



SELECTING PLANTS FOR POLLINATORS



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

PRAIRIE PARKLAND (SUBTROPICAL) PROVINCE

INCLUDING THE STATES OF
TEXAS AND OKLAHOMA

**POLLINATOR
PARTNERSHIP**

Protect their lives. Preserve ours.

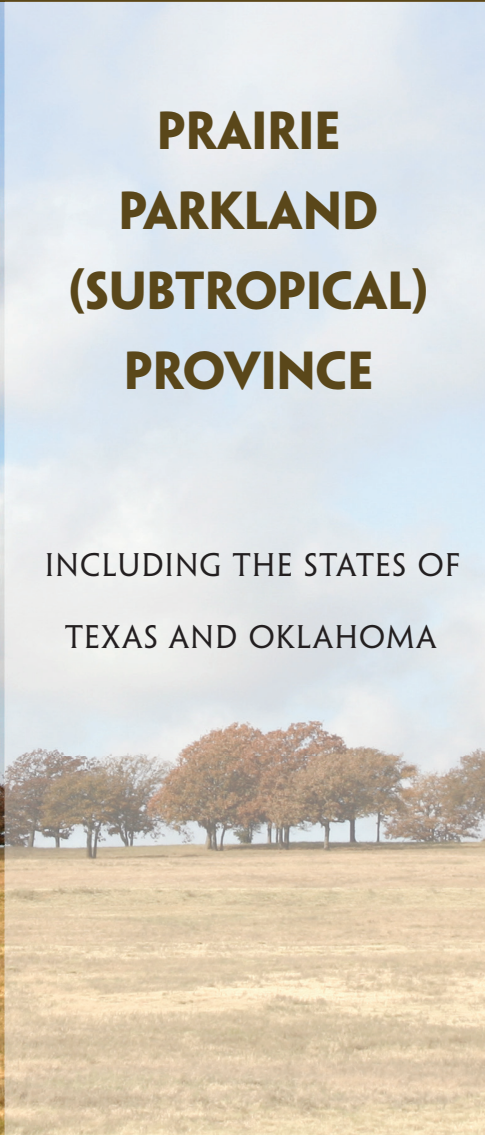


TABLE OF CONTENTS

WHY SUPPORT POLLINATORS?	4
GETTING STARTED	5
PRAIRIE PARKLAND (SUBTROPICAL) PROVINCE	6
MEET THE POLLINATORS	8
PLANT TRAITS	10
DEVELOPING PLANTINGS	12
FARMS	13
PUBLIC LANDS	14
HOME LANDSCAPES	15
BLOOM PERIODS	16
PLANTS THAT ATTRACT POLLINATORS	18
HABITAT HINTS	20
CHECKLIST	22
RESOURCES AND FEEDBACK	23

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

PRAIRIE PARKLAND (SUBTROPICAL) PROVINCE

INCLUDING THE STATES OF
TEXAS AND OKLAHOMA

A NAPPC 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.

Cucumbers, figs, blackberries, and blueberries are some of the crops raised in the Prairie Parkland (Subtropical) 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.



Kelly Bills
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 Prairie Parkland (Subtropical) Province.

This 80,000 square mile province is a region of plains and low hills. A majority of the area gently slopes at elevations ranging from sea level to 1,300 feet. The climate is similar to the temperate prairies but characterized by warmer winters (50° to 80°F), and more precipitation, most of which falls year-round as rain. Average annual rainfall ranges from 35 inches in the north to 55 inches in the south. Hurricanes are common in autumn months.

This province is characterized by prairies and savannas that comprise part of the grassland-forest transition area in the central U.S. Vegetation features a few hardy evergreen tree species, including

oaks and hickories typically short of stature and widely spaced, and various short and medium-to-tall grasses. Bluestem is the principal grass found throughout the region. Local distribution largely depends on soil. Grassland is supported by fine, heavy soils while savanna stands grow in coarse, light soil.

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.

