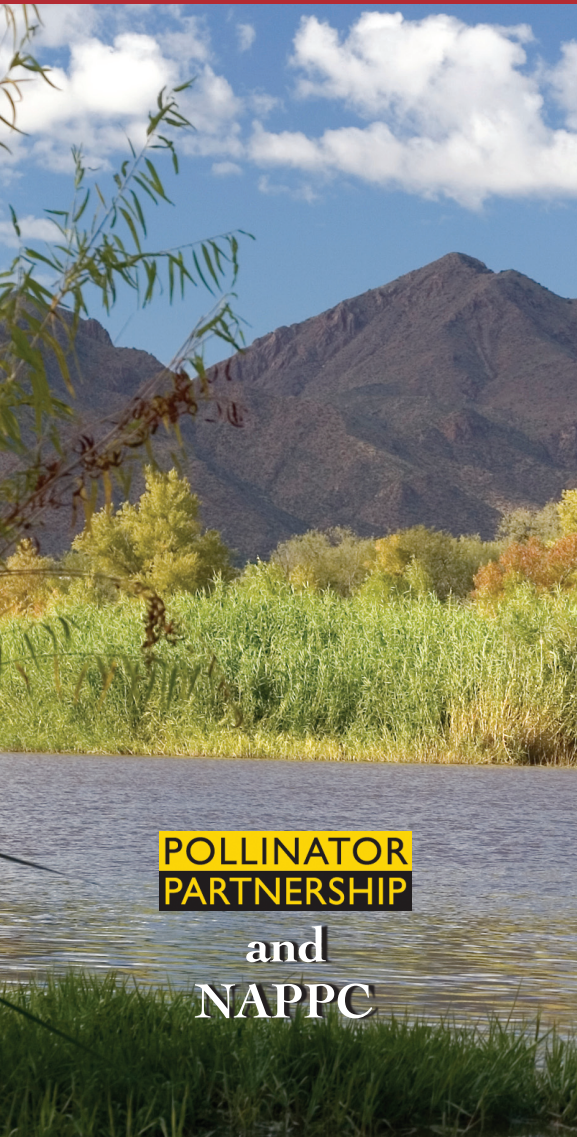




SELECTING
PLANTS
FOR
POLLINATORS



A REGIONAL GUIDE FOR FARMERS, LAND MANAGERS, AND GARDENERS IN THE



**ARIZONA-
NEW MEXICO
MOUNTAINS
SEMIDESERT
OPEN WOODLAND
CONIFEROUS
FOREST
ALPINE MEADOW
PROVINCE**



**POLLINATOR
PARTNERSHIP**

and
NAPPC

INCLUDING THE STATES OF:

ARIZONA

NEW MEXICO

TEXAS

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This is one of several guides for different regions in the United States. We welcome your feedback to assist us in making the future guides useful. Please contact us at feedback@pollinator.org

SELECTING PLANTS FOR POLLINATORS

A REGIONAL GUIDE FOR FARMERS, LAND MANAGERS, AND GARDENERS

IN THE
ECOLOGICAL REGION OF THE

**ARIZONA-NEW MEXICO
MOUNTAINS SEMIDESERT**

OPEN WOODLAND

CONIFEROUS FOREST

ALPINE MEADOW PROVINCE

INCLUDING THE STATES OF:
ARIZONA, NEW MEXICO AND TEXAS

A NAPPCC AND POLLINATOR PARTNERSHIP™ PUBLICATION

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WHY SUPPORT POLLINATORS?

IN THEIR 1996 BOOK, *THE FORGOTTEN POLLINATORS*, Buchmann and Nabhan estimated that animal pollinators are needed for the reproduction of 90% of flowering plants and one third of human food crops. Each of us depends on these industrious pollinators in a practical way to provide us with the wide range of foods we eat. In addition, pollinators are part of the intricate web that supports the biological diversity in natural ecosystems that helps sustain our quality of life.

Abundant and healthy populations of pollinators can improve fruit set and quality, and increase fruit size. In farming situations this increases production per acre. In the wild, biodiversity increases and wildlife food sources increase.

Alfalfa, watermelon, cotton, and chile pepper are some of the crops raised in the Arizona–New Mexico Mountains Semidesert that rely on honey bees and native bees for pollination. Domestic honey bees pollinate approximately \$10 billion worth of crops in the U.S. each year.

Unfortunately, the numbers of both native pollinators and domesticated bee populations are declining. They are threatened by habitat loss, disease, and the excessive and inappropriate use of pesticides. The loss of commercial bees to Colony Collapse Disorder (CCD) has highlighted how severe the issues of proper hive management are to reduce stresses caused by disease, pesticide use, insufficient nutrition, and transportation practices. Currently, the pollination services that the commercial beekeeping industry provides are receiving much needed research and conservation resources. The efforts to understand the threats to commercial bees should help us understand other pollinators and their roles in the environment as well.

It is imperative that we take immediate steps to help pollinator populations thrive. The beauty of the situation is that by supporting pollinators' need for habitat, we support our own needs for food and support diversity in the natural world.

Thank you for taking time to consult this guide. By adding plants to your landscape that provide food and shelter for pollinators throughout their active seasons and by adopting pollinator friendly landscape practices, you can make a difference to both the pollinators and the people that rely on them.



Laurie Davies Adams
Executive Director
Pollinator Partnership

“**FARMING FEEDS
THE WORLD, AND
WE MUST REMEMBER
THAT POLLINATORS
ARE A CRITICAL
LINK IN OUR FOOD
SYSTEMS.**”

-- PAUL GROWALD,
CO-FOUNDER,
POLLINATOR PARTNERSHIP



THIS REGIONAL GUIDE IS just one in a series of plant selection tools designed to provide information on how individuals can influence pollinator populations through choices they make when they farm a plot of ground, manage large tracts of public land, or plant a garden. Each of us can have a positive impact by providing the essential habitat requirements for pollinators including food, water, shelter, and enough space to allow pollinators to raise their young.

