opportunity to guide the direction of our shared natural resources, and when managing for pollinators the effects can be overwhelmingly positive. This brochure will provide a series of best management practices (BMPs) for pollinators. These BMPs are meant as guidelines and to help land managers incorporate pollinators into their decision making process.

Pollinators are Essential

Pollination is the movement of pollen within a flower or from one flower to another. The successful movement of pollen leads to fertilization and the development of full-bodied fruit and viable seeds. There are several methods of pollination; wind, pollinating animals, and occasionally water. Pollinating animals include birds, bees, bats, beetles, moths, flies, reptiles, butterflies and small mammals – known as pollinators. Pollinators are needed to pollinate 96% of all flowering plants, which results in 1 out of every 3 bites of our food. Pollinators are responsible for the harvest of 1000 of 1200 of our most commonly cultivated crops. In the United States, pollination by honey bees, native bees, and other insects produces \$40 billion worth of products annually.



Meet the Pollinators of Public Lands

There are a variety of pollinators that populate our Public Lands, but it's the bees that do the heavy lifting when it comes to pollinating crops and native vegetation. Bees are extremely efficient at their jobs because unlike other pollinators, bees actively seek out pollen to support the larval development back the nest. When you see honey and bumble bees pollinating they are collecting nectar and pollen and it's important to have both resources available all growing season long. There are approximately 3500 species of native bees in the United States alone, and new species are still being discovered!

Native Bees

Bumble Bees

Bumble bees are essential in the pollination of tomatoes and peppers, but are also the main pollinators of penstemons and other native forbs. There are about 30 species of bumble bees that call the Western US home.

Bumble bees perform a specialized type of pollination called buzz-pollination. Buzz-pollination occurs when a bumble bee grabs a flower with her mouth, then dislodges her wings and vibrates them to shake the pol-

len from the flower. Without bumble bees, the vegetation of the Public Lands would be drastically different and healthy delicious summer tomatoes would be very difficult to come by.

Halictids

Halictids are among some of the most visually striking bees, but beyond looks they pollinate native plant species, including rare plants, across Public Lands and crops, such as alfalfa.

Blue Orchard

The blue orchard bee, *Osmia lignaria*, of the Western US is being managed for the pollination of fruit trees (especially sweet cherries and almonds). While farmers are working to create nesting sites to lure these bees to their crops, if the adjacent Public Lands are not supporting these bees the farmers will have few blue orchard bee resources to draw from.



Photo by: Leah Lewis



Photo by: Derrick Dreihorn

Hummingbirds

There are over a dozen species of hummingbirds that call Public Lands their home at some point during the year. These birds pollinate many iconic Western plant species such as ocotillo, columbine, paintbrush, and ceanothus. The hummingbirds' migratory corridor depends on reliable nectar resources to fuel their journey. Their migration connects landscapes and impacts ecosystem services throughout the Western US.

Western Monarch Migration

Similar to the hummingbirds in the Western US, monarchs also migrate throughout our Public Lands. There are two populations in North America, one east of the Rocky Mountains and the other west of the Rocky Mountains. The western monarchs overwinter at numerous sites along the California coast. Monarchs depend on nectar plants and milkweed (*Asclepias* spp.) to fuel their migration and for breeding. Healthy Public Lands support the monarch migration, a natural phenomenon.

Bats of the Southwest

There are 47 species of bats in the US, occurring throughout the country but they are only considered pollinators in the Southwestern US. Bats are facing pressures from disease and habitat loss. Bats live in caves and abandoned mines which are sometimes permanently sealed for human safety. White-nose syndrome is a disease affecting bats in the Eastern US and is spreading further west every year. Pollinating bats prefer large white fragrant flowers that bloom at night such as agave and saguaro cactus.

Honey Bees

Honey bees are one species of the more than 25,000 species of bees that are known globally. They are native to Europe and the Middle East, but are currently found on every continent except for Antarctica because of their utility in agriculture. Honey bees have been in North America for nearly 400 years. Honey bees are social bees, meaning that they live together in a colony, split tasks and labor, and live for more than one season. Other social bees are bumble bees. Honey bees store nectar that is collected from plants as honey so that the colony can survive when food resources aren't present in the landscape (dry seasons and winters). Honey is essentially dehydrated plant nectar.

Honey bees also collect pollen and store it because they need pollen to feed their larvae. Because honey bees are generally managed, even in their native range, they are most commonly found in agricultural settings. Feral colonies can and do exist in many landscapes because honey bees are general foragers that feed on many different species of plants.

Open meadows and lowlands are preferred to forests and woodlands because it is easier for honey bees to navigate in open areas. They prefer flowers that are disc-shaped, like many of the aster species.



Hummingbird



Bat



Honey Bee





Bee vs. Fly

Bees and flies can often be confused, and there are many flies that mimic bees. In general there are three characteristics to look for to determine if an insect is a bee or a fly. Bees have two sets of wings (4 in total), flies only have one set (two wings). Bees also have a small waist; flies have a wide body with no obvious waist. Last, bees have long and obvious antennae; the antennae of flies are short and stubby. One other thing separates bees from flies - a stinger. Flies don't have the ability to sting, which is why they often mimic bees in appearance so that predators think they have a defense mechanism.