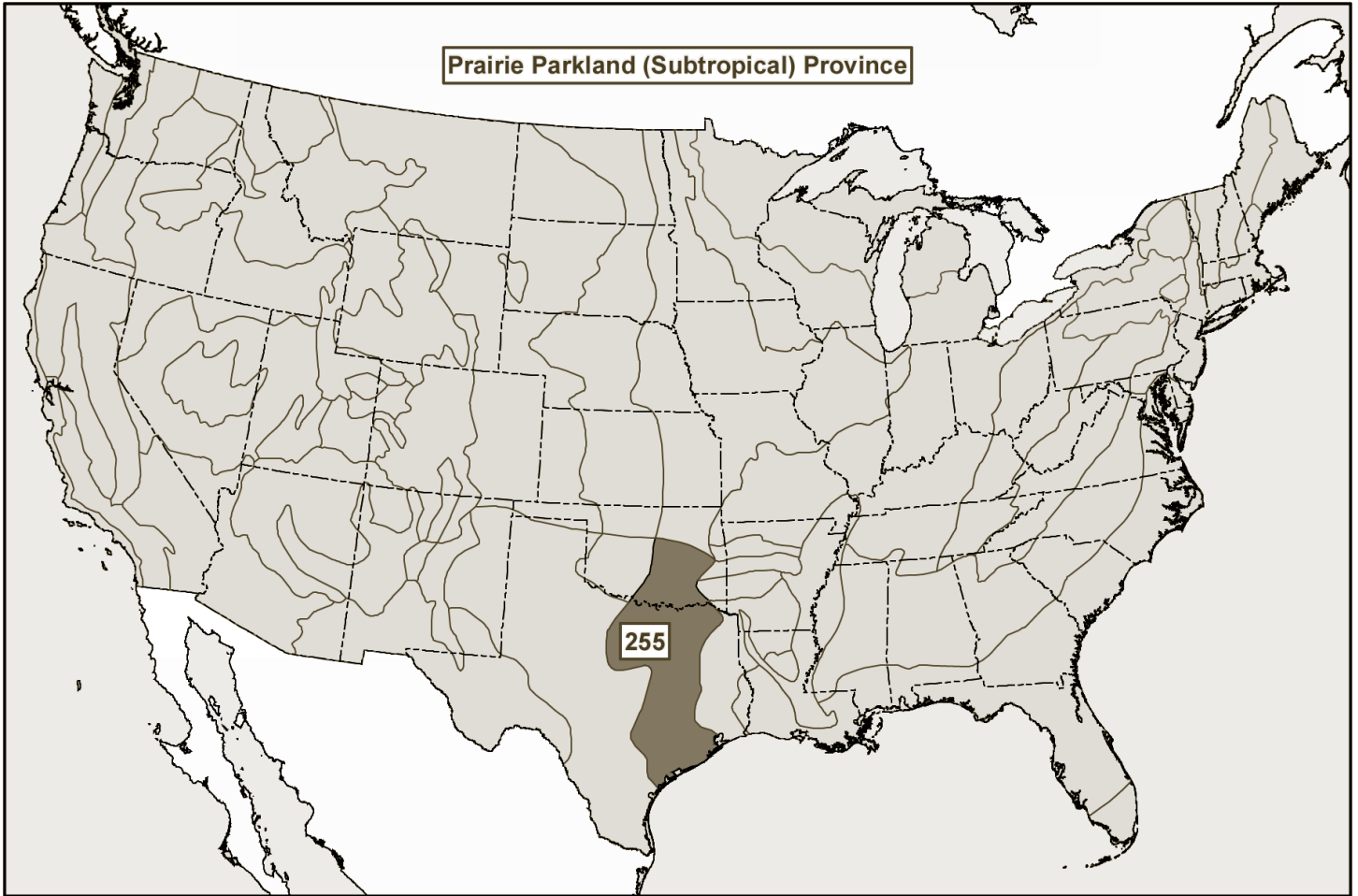
UNDERSTANDING THE PRAIRIE PARKLAND (SUBTROPICAL)



- ✿ This region is designated **number 255** in the Baileys' Ecosystem Provinces. To see a map of the provinces go to: fs.fed.us/colorimagemap/ecoreg1_provinces.html
- ✿ Not sure about which bioregion you live or work in? Go to pollinator.org and click on **Ecoregion Locator** for help.
- ✿ 80,100 square miles within Texas and Oklahoma.
- ✿ Primarily gently rolling to flat plains.
- ✿ Elevations ranging from sea level to 1,300 feet.
- ✿ Average winter temperature from 50° to 60°F, summers from 70° to 80°F.
- ✿ Average year-round precipitation ranges from 35 inches in the north to 55 inches in the south.
- ✿ USDA Hardiness Zones 7a-9a.