Pollinators travel through the landscape without regard to property ownership or state boundaries. We've chosen to use R.G. Bailey's classification system to identify the geographic focus of this guide and to underscore the connections between climate and vegetation types that affect the diversity of pollinators in the environment.

Bailey's Ecoregions of the United States, developed by the United States Forest Service, is a system created as a management tool and is used to predict responses

to land management practices throughout large areas. This guide addresses pollinator-friendly land management practices in what is known as the Arizona–New Mexico Mountains Semidesert, Open Woodland, Coniferous Forest, Alpine Meadow Province.

Extending from central New Mexico in a cat claw-like shape, this 50,200 square mile province is primarily composed of steep foothills and mountains with instances of deeply dissected high plateaus. Elevations range from 4,500 to 10,000 feet, with some mountain peaks reaching higher than 12,000 feet. The climate varies appreciably with altitude. Average annual temperature is between 40°F on the upper mountain slopes to 55°F in the lower foothills. Annual rainfall ranges from 10 to 35 inches. This province is characterized by vegetational zones that resemble those of the Rocky Mountains. Mixed grasses, chaparral brush, oak-juniper woodland, and pinyon-juniper woodland inhabit the foothills which reach as high

as 7,000 feet. Open forests of ponderosa and pine grow above this altitude (pinyon and juniper still occupying southfacing slopes), and are replaced at 8,000 feet on northfacing slopes by Douglas-fir and Aspen. At 9,000 feet the latter zone merges with Engelmann spruce, corkbark fir, and pines that grow in rockier places. An alpine belt covers relatively small areas above 11,000 feet.

Long before there were homes and farms in this area, the original, natural vegetation provided continuous cover and adjacent feeding opportunities for wildlife, including pollinators. In choosing plants, aim to create habitat for pollinators that allow adequate food shelter, and water sources. Most pollinators have very small home ranges. You can make a difference by understanding the vegetation patterns of the farm, forest, or neighbor's yard adjacent to you and by making planting choices that support the pollinators' need for food and shelter as they move through the landscape.

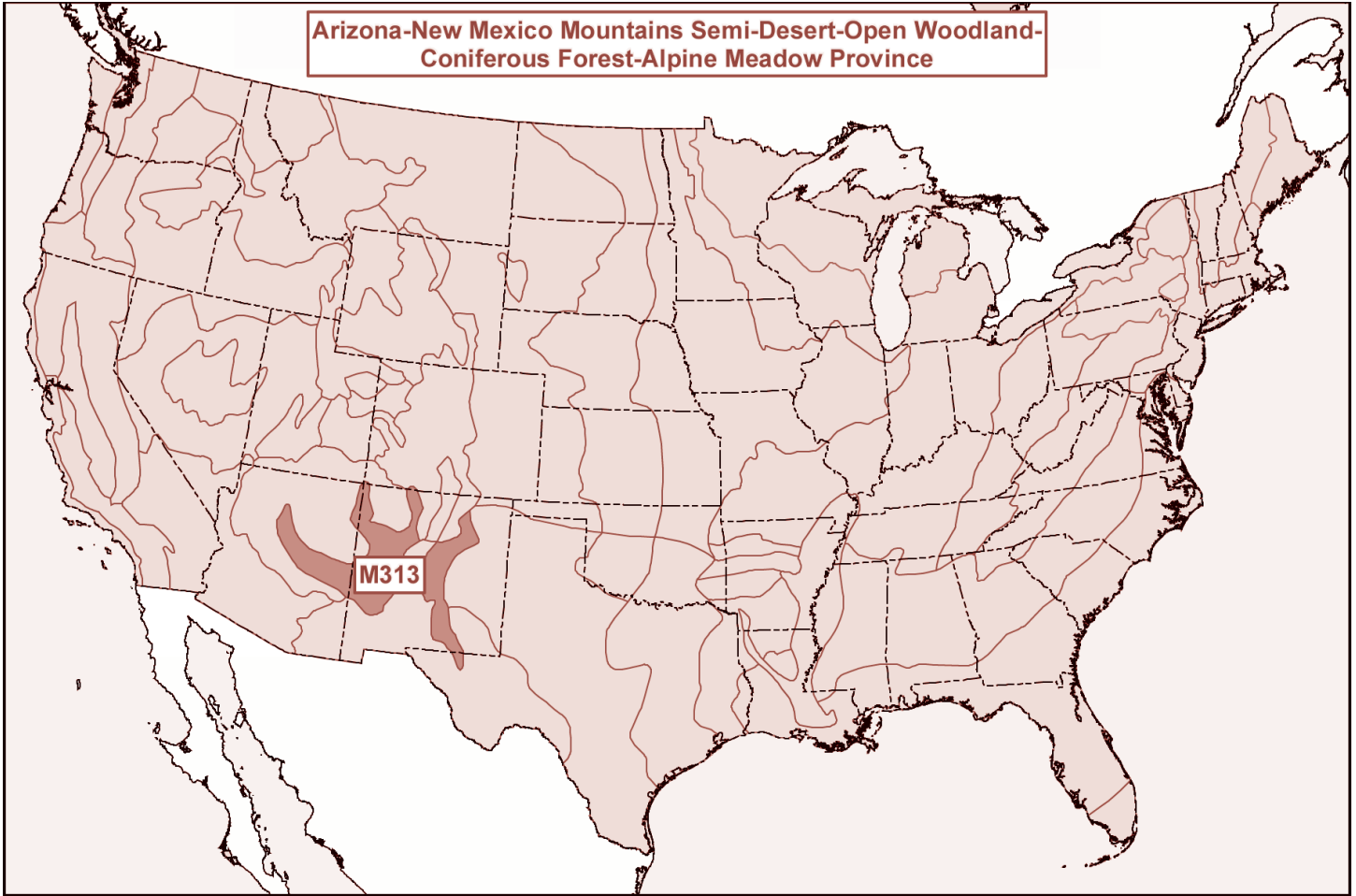
UNDERSTANDING THE ARIZONA-NEW MEXICO MOUNTAINS SEMIDESERT



- ✿ This region is designated **number M313** in the Baileys' Ecosystem Provinces. To see a map of the provinces go to: www.fs.fed.us/colorimagemap/ecoreg1_provinces.html
- ✿ Not sure about which bioregion you live or work in? Go to www.pollinator.org and click on **Ecoregion Locator** for help.
- ✿ 50,200 square miles within central and eastern-central Arizona and west-central, central, and south-central New Mexico.
- ✿ Primarily steep foothills and mountains, including some high plateaus.
- ✿ Elevations ranging from 4,500 feet to 12,600 feet.
- ✿ Average annual temperature range from 40° to 55°F.
- ✿ Average year-round precipitation between 10-35 inches.
- ✿ USDA Hardiness Zones 4b-7b.