Photo by: Derrick Ditchburn

Land Health

There are numerous existing land health standards that can be beneficial to pollinators. By maintaining the minimum requirements of vegetation ground cover, riparian-wetland functions, enhancing threatened and endangered species habitat, and promoting seeding establishment, land managers are already doing many actions to sustain pollinators.

Land Health and Pollinators

- Pollinators depend on nectar and pollen for nutrient and energy. Flowering plants provide pollen and nectar resources; it is important that bloom periods coincide with pollinator emergence and activity to sustain both plant and pollinator populations.
- Provide continuous nectar and pollen sources from early spring through fall with native plants.
- In restoration planting projects, cluster plants together. This makes for more efficient foraging by pollinators.
- Maintain seed sources of locally adapted native plant species important to pollinators.
- Remove nonnative grasses from seeding mixes.
- Manage mowing activities to reduce impacts on pollinators; consider a bi-annual mowing regime and leaving patches un-mowed so not all pollinator habitat is mowed down at once.



Photo by: Marguerite Meyer

Land Health Indicators

Riparian Areas and Wetlands

We don't typically think of bees buzzing around wetlands, but they are an integral part of the wetland ecosystem. Bees, bats, birds and butterflies can all call riparian areas home.

- Evaluate the areas for invasive species. Are invasive species crowding out native vegetation or consuming large amounts of water, changing the hydrology of the riparian system?
- Manage riparian areas to maintain naturally occurring shrubs and trees with abundant pollen and nectar sources such as *Rosa*, *Philadelphus*, *Prunus*, *Amelanchier*, *Ribes*, or *Rhus* as appropriate in the intermountain west and shrubs like *Fallugia*, *Baccharis*, *Chilopsis*, and *Parkinsonia* in the southwest.
- Is there a potential to remove invasive species and begin restoring the area with native species that provide nectar and pollen resources?
- Consider using rooted cuttings of native woody plants to begin the restoration process. Woody plants like willows provide floral resources to pollinators.
- Maintain high-quality riparian areas with vegetation on both sides of streams for pollinators.

Water Quality

Like humans, pollinators depend on clean water. Bees, butterflies, birds, and bats all need clean water to survive.

- Monitor water quality on Public Lands for pH, turbidity, fecal coliform, sediment, and toxins.
- Because pollinators are much smaller than people or livestock, they are more sensitive to pollution.
- If any water quality indicators are reaching unsafe levels for people and livestock, they are already unsafe for pollinators.
- Use an integrated pest management approach to limit run-off of herbicides and insecticides into watersheds.

Air Quality

Clean air is important to both adult pollinators and immature larva. When food sources are covered in dust, adults and larva have a difficult time feeding.

- Minimize activities that create dust along roadsides. Dust makes flying difficult, and leaves inedible to larval insects.
- Minimize hoof action that creates dust.
- When possible, restrict the use of flame retardant near known pollinator habitat. The residue can negatively impact the air as well as floral and water resources.

Habitats

Just like other wildlife, pollinators depend on quality habitat.

- Improving and maintaining native plant communities ensures functional ecosystem processes and productivity.
- Ensure that plants and animal species are diverse and take steps to cut invasive weeds so they are not a significant part of the plant community. Pollinators cannot collect pollen or nectar resources from most grasses, like the invasive cheatgrass. Grasses are wind pollinated and offer very little in terms of pollen or nectar.
- Take actions to ensure floral connectivity, especially through migratory corridors of hummingbirds and monarchs. Manage these areas as "nectar corridors". When possible restore areas with connectivity in mind.



Best Management Practices (BMPs) to Improve Pollinator Health

The following BMPs are measures that Public Land managers can apply to their field unit to support pollinator health. Some are straightforward, such as avoid spraying pesticides while pollinators are most active, others require coordinating more closely with permittees.

Management Activities

Pesticide Use (Herbicide, Insecticide and Fungicide)

When you use pesticides you could unintentionally harm pollinators and other beneficial insects. Your careful actions can prevent harming pollinators.

- Use an Integrated Pest Management (IPM) approach.
- Carefully diagnose your pest problem, and, before you apply a pesticide, make sure the pest population has reached a level where chemical control is necessary.
 - Complete pesticide application before pollinator foraging plants bloom.
 - Time applications to take place when foraging pollinators are least active both seasonally and daily (before 9am and after 3pm).
 - Establish pesticide free buffer zones around important pollinator forage and nesting areas.
 - Use all pesticides as directed.
 - Treat less than 50% of any one pollinator's habitat in a single year.
 - Minimize drift and broadcast spraying.

Prescribed Fire

Prescribed fire can be a useful tool for managing pollinator habitat. Like most land management actions, timing is the key to success.