CHARACTERISTICS

- ✿ Comprised of prairies and savannas.
- ✿ Vegetation includes oak and hickory trees and various short and medium-to-tall grasses.
- ✿ One of the most altered regions in the U.S.' threats to habitat include conversion and fragmentation associated with agriculture and development.



The Prairie Parkland (Subtropical) Province includes the states of:

Texas and Oklahoma

“ 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



Photo Kim Davis & Mike Stangeland

Pair of Reakirt's Blue butterflies mating.

A female Black Chinned Hummingbird in flight.



WHO ARE THE POLLINATORS?

BEES

Bees are well documented pollinators in the natural and agricultural systems of the Prairie Parkland (Subtropical). A wide range of crops including cucumbers, figs, blackberries, and blueberries 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 Prairie Parkland (Subtropical)



are Silver-spotted Skipper, Eastern Tiger Swallowtail, Dainty Sulphur, Reakirt's Blue, and Pearl Crescent 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 (*Carnegieia 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. Coralbean growing in the Prairie Parkland (Subtropical) attracts black-chinned hummingbirds.

BATS

Though bats in the Prairie Parkland (Subtropical) 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://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

Cucumbers, figs, blackberries and blueberries are a few of the food crops in the Prairie Parkland (Subtropical) 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

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

-- LOGAN LEE
PRAIRIE SUPERVISOR, MIDWIN
NATIONAL TALLGRASS PRAIRIE



Public lands are maintained for specific reasons ranging from high impact recreation to conservation. In the Prairie Parkland (Subtropical), habitat has been greatly threatened by conversion to crops and development associated with high population growth. 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.



HOME LANDSCAPES

“ 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 PRAIRIE PARKLAND (SUBTROPICAL)



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 "spp."

Botanical Name	Common Name	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Annual Flowers												
<i>Argemone albiflora</i>	White Prickly Poppy		white	white	white	white	white					
<i>Castilleja indivisa</i>	Indian Paintbrush		red	red	red							
<i>Centaurea americana</i>	American Basketflower				white-purple	white-purple						
<i>Chamaechaerista fasciculata</i>	Partridge Pea					yellow	yellow	yellow	yellow	yellow		
<i>Coreopsis basalis</i>	Golden-Wave Tickseed			yellow w/red center	yellow w/red center	yellow w/red center	yellow w/red center					
<i>Coreopsis tinctoria</i>	Plains Coreopsis		yellow w/red center	yellow w/red center	yellow w/red center	yellow w/red center	yellow w/red center					
<i>Eustoma exaltatum</i> <i>ssp. russellianum</i>	Texas Bluebells					purple	purple	purple	purple	purple		
<i>Gaillardia pulchella</i>	Indian Blanket				red w/yellow tips	red w/yellow tips	red w/yellow tips					
<i>Helianthus annuus</i>	Common Sunflower				yellow	yellow	yellow	yellow	yellow	yellow		
<i>Lupinus texensis</i>	Texas Bluebonnet		blue	blue	blue							
<i>Oenothera lacinata</i>	Cutleaf Evening Primrose		yellow	yellow	yellow	yellow	yellow	yellow	yellow	yellow		
<i>Phacelia congesta</i>	Blue Curls		blue	blue	blue							
<i>Phlox drummondii</i>	Drummond Phlox		pink	pink	pink	pink						
<i>Proboscoidea louisianica</i>	Devil's Claw					purple	purple	purple	purple			
<i>Sabatia campestris</i>	Meadow Pinks		pink	pink	pink	pink	pink					
<i>Verbesina encelioides</i>	Cowpen Daisy			yellow	yellow	yellow	yellow	yellow	yellow	yellow		
Perennial Flowers												
<i>Aquilegia canadensis</i>	Red Columbine		red	red	red							
<i>Asclepias tuberosa</i>	Butterfly Weed				orange	orange	orange	orange	orange			
<i>Asclepias viridis</i>	Green Milkweed			green	green	green	green	green	green			
<i>Callirhoe involucrata</i>	Winecup	pink	pink	pink	pink	pink						
<i>Camassia scilloides</i>	Wild Hyacinth											
<i>Castilleja purpurea</i>	Prairie Paintbrush											
<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis				yellow	yellow	yellow					
<i>Dalea aurea</i>	Golden Dalea					yellow	yellow					
<i>Dalea candida</i>	White Prairie Clover					white	white					
<i>Dalea purpurea</i>	Purple Prairie Clover					red-purple	red-purple					
<i>Delphinium carolinianum</i> <i>ssp. virescens</i>	Prairie Larkspur			blue	blue	blue						
<i>Desmanthus illinoensis</i>	Illinois Bundleflower				white	white	white	white	white			
<i>Echinacia angustifolia</i>	Purple coneflower				purple	purple						
<i>Eryngium yuccifolium</i>	Rattlesnake Master			white	white	white	white					