CHARACTERISTICS

- ✿ Dominated by vegetational zones comprised of foothill grasses and brush, pine forest and forest that grows in rockier land, and an alpine belt.
- ✿ Common tree species include juniper, ponderosa pine, Douglas-fir, Aspen, Engelmann Spruce, corkbark fir, and bristlecone pine.
- ✿ There is a moisture deficit during the late spring until the arrival of summer rains.
- ✿ An exceptionally high level of biological diversity in its terrestrial and riparian/aquatic habitats has been badly compromised by human impact.



The Arizona–New Mexico Mountains Semidesert Open Woodland Coniferous Forest Alpine Meadow Province includes the states of:

Arizona

New Mexico

Texas

“ ADDING NATIVE PLANTINGS IN RIPARIAN AREAS TO IMPROVE POLLINATOR HABITAT MAKES SENSE IN ADVANCING OUR FAMILY FARM’S CONSERVATION AND ECONOMIC OBJECTIVES, ENHANCING BENEFICIAL WILDLIFE AND IMPROVING POLLINATION IN OUR ORCHARD AND GARDEN. ”

–LEE MCDANIEL, FARMER AND PRESIDENT,
NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS

MEET THE POLLINATORS

WHO ARE THE POLLINATORS?

BEES

Bees are well documented pollinators in the natural and agricultural systems of the Arizona–New Mexico Mountains Semidesert. Crops such as alfalfa, watermelon, cotton and chile pepper are just a few plants that benefit from bee pollinators.

Most of us are familiar with the colonies of honey bees that have been the workhorses of agricultural pollination for years in the United States. They were imported from Europe almost 400 years ago.

There are nearly 4000 species of native ground and twig nesting bees in the U.S. Some form colonies while others live and work a solitary life. Native bees currently pollinate many crops and can be encouraged to do more to support agricultural endeavors if their needs for nesting habitat are met and if suitable sources of nectar, pollen, and water are provided. Bees have tongues of varying lengths that help determine which flowers they can obtain nectar and pollen from.

The bumble bee (*Bombus* spp.) forms small colonies, usually underground. They are generalists, feeding on a wide range of plant material from February to November and are important pollinators of tomatoes. The sweat bee (family *Halictidae*) nests underground. Various species are solitary while others form loose colonies.

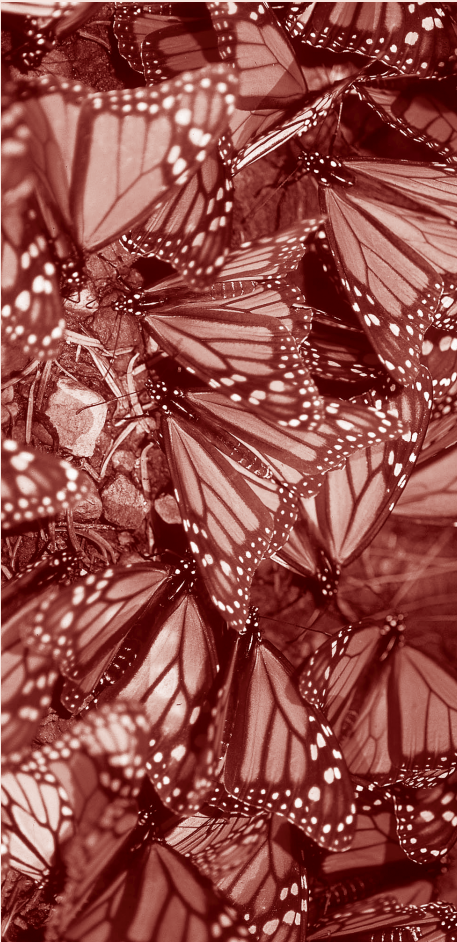
Solitary bees include carpenter bees (*Xylocopa* spp.), which nest in wood; digger, or polyester bees (*Colletes* spp.), which nest underground; leafcutter bees (*Megachile* spp.), which prefer dead trees or branches for their nest sites; and mason bees (*Osmia* spp.), which utilize cavities that they find in stems and dead wood. Cactus bees (*Diadasia* spp.) are also solitary ground nesters.

BUTTERFLIES

Gardeners have been attracting butterflies to their gardens for some time. These insects tend to be eye-catching, as are the flowers that attract them. Position flowering plants where they have full sun and are protected from the wind. Also, you will need to provide open areas (e.g. bare earth, large stones) where butterflies may bask, and moist soil from which they may get needed minerals. By providing a safe place to eat and nest, gardeners can also support the pollination role that butterflies play in the landscape. It might mean accepting slight damage to the plants, known as host plants, that provide food for the larval stage of the butterfly.

A diverse group of butterflies are present in garden areas and woodland edges that provide bright flowers, water sources, and specific host plants. Numerous trees, shrubs, and herbaceous plants support butterfly populations.

Butterflies are in the Order *Lepidoptera*. Some of the species in the Arizona–New Mexico




Monarch butterflies.

Protoxaea gloriosa bee pollinating a flower.



Photo Stephen Buchmann

Photo Stephen Buchmann



Mountains Semidesert are Ellis' Dotted Blue, Desert Elfin, Poling's Hairstreak, and Bay Checkerspot butterflies. They usually look for flowers that provide a good landing platform.