- Timing: Minimize prescribed fire in the spring when and where fire could kill larvae and eggs of pollinating insects, especially butterflies.
- Burn in patches so not all pollinator habitat is lost at one time. Leave at least 1/3 of the area unburned until the burned area re-vegetates.
- Consider leaving patches with south facing slopes that provide nesting habitat for bees out of areas where burns are planned.
- Allow 5 years between burns in areas of documented pollinator habitat.
- Minimize the use of fire retardants in pollinator habitat.
- After wildfire, determine the effects of back burning and fire line construction on important pollinator habitat and mitigate damage.

Grazing by Livestock, Wild Horses, and Burros

Some native bees are ground nesters and can be easily impacted by hoof action.

- Take actions to minimize hoof action of grazing animals that causes soil compaction in pollinator ground nesting sites.
- Limit grazing animal use of freshly burned plant regrowth. Rest burned areas for a minimum of two years to allow for the return of pollinators.



Photo courtesy Thomas Maurer



Habitat

What pollinator populations need to thrive is healthy, diverse habitat.

- Provide continuous nectar and pollen sources from early spring through fall with native plants with different bloom times.
- Manage for and monitor a water source.
- In restoration planting projects, cluster plants together.
- Maintain seed sources of locally adapted native plant species important to pollinators.
- Maintain high-quality riparian areas with vegetation on both sides of streams for pollinators.
- Minimize recreation and visitor use in active bat hibernacula.
- Manage mowing activities to reduce impacts on pollinators; consider a bi-annual mowing regime and leaving patches un-mowed so not all pollinator habitat is mowed down at once.
- Provide sufficient ground nestings areas, snags or natural bee blocks for native bee species.
- Leave standing dead trees and trees with cavities and hollow portions of limbs and holes for bee nesting and bat roosting.
- When possible, leave some litter on the soil surface for ground nesting bees.
- Maintain patches of roosting trees with east-southeast and south-southwest exposures to maintain optimal bat roosting temperatures.
- Provide sufficient nesting habitat for hummingbirds. Evaluate abandoned mines for bat roosting before sealing entrances. Place bat friendly gates that allow for air flow and temperature control at entrances to abandoned mines.
- Identify large pollinator habitat areas and install small islands of pollinator-friendly plants between the large areas for connectivity.

Photo by: Manguerite Meyer





Restoration: Inventory and Monitoring, Special Status Species

Restoration: Planting for Pollinators

Select plant species carefully when undertaking a restoration project.

- Choose locally adapted native species over horticultural varieties or cultivars; often times the desirable pollinator-friendly qualities have been bred out in favor of visually appealing qualities.
- Ensure that bloom times for flowers match with pollinator activities; use a monthly blooming chart to maintain bloom coverage.



Rare Plants/ Special Status Species

It's important to understand the reproductive biology of Special Status Species, this often includes pollinator research.

- Identify pollinators of Special Status Species.
- Include managing and monitoring pollinators in all special status plant conservation planning efforts.
- Establish site specific 'no activity' buffers around listed plants.
- Implement recovery plan actions of listed plant species concerning pollinators.

Inventory and Monitoring Programs and Land Health Assessment

Monitoring protocols differ depending on the type of pollinator being studied.

- Establish site monitoring protocols for each class of pollinator.
- Monitor and assess the presence, abundance, and diversity of native pollinators on wildlands.
- Establish baseline abundance and monitor the pollinators of endemic and special status plant species.



Education and Outreach: Increase the Awareness of Pollinators

Outreach

Educating the public on pollinators can help you achieve your pollinator land management goals.

- Include outreach on the importance of pollinators when talking to permittees and lessees.
- Hold a Pollinator Week Event such as a pollinator field day, guided pollinator hike or show a movie on pollinators at your visitor's facility.
- Increase understanding of plant-pollinator relationships in the field units.
- Add pollinators to the checklists used in office environmental assessments.
- Limit the collection of pollinators and invertebrates on Public Lands. Work with researchers to ensure that populations are not impacted during collection.
- Wise decision making about pollinator habitat management can help support landscape health and thriving ecosystems. Public land managers can have a direct and positive impact on pollinator populations.

Resource Guide

Please contact the Pollinator Partnership (info@pollinator.org or 415-362-1137) with any questions about pollinators, how you can help or if you are interested in conducting pollinator monitoring and research.

NRCS: Pollinator Habitat Management (<http://www.mda.state.mn.us/~media/Files/news/govrelations/pollinators/nrcsjobsheet17.ashx>)

NAPPC: Public Lands and Pollinators: Perfect Partners Investing in Flora, Fauna, and Our Future (<http://pollinator.org/PDFs/NAPPCPublicLandsbroch.pdf>)

P2: Ecoregional Planting Guides (<http://pollinator.org/guides.htm>)

Department of Defense: Pollinators: What You Can Do To Help (http://www.dodpollinators.org/Pollinators-What_You_Can_Do_To_Help_FS_6-19-14.pdf)

P2: Useful Resources for Public Lands (<http://pollinator.org/lands.htm>)





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