Botanical Name	Common Name	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
<i>Eupatorium serotinum</i>	White Boneset							white	white	white		
<i>Gaillardia suavis</i>	Pincushion Daisy		red	red	red							
<i>Guara lindheimeri</i>	White Gaura			white to red	white to red	white to red	white to red	white to red	white to red	white to red	white to red	
<i>Helianthus maximiliani</i>	Maximilian sunflower							yellow	yellow	yellow		
<i>Liatris mucronata</i>	Gayfeather											
<i>Liatris pycnostachya</i>	Gayfeather, Blazing Star							pink	pink	pink	pink	pink
<i>Linum lewisii</i>	Blue Flax				blue	blue	blue	blue	blue			
<i>Lobelia cardinalis</i>	Cardinal Flower						red	red	red	red		
<i>Marshallia caespitosa</i>	Barbara's Buttons			white	white	white						
<i>Monarda fistulosa</i>	Bergamot				purple	purple	purple					
<i>Oenothera macrocarpa</i> ssp. <i>macrocarpa</i>	Missouri Primrose			yellow	yellow	yellow						
<i>Oenothera speciosa</i>	Pink Evening Primrose		pink	pink	pink	pink	pink					
<i>Penstemon cobaea</i>	Foxglove			white-purple	white-purple							
<i>Penstemon laxiflorus</i>	Beardtongue		pink	pink	pink	pink						
<i>Physostegia intermedia</i>	Obedient Plant				pink	pink						
<i>Ratibida columnifera</i>	Mexican Hat			red or yellow	red or yellow	red or yellow	red or yellow					
<i>Rudbeckia hirta</i>	Black-Eyed Susan				yellow	yellow	yellow	yellow	yellow	yellow	yellow	
<i>Rudbeckia maxima</i>	Giant Coneflower				yellow	yellow						
<i>Salvia azurea</i>	Pitcher Sage				blue	blue	blue	blue	blue	blue	blue	
<i>Salvia coccinea</i>	Scarlet Sage				red	red	red	red	red	red		
<i>Salvia engelmannii</i>	Englemann Sage			red	red	red						
<i>Solidago gigantea</i>	Giant Goldenrod						yellow	yellow	yellow	yellow	yellow	
<i>Solidago nemoralis</i>	Prairie Goldenrod								yellow	yellow		
<i>Tradescantia occidentalis</i>	Spiderwort			purple	purple	purple						
<i>Verbesina virginica</i>	Frostweed							white	white	white	white	
<i>Vernonia baldwinii</i>	Western Ironweed					purple	purple	purple	purple			
Shrubs												
<i>Callicarpa americana</i>	American Beautyberry				purple	purple	purple					
<i>Cephalanthus occidentalis</i>	Buttonbush					white	white					
<i>Dalea frutescens</i>	Black Dalea						purple	purple	purple	purple		
Vines												
<i>Campsis radicans</i>	Trumpetvine					orange	orange	orange	orange			
<i>Passiflora incarnata</i>	Passionflower				lavender	lavender	lavender	lavender				
Trees												
<i>Cercis canadensis</i> var. <i>texensis</i>	Texas Redbud		lavender	lavender								

PLANTS THAT ATTRACT POLLINATORS FOR THE PRAIRIE PARKLAND (SUBTROPICAL) (WESTERN CROSS TIMBERS AND BLACKLAND PRAIRIES)