Wet mud areas provide butterflies with both the moisture and minerals they need to stay healthy. Butterflies eat rotten fruit and even dung, so don't clean up all the messes in your garden!

MOTHS

Moths are most easily distinguished from butterflies by their antennae. Butterfly antennae are simple with a swelling at the end. Moth antennae differ from simple to featherlike, but never have a swelling at the tip. In addition, butterflies typically are active during the day; moths at night. Butterfly bodies are not very hairy, while moth bodies are quite hairy and more stout.

Moths, generally less colorful than butterflies, also play a role in pollination. They are attracted to flowers that are strongly sweet smelling, open in late afternoon or night, and are typically white or pale colored.

BEETLES

Over 30,000 species of beetles are found in the United States and many of them can be found on flower heads. Gardeners have yet to intentionally draw beetles to their gardens, possibly because beetle watching isn't as inspiring

as butterfly or bird watching. Yet beetles do play a role in pollination. Some have a bad reputation because they can leave a mess behind, damaging plant parts that they eat. Beetles are not as efficient as some pollinators. They wander between different species, often dropping pollen as they go.

Beetle pollinated plants tend to be large, strong scented flowers with their sexual organs exposed. They are known to pollinate Magnolia, sweetshrub (*Calycanthus*), paw paws, and yellow pond lilies.

FLIES

It may be hard to imagine why one would want to attract flies to the garden. However, like beetles, the number of fly species and the fact that flies are generalist pollinators (visit many species of plants), should encourage us all to leave those flies alone and let them do their job as pollinators.

Recent research indicates that flies primarily pollinate small flowers that bloom under shade and in seasonally moist habitats. The National Research Council's *Status of Pollinators in North America* study states that flies are economically important as pollinators for a range of annual and bulbous ornamental flowers.

Plants pollinated by the fly include the American pawpaw (*Asimina triloba*), dead horse arum (*Helicodiceros muscivorus*), skunk cabbage (*Symplocarpus foetidus*), goldenrod (*Solidago* spp.), and

members of the carrot family like Queen Anne's lace (*Daucus carota*).

BIRDS

Hummingbirds are the primary birds which play a role in pollination in North America. Their long beaks and tongues draw nectar from tubular flowers. Pollen is carried on both the beaks and feathers of different hummingbirds. The regions closer to the tropics, with warmer climates, boast the largest number of hummingbird species and the greatest number of native plants to support the bird's need for food. White-winged doves (*Zenaidura asiatica*) are also pollinators of the saguaro cactus (*Carnegeia gigantea*) in the south central United States.

Bright colored tubular flowers attract hummingbirds to gardens throughout the United States. Hummingbirds can see the color red; bees cannot. Arid scrub in the Arizona–New Mexico Mountains Semidesert contains an abundance of flora, such as the cardinal flower, that attract broad-billed and black-chinned hummingbirds.

BATS

Though bats in the Arizona–New Mexico Mountains Semidesert are not pollinators, bats play an important role in pollination in the other regions of the southwest where they feed on agave and cactus. The long-nosed bats' head shape and long tongue allows it to delve into flower blossoms and extract both pollen and nectar.

PLANT TRAITS

WHICH FLOWERS DO THE POLLINATORS PREFER?

NOT ALL POLLINATORS ARE found in each North American province, and some are more important in different parts of the United States. Use this page as a resource to understand the plants and pollinators where you live.

Plants can be grouped together based on the similar characteristics of their flowers. These floral characteristics can be useful to predict the type of pollination method or animal that is most effective for that group of plants. This association between floral characteristics and pollination method is called a pollination syndrome.

The interactions of animal pollinators and plants have influenced the evolution of both groups of organisms. A mutualistic relationship between the pollinator and the plant species helps the pollinator find necessary pollen and nectar sources and helps the plant reproduce by ensuring that pollen is carried from one flower to another.

Plant Trait	Bats	Bees	Beetles
Color	Dull white, green or purple	Bright white, yellow, blue, or UV	Dull white or green
Nectar guides	Absent	Present	Absent
Odor	Strong musty; emitted at night	Fresh, mild, pleasant	None to strongly fruity or fetid
Nectar	Abundant; somewhat hidden	Usually present	Sometimes present; not hidden
Pollen	Ample	Limited; often sticky and scented	Ample
Flower Shape	Regular; bowl shaped – closed during day	Shallow; have landing platform; tubular	Large bowl-like, Magnolia

This chart and more information on pollinator syndromes can be found at:



AND THE POLLINATORS THEY ATTRACT

Pollinator

Birds	Butterflies	Flies	Moths	Wind
Scarlet, orange, red or white	Bright, including red and purple	Pale and dull to dark brown or purple; flecked with translucent patches	Pale and dull red, purple, pink or white	Dull green, brown, or colorless; petals absent or reduced
Absent	Present	Absent	Absent	Absent
None	Faint but fresh	Putrid	Strong sweet; emitted at night	None
Ample; deeply hidden	Ample; deeply hidden	Usually absent	Ample; deeply hidden	None
Modest	Limited	Modest in amount	Limited	Abundant; small, smooth, and not sticky
Large funnel like; cups, strong perch support	Narrow tube with spur; wide landing pad	Shallow; funnel like or complex and trap-like	Regular; tubular without a lip	Regular; small and stigmas exerted

<http://www.fs.fed.us/wildflowers/pollinators/syndromes.shtml>



DEVELOPING LANDSCAPE PLANTINGS THAT PROVIDE POLLINATOR HABITAT

WHETHER YOU ARE A FARMER of many acres, land manager of a large tract of land, or a gardener with a small lot, you can increase the number of pollinators in your area by making conscious choices to include plants that provide essential habitat for bees, butterflies, moths, beetles, hummingbirds and other pollinators.

FOOD:

Flowers provide nectar (high in sugar and necessary amino acids) and pollen (high in protein) to pollinators.

Fermenting fallen fruits also provide food for bees, beetles and butterflies.

Specific plants, known as host plants, are eaten by the larvae of pollinators such as butterflies.

- Plant in groups to increase pollination efficiency. If a pollinator can visit the same type of flower over and over, it doesn't have to relearn how to enter the flower and can transfer pollen to the same species, instead of squandering the pollen on unreceptive flowers.
- Plant with bloom season in mind, providing food from early spring to late fall. (see Bloom Periods pp.16-17)
- Plant a diversity of plants to support a variety of pollinators. Flowers of different color, fragrance, and season of bloom on plants of different heights will attract different pollinator species and provide pollen and nectar throughout the seasons.
- Many herbs and annuals, although

not native, are very good for pollinators. Mint, oregano, garlic, chives, parsley and lavender are just a few herbs that can be planted. Old fashioned zinnias, cosmos, and single sunflowers support bees and butterflies.

- Recognize weeds that might be a good source of food. For example, dandelions provide nectar in the early spring before other flowers open. Plantain is alternate host for the Baltimore Checkerspot.
- Learn and utilize Integrated Pest Management (IPM) practices to address pest concerns. Minimize or eliminate the use of pesticides.

SHELTER:

Pollinators need protection from severe weather and from predators as well as sites for nesting and roosting.

- Incorporate different canopy layers in the landscape by planting trees, shrubs, and different-sized perennial plants.
- Leave dead snags for nesting sites of bees, and other dead plants and leaf litter for shelter.
- Build bee boxes to encourage solitary, non-aggressive bees to nest on your property.
- Leave some areas of soil uncovered to provide ground nesting insects easy access to underground tunnels.
- Group plantings so that pollinators can move safely through the landscape protected from predators.
- Include plants that are needed

by butterflies during their larval development.

WATER:

A clean, reliable source of water is essential to pollinators.

- Natural and human-made water features such as running water, pools, ponds, and small containers of water provide drinking and bathing opportunities for pollinators.
- Ensure the water sources have a shallow or sloping side so the pollinators can easily approach the water without drowning.

Your current landscape probably includes many of these elements. Observe wildlife activity in your farm fields, woodlands, and gardens to determine what actions you can take to encourage other pollinators to feed and nest. Evaluate the placement of individual plants and water sources and use your knowledge of specific pollinator needs to guide your choice and placement of additional plants and other habitat elements. Minor changes by many individuals can positively impact the pollinator populations in your area. Watch for - and enjoy - the changes in your landscape!

- **CAUTION:** Remember that pesticides are largely toxic to pollinators. Extreme caution is warranted if you choose to use any pesticide. Strategically apply pesticides only for problematic target species.



FARMS

Alfalfa, watermelon, cotton, and chile pepper are a few of the food crops in the Arizona-New Mexico Mountains Semidesert Province that will benefit from strong native bee populations that boost pollination efficiency. Incorporate different plants throughout the farm that provide food for native populations when targeted crops are not in flower.

Farmers have many opportunities to incorporate pollinator-friendly land management practices on their land which will benefit the farmer in achieving his or her production goals:

- Manage the use of pesticides to reduce the impact on native pollinators. Spray when bees aren't active (just after dawn) and choose targeted ingredients.
- Carefully consider the use of

herbicides. Perhaps the targeted weeds can provide needed food for pollinators.

- Minimize tillage to protect ground nesting pollinators.
- Ensure water sources are scattered throughout the landscape.
- Choose a variety of native plants to act as windbreaks, riparian buffers, and field borders throughout the farm.
- Plant unused areas of the farm with temporary cover crops that can provide food or with a variety of trees, shrubs, and flowers that provide both food and shelter for pollinators.
- Check with your local Natural Resources Conservation Service (NRCS) office to see what technical and financial support might be available to assist you in your effort to provide nectar, pollen, and larval food sources for pollinators on your farm.

“**FOOD SUPPLIES FOR BEES ARE CRITICAL TO MAINTAINING STRONG HIVES FOR ALMOND POLLINATION THE FOLLOWING WINTER.**”

-- DAN CUMMINGS,
CHICO, CALIFORNIA
ALMOND GROWER.



Illustrations by Carolyn Vibbert

PUBLIC LANDS

“FROM HUMMINGBIRDS TO BEETLES, TO BUTTERFLIES, NATURE’S POLLINATORS HELP KEEP MIDEWIN’S TALLGRASS PRAIRIE RESTORATIONS FULL OF DIVERSE FLOWERING PLANTS. INSECT MONITORING PROVIDES A KEY MEASURE OF OUR SUCCESS.”

-- LOGAN LEE
PRAIRIE SUPERVISOR, MIDEWIN
NATIONAL TALLGRASS PRAIRIE



Public lands are maintained for specific reasons ranging from high impact recreation to conservation. In the Arizona-New Mexico Mountains Semidesert, habitats have been impacted by livestock grazing, timber harvesting, exotic species invasions, and the development associated with increased human populations. Less disturbed natural areas can be augmented with plantings of native plant species. Existing plantings around buildings and parking areas should be evaluated to determine if pollinator-friendly plants can be substituted or added to attract and support pollinators. Public land managers have a unique opportunity to use their plantings as an education tool to help others understand the importance of pollinators in the environment

through signs, brochures, and public programs.

In an effort to increase populations of pollinators the land manager can:

- Inventory and become knowledgeable of local pollinators.
- Provide connectivity between vegetation areas by creating corridors of perennials, shrubs, and trees that provide pollinators shelter and food as they move through the landscape.
- Maintain a minimum of lawn areas that support recreational needs.
- Restrict the use of pesticides and herbicides.
- Provide water sources in large open areas.
- Maintain natural meadows and openings that provide habitats for sun-loving wildflowers and grasses.
- Remove invasive species and encroaching shrubs and trees.



“ A GARDEN IS ONLY AS RICH AND BEAUTIFUL AS THE INTEGRAL HEALTH OF THE SYSTEM; POLLINATORS ARE ESSENTIAL TO THE SYSTEM - MAKE YOUR HOME THEIR HOME. ”

-- DERRY MACBRIDE
NATIONAL AFFAIRS AND
LEGISLATION CHAIRWOMAN,
GARDEN CLUB OF AMERICA

Gardeners have a wide array of plants to use in their gardens. Native plants, plants introduced from years of plant exploration from around the world, and plants developed by professional and amateur breeders can be found in garden centers, in catalogs, and on web-sites. Use your knowledge of pollinator needs to guide your choices.