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
Annual Flowers							
<i>Argemone albiflora</i>	White Prickly Poppy	white	2-4'	Mar-July	sun to partial sun	sand, loam, clay, caliche-well drained	bees, beetles, flies, butterflies
<i>Castilleja indivisa</i>	Indian Paintbrush	red	6-18"	Mar-May	full sun	sand, loam, clay-well drained	beetles, butterflies
<i>Centaurea americana</i>	American Basketflower	white-purple	2-5'	May-June	full sun	sand, loam, clay-medium-moist	bees, beetles, flies, butterflies
<i>Chamaechrista fasciculata</i>	Partridge Pea	yellow	1-3'	June-Oct	sun to partial sun	sand, loam, clay-well drained	bees
<i>Coreopsis basalis</i>	Golden-Wave Tickseed	yellow w/red center	8-16"	Apr-July	sun to partial sun	sand-well drained	bees, beetles, flies, butterflies
<i>Coreopsis tinctoria</i>	Plains Coreopsis	yellow w/red center	1-2'	Mar-July	sun to partial sun	sand, loam, clay-medium-moist	bees, beetles, flies, butterflies
<i>Eustoma exaltatum ssp. russellianum</i>	Texas Bluebells	purple	1-2'	June-Oct	sun to partial sun	sand, loam, clay	bees
<i>Gaillardia pulchella</i>	Indian Blanket	red w/yellow tips	1-2'	May-July	sun to partial sun	sand, loam, clay-well drained	bees, beetles, flies, butterflies
<i>Helianthus annuus</i>	Common Sunflower	yellow	2-8'	May-Oct	sun to partial sun	sand, loam, clay, caliche-moist	songbirds, butterflies
<i>Lupinus texensis</i>	Texas Bluebonnet	blue	6-20"	Mar-May	full sun	sand, loam, clay, caliche-well drained	bees
<i>Oenothera laciniata</i>	Cutleaf Evening Primrose	yellow	2-10"	Mar-Oct	sun to partial sun	sand	beetles, butterflies
<i>Phacelia congesta</i>	Blue Curly	blue	1-3'	Mar-May	full sun to shade	sand, loam, clay	bees
<i>Phlox drummondii</i>	Drummond Phlox	pink	6-18"	Mar-June	sun to partial sun	sand-well drained	butterflies
<i>Proboscidea louisianica</i>	Devil's Claw	purple	1-2'	June-Sept	full sun	sand, loam, clay	bees
<i>Sabatia campestris</i>	Meadow Pinks	pink	9-12"	Mar-July	sun to partial sun	sand, loam, clay	bees, beetles
<i>Verbesina encelioides</i>	Cowpen Daisy	yellow	1-4'	April-Oct	full sun	sand	bees, beetles, flies, butterflies
Perennial Flowers							
<i>Aquilegia canadensis</i>	Red Columbine	red	1-2'	Mar-May	partial sun to shade	sand, loam	hummingbirds
<i>Asclepias tuberosa</i>	Butterfly Weed	orange	10-20"	May-Sept	sun to partial sun	sand, loam, clay-well drained	bees, butterflies
<i>Asclepias viridis</i>	Green Milkweed	green	1-2'	Apr-Sept	full sun	sand, loam, clay, caliche	bees, butterflies
<i>Callirhoe involucrata</i>	Winecup	pink	6-12"	Feb-June	sun to partial sun	sand, loam, clay, caliche-well drained	beetles
<i>Camassia scilloides</i>	Wild Hyacinth	blue	1-2'	Mar-May	full sun to dappled shade	sand, loam, clay	hawkmoths
<i>Castilleja purpurea</i>	Prairie Paintbrush	purple	6-18"	Mar-May	full sun	sand, loam, clay, caliche	bees, beetles, flies, butterflies
<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	yellow	2-3'	May-July	sun to partial sun	sand, loam, clay-well drained	bees, beetles, butterflies
<i>Dalea aurea</i>	Golden Dalea	yellow	1-2'	June-July	full sun	sand, caliche	bees
<i>Dalea candida</i>	White Prairie Clover	white	2-3'	June-July	full sun	clay, caliche-well drained	bees
<i>Dalea purpurea</i>	Purple Prairie Clover	red-purple	1-3'	June-July	full sun	loam, clay, caliche-dry medium	bees
<i>Delphinium carolinianum ssp. virescens</i>	Prairie Larkspur	blue	1-3'	Apr-June	sun to partial sun	sand, loam, clay	bees
<i>Desmanthus illinoensis</i>	Illinois Bundleflower	white	1-3'	May-Sept	sun to partial sun	sand, loam, clay, caliche-well drained	bees
<i>Echinacea angustifolia</i>	Purple coneflower	purple	2'	May-June	sun to partial sun	sand, loam, clay-well drained	butterflies