- Choose a variety of plants that will provide nectar and pollen throughout the growing season.
- Resist the urge to have a totally manicured lawn and garden. Leave bare ground for ground nesting bees. Leave areas of dead wood and leaf litter for other insects.
- Strive to eliminate the use of all pesticides.
- Find local resources to help you in your efforts. Contact your local county extension agent or native plant society. Visit your regional botanic gardens and arboreta.

The scale of your plantings will vary but it is important to remember that you are trying to provide connectivity to the landscape adjacent to your property. Don't just look within your property boundaries. If your neighbor's property provides an essential element, such as water, which can be utilized by pollinators visiting your land, you may be able to devote more space to habitat elements that are missing nearby. It is best to use native plants which have evolved to support the needs of specific native pollinators. Some pollinators, however, are generalists and visit many different plants, both native and non-native. Be sure that any non-native plants you choose to use are not invasive. Remember that specialized cultivars sometimes aren't used by pollinators. Flowers that have been drastically altered, such as those that are double or a completely different color than the wild species, often prevent pollinators from finding and feeding on the flowers. In addition, some altered plants don't contain the same nectar and pollen resources that attract pollinators to the wild types.

- **CAUTION:** Take time to evaluate the source of your plant material. You want to ensure you get plants that are healthy and correctly identified. Your local native plant society can help you make informed decisions when searching for plants.



BLOOM PERIODS

FOR THE ARIZONA-NEW MEXICO MOUNTAINS SEMIDESERT

The following chart lists plants and the time they are in bloom throughout the growing seasons. Choose a variety of flower colors and make sure something is blooming at all times! Note for all charts: When more than one species of the same genus is useful, the genus name is followed by "ssp."

Botanical Name	Common Name	April	May	June	July	Aug	Sept	Oct
Trees & Shrubs								
<i>Fallugia paradoxa</i>	Apache plume	white	white	white	white	white	white	white
<i>Fendlera rupicola</i>	cliff fendlerbush	white	white	white	white	white	white	white
<i>Dasiphora fruticosa</i> ssp. <i>floribunda</i>	shrubby cinquefoil			yellow	yellow			
<i>Prunus virginiana</i>	chokecherry		white	white				
<i>Robinia neomexicana</i>	New Mexico locust	rose-pink	rose-pink	rose-pink	rose-pink			
<i>Rosa woodsii</i>	Woods' rose			rose-pink	rose-pink	rose-pink		
Perennial Flowers								
<i>Achillea millefolium</i>	common yarrow		white	white	white	white		
<i>Agastache pallidiflora</i>	Bill Williams Mountain giant hyssop				white to deep rose-purple	white to deep rose-purple	white to deep rose-purple	white to deep rose-purple
<i>Calypso bulbosa</i>	fairy slipper		purple to magenta	purple to magenta	purple to magenta	purple to magenta		
<i>Castilleja integra</i>	wholeleaf Indian paintbrush		orange	orange	orange	orange	orange	



Botanical Name	Common Name	April	May	June	July	Aug	Sept	Oct
<i>Erigeron speciosus</i>	aspen fleabane				blue to violet	blue to violet	blue to violet	
<i>Gentiana affinis</i>	pleated gentain				blue	blue	blue	
<i>Hymenoxys hoopesii</i>	owl's-claws				yellow to orange	yellow to orange	yellow to orange	
<i>Ipomopsis aggregata</i> ssp. <i>formosissima</i>	scarlet gilia		orange to scarlet	orange to scarlet	orange to scarlet	orange to scarlet	orange to scarlet	orange to scarlet
<i>Iris missouriensis</i>	Rocky Mountain iris		blue to violet	blue to violet	blue to violet			
<i>Lupinus argenteus</i>	silvery lupine			blue to purple	blue to purple	blue to purple	blue to purple	
<i>Mertensia franciscana</i>	Franciscan bluebells			blue	blue	blue		
<i>Oxytropis sericea</i>	white locoweed	white	white	white	white	white	white	white
<i>Penstemon virgatus</i>	upright blue beardtongue			light blue	light blue	light blue	light blue	
<i>Penstemon whippleanus</i>	Whipple's penstemon			dull purple	dull purple	dull purple	dull purple	
<i>Rhodiola integrifolia</i>	ledge stonecrop			reddish-purple	reddish-purple	reddish-purple	reddish-purple	
<i>Sidalcea neomexicana</i>	salt spring checkerbloom			rose-purple	rose-purple	rose-purple	rose-purple	
<i>Thermopsis montana</i>	mountain goldenbanner	yellow to orange	yellow to orange	yellow to orange	yellow to orange			

PLANTS THAT ATTRACT POLLINATORS

FOR THE ARIZONA-NEW MEXICO MOUNTAINS SEMIDESERT

The following chart lists plants that attract pollinators. It is not exhaustive, but provides guidance on where to start. Annuals, herbs, weeds, and cover crops provide food and shelter for pollinators, too.

Botanical Name	Common Name	Color	Height	Flower Season	Sun	Soil	Visitation by Pollinator	Also a host
Trees & Shrubs								
<i>Fallugia paradoxa</i>	Apache plume	white	3-6'	Apr-Oct	full sun	gravelly alluvium	bees, flies, butterflies, moths	
<i>Fendlera rupicola</i>	cliff fendlerbush	white	3-6'	Apr-Oct	full sun	rocky	bees, flies, butterflies, moths	
<i>Dasiphora fruticosa</i> ssp. <i>floribunda</i>	shrubby cinquefoil	yellow	2-4'	Jun-Jul	full sun	clay to sandy loam	bees, flies, butterflies	
<i>Prunus virginiana</i>	chokecherry	white	6-30'	May-Jun	full sun to partial shade	various	bees, flies, butterflies	
<i>Robinia neomexicana</i>	New Mexico locust	rose-pink	10-30'	Apr-Jul	full sun to full shade	clay to sandy loam	bees, bumblebees	
<i>Rosa woodsii</i>	Woods' rose	rose-pink	2-3'	Jun-Aug	full sun to full shade	clay loam to sandy loam	bees, flies, butterflies	
Perennial Flowers								
<i>Achillea millefolium</i>	common yarrow	white	6-12"	May-Aug	full sun	various	bees, flies, butterflies, moths	
<i>Agastache pallidiflora</i>	Bill Williams Mountain giant hyssop	white to deep rose-purple	12-30"	Jul-Oct	partial to full shade	loamy	butterflies, bees, hummingbirds	
<i>Calypso bulbosa</i>	fairy slipper	purple to magenta	3-8"	May-Aug	full shade	humus	bumblebees	
<i>Castilleja integra</i>	wholeleaf Indian paintbrush	orange	12-16"	May-Sep	full sun	rocky mineral	hummingbirds	
<i>Erigeron speciosus</i>	aspen fleabane	blue to violet	18-24"	Jul-Sep	full sun	loamy	bees, flies, butterflies	



Botanical Name	Common Name	Color	Height	Flower Season	Sun	Soil	Visitation by Pollinator	Also a host
<i>Gentiana affinis</i>	pleated gentain	blue	4-12"	Jul-Sep	full sun	rocky to loamy	bumblebees	
<i>Hymenoxys hoopesii</i>	owl's-claws	yellow to orange	12-30"	Jul-Sep	full sun to partial shade	rocky to loamy	bees, flies, butterflies, moths	
<i>Ipomopsis aggregata ssp. formosissima</i>	scarlet gilia	orange to scarlet	18-24"	May-Oct	full sun to partial shade	rocky mineral	hummingbirds	
<i>Iris missouriensis</i>	Rocky Mountain iris	blue to violet	16-30"	May-Jul	full sun	wet loamy	bumblebees	
<i>Lupinus argenteus</i>	silvery lupine	blue to purple	12-30"	Jun-Sep	full sun	various	bees, bumblebees	
<i>Mertensia franciscana</i>	Franciscan bluebells	blue	12-24"	Jun-Aug	partial to full shade	wet loamy	bees, bumblebees, flies, butterflies	
<i>Oxytropis sericea</i>	white locoweed	white	8-16"	Apr-Oct	full sun	loamy	bees, bumblebees	
<i>Penstemon virgatus</i>	upright blue beardtongue	light blue	2-3'	Jun-Sep	full sun	rocky mineral	bees, hummingbirds	
<i>Penstemon whippleanus</i>	Whipple's penstemon	dull purple	1-2'	Jun-Sep	partial to full shade	rocky mineral	bees	
<i>Rhodiola integrifolia</i>	ledge stonecrop	reddish-purple	8-12"	Jun-Sep	full sun	damp rocky	butterflies, bees	
<i>Sidalcea neomexicana</i>	salt spring checkerbloom	rose-purple	2-3'	Jun-Sep	full sun to partial shade	wet loamy	bees, bumblebees, flies, butterflies	
<i>Thermopsis montana</i>	mountain goldenbanner	yellow to orange	1-2'	Apr-Jul	full sun to partial shade	loamy	bees, bumblebees	

HABITAT HINTS

FOR THE ARIZONA-NEW MEXICO MOUNTAINS SEMIDESERT

HABITAT REQUIREMENTS FOR BEE-POLLINATED GARDEN FLOWERS AND CROPS

	Bumble	Digger	Lg Carpenter	Sm Carpenter	Squash/Gourd	Leafcutter	Mason	Sweat	Plasterer	Yellow-faced	Andrenid
FLOWERS											
Catalpa			x								
Catnip	x	x					x				
Clover		x									x
Columbine	x										
Cow parsley										x	
Goldenrod	x	x				x		x			
Impatiens	x										
Irises	x		x								
Lavender	x	x	x			x					
Milkwort								x			
Morning glory				x							
Penstemon	x	x					x				
Passion flowers			x								
Phacelia	x	x		x		x	x	x	x		x
Potentilla										x	
Rose	x		x				x	x		x	
Salvia	x	x	x			x	x				
Saxifrages								x		x	
Sorrel				x							
Sunflowers	x	x	x	x		x		x	x		x
Violet								x			x
Wild Mustard		x							x		
Willow catkins									x		x
CROPS											
Almond	x						x				x
Apple							x				
Blueberry	x	x									x
Cherry							x				x
Eggplant	x		x					x			
Gooseberry	x										x
Legumes	x	x				x		x			
Water melon	x							x			
Squash/ Pumpkins/ Gourds			x		x						
Tomatoes	x	x	x					x			
Thyme	x	x					x	x		x	



HABITAT AND NESTING REQUIREMENTS:

Bumble Bees:

Abandoned mouse nests, other rodent burrows, upside down flower pots, under boards, and other human-made cavities. Colonies are founded by a queen in the spring and don't die out in the fall. New queens mate then and overwinter in a sort of hibernation. Bumble bees are usually active during the morning hours and forage at colder temperatures than honey bees, even flying in light rain.

Large carpenter bees:

Soft dead wood, poplar, cottonwood or willow trunks and limbs, structural timbers including redwood. Depending on the species, there may be one or two brood cycles per year. These bees can be active all day even in the hottest weather.

Digger bees:

Sandy soil, compacted soils, bank sides. Anthophorid bees (now in the Apidae) are usually active in the morning hours, but can be seen at other times.

Small carpenter bees:

Pithy stems including roses and blackberry canes. These bees are more active in the morning but can be found at other times.

Squash and Gourd bees:

Sandy soil, may nest in gardens (where pumpkins, squash and gourds are grown) or pathways. These bees are early risers and can be found in pumpkin patches before dawn. Males often sleep in the wilted flowers.

Leafcutter bees:

Pre-existing circular tunnels of various diameters in dead but sound wood created by emerging beetles, some nest in the ground. Leave dead limbs and trees to support not just pollinators but other wildlife. Leafcutter bees can be seen foraging throughout the day even in hot weather.

Mason bees:

Pre-existing tunnels, various diameters in dead wood made by emerging beetles, or human-made nesting substrates, drilled wood boards, paper soda straws inserted into cans attached to buildings. Mason bees are generally more active in the morning hours.

Sweat bees:

Bare ground, compacted soil, sunny areas not covered by vegetation. Like most bees, sweat bees forage for pollen earlier in the morning and then for nectar later.

Plasterer or cellophane bees:

Bare ground, banks or cliffs. Colletid bees can be active in the morning or later in the day.

Yellow-faced bees:

In dead stems. These bees are more active during morning hours.

Andrenid bees:

Sunny, bare ground, sand soil, under leaf litter or in soil in banksides and cliffs. These generally spring-active bees are most commonly seen on flowers during the morning when pollen and nectar resources are abundant.



**“MONARCH
BUTTERFLIES
NEVER FAIL TO
CATCH THE
VISITOR’S EYE
AND ALWAYS
LEAD TO
A TEACHABLE
MOMENT.”**

**-- LOGAN LEE,
PRAIRIE SUPERVISOR
MIDWIN NATIONAL
TALLGRASS PRAIRIE**

BECOME FAMILIAR WITH POLLINATORS IN YOUR LANDSCAPE.

- ✿ Watch for activity throughout the day and the seasons.
- ✿ Keep a simple notebook of when and what comes to your garden.
NOTE: It is not necessary to identify each species when you first get started. Simply note if it is a bee that likes the yellow flower that blooms in the fall.
- ✿ Consult a local field guide or web site when you are ready to learn more details.

ADD NATIVE PLANTS TO ATTRACT MORE NATIVE POLLINATORS.

- ✿ List the plants you currently have in your landscape.
- ✿ Determine when you need additional flowers to provide nectar and pollen throughout the growing season.
- ✿ Add plants that provide additional seasons of bloom, create variable heights for shelter, and attract the types of pollinators you want.
- ✿ Don't forget to include host plants that provide food and shelter for larval development.
- ✿ Contact your local native plant society or extension agent for more help.

USE POLLINATOR FRIENDLY LANDSCAPE PRACTICES TO SUPPORT THE POLLINATORS YOU ATTRACT.

- ✿ Use Integrated Pest Management Practices to address pest concerns.
- ✿ Tolerate a little mess – leave dead snags and leaf litter, keep areas bare for ground nesting insects, and leave some weeds that provide food for pollinators.
- ✿ Provide safe access to clean water.

NOTICE THE CHANGES THAT YOU HAVE HELPED TO CREATE!



RESOURCES

Many books, websites, and people were consulted to gather information for this guide. Use this list as a starting point to learn more about pollinators and plants in your area.

BAILEY'S ECOREGION MAPS

USDA Forest Service

http://www.fs.fed.us/land/ecosysmgmt/ecoreg1_home.html

POLLINATION/POLLINATORS

Pollinator Partnership

www.pollinator.org

Coevolution Institute

www.coevolution.org

Natural Resources Conservation Service

www.nrcs.usda.gov

North American Pollinator Protection Campaign

www.nappc.org

USDA Forest Service

www.fs.fed.us/wildflowers/pollinators/

Wild Farm Alliance

www.wildfarmalliance.org

Xerces Society Pollinator Program

www.xerces.org

Shepherd, MD, S. Buchmann, M. Vaughan, and S. Black. 2003. *Pollinator Conservation Handbook*. Xerces Society for Invertebrate Conservation. Portland, OR.

Illinois Natural History Survey

www.inhs.uiuc.edu

Buchmann, S.L. and G.P. Nabhan. 1997. *The Forgotten Pollinators*. Island Press: Washington, DC.

Committee on the Status of Pollinators in North America. 2007. *Status of Pollinators in North America*. The National Academies Press: Washington, DC.

NATIVE PLANTS

Plant Conservation Alliance

www.nps.gov/plants

Seeds of Success

www.nps.gov/plants/sos

Lady Bird Johnson Wildflower Center

www.wildflower.org/plants/

USDA Hardiness Zone Map

www.usna.usda.gov/Hardzone/

U.S. National Arboretum

www.usna.usda.gov/Hardzone/ushzmap.html

USDA, NRCS. 2007. The PLANTS Database

www.plants.usda.gov, 19 July, 2007
National Plant Data Center,
Baton Rouge, LA 70874-4490 USA

NATIVE BEES

National Sustainable Information Service

"Alternative Pollinators: Native Bees" by Lane Greer, NCAT Agriculture Specialist, Published 1999, ATTRA Publication #IP126
www.attra.ncat.org/attra-pub/nativebee.html

Agriculture Research Service

Plants Attractive to Native Bees table
www.ars.usda.gov/Research/docs.htm?docid=12052

Christopher O'Toole and Anthony Raw. 1999. *Bees of the World*. Blandford. London, UK.

BUTTERFLIES AND MOTHS

Opler, Paul A., Harry Pavulaan, Ray E. Stanford, Michael Pogue, coordinators. 2006. *Butterflies and Moths of North America*. Bozeman, MT: NBII Mountain Prairie Information Node.
www.butterfliesandmoths.org/
(Version 07192007)

Jim Brock and Kenn Kaufman. 2003. *Butterflies of North America*. Houghton Mifflin. New York, NY.

North American Butterfly Association

www.naba.org

FEEDBACK

We need your help to create better guides for other parts of North America. Please e-mail your input to feedback@pollinator.org or fax to 415-362-3070.

- ✿ How will you use this guide?
- ✿ Do you find the directions clear? If not, please tell us what is unclear.
- ✿ Is there any information you feel is missing from the guide?
- ✿ Any other comments?

**THANK YOU
FOR TAKING
THE TIME TO HELP!**

**POLLINATOR
PARTNERSHIP**



NAPPC



Plant Conservation Alliance



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