Botanical Name	Common Name	Color	Height	Flower Season	Sun	Soil	Visitation by Pollinator
<i>Eryngium yuccifolium</i>	Rattlesnake Master	white	8-20"	Apr-July	sun to partial sun	sand, loam, clay	bees, beetles, butterflies
<i>Eupatorium serotinum</i>	White Boneset	white	2-4'	Aug-Oct	full sun to shade	sand, loam, clay	bees, butterflies
<i>Gaillardia suavis</i>	Pincushion Daisy	red	1-2'	Mar-May	full sun	sand, loam, clay	bees, beetles, butterflies
<i>Guara lindheimeri</i>	White Gaura	white to red	2-5'	Apr-Nov	full sun	sand, loam, clay, caliche-well drained	butterflies, bees, hummingbirds
<i>Helianthus maximiliani</i>	Maximilian sunflower	yellow	4-6'	Aug-Oct	sun to partial sun	sand, loam, clay-medium-moist	butterflies, bees
<i>Liatris mucronata</i>	Gayfeather	pink	1-3'	Aug-Dec	sun to partial sun	sand, loam, clay, caliche-well drained	bees, butterflies
<i>Liatris pycnostachya</i>	Gayfeather, Blazing Star	pink	1-3'	Aug-Dec	sun to partial sun	sand, loam, clay-medium-moist	bees, butterflies
<i>Linum lewisii</i>	Blue Flax	blue	1-2'	May-Sept	sun to partial sun	sand, loam, clay, caliche-dry	bees
<i>Lobelia cardinalis</i>	Cardinal Flower	red	1-4'	July-Oct	sun to partial sun	sand, loam, clay	hummingbirds
<i>Marshallia caespitosa</i>	Barbara's Buttons	white	8-18"	Apr-June	sun to partial sun	sand, loam, clay, caliche-medium	bees, beetles, butterflies
<i>Monarda fistulosa</i>	Bergamot	purple	1-3'	May-July	sun to partial sun	sand, loam, clay-medium	bees, butterflies, hummingbirds
<i>Oenothera macrocarpa</i> ssp. <i>macrocarpa</i>	Missouri Primrose	yellow	3-12"	Apr-June	full sun	sand, caliche-well drained	bees, moths, butterflies
<i>Oenothera speciosa</i>	Pink Evening Primrose	pink	1-2'	Mar-July	sun to partial sun	sand, loam, clay, caliche-medium	bees, moths, butterflies
<i>Penstemon cobaea</i>	Foxglove	white-purple	12-18"	Apr-May	sun to partial sun	sand, loam, clay, caliche-well drained	bees
<i>Penstemon laxiflorus</i>	Beardtongue	pink	1-2'	Mar-June	sun to partial sun	sand-well drained	bees
<i>Physostegia intermedia</i>	Obedient Plant	pink	12-36"	May-June	full sun to shade	sand, caliche-well drained	bees
<i>Ratibida columnifera</i>	Mexican Hat	red or yellow	1-3'	Apr-July	sun to partial sun	sand, loam, clay, caliche-well drained	bees, butterflies
<i>Rudbeckia hirta</i>	Black-Eyed Susan	yellow	1-3'	May-Nov	sun to partial sun	sand, loam, clay-well drained	bees, butterflies
<i>Rudbeckia maxima</i>	Giant Coneflower	yellow	3-6'	May-June	sun to partial sun	sand, loam, clay	bees
<i>Salvia azurea</i>	Pitcher Sage	blue	2-3'	May-Nov	sun to partial sun	sand, loam, clay-medium	bees
<i>Salvia coccinea</i>	Scarlet Sage	red	6-30"	May-Oct	sun to partial sun	sand, loam, clay, caliche-medium-moist	hummingbirds
<i>Salvia engelmannii</i>	Englemann Sage	red	12-18"	Apr-June	sun to partial sun	sand, loam, clay, caliche-medium	bees, hummingbirds
<i>Solidago gigantea</i>	Giant Goldenrod	yellow	3-5'	July-Nov	sun to dappled sun	loam, clay	bees, beetles, butterflies
<i>Solidago nemoralis</i>	Prairie Goldenrod	yellow	8-24"	Sept-Oct	full sun	sand, loam, clay, caliche	bees, beetles, butterflies
<i>Tradescantia occidentalis</i>	Spiderwort	purple	12-18"	Apr-June	sun to partial sun	sand, loam, clay-medium-moist	bees
<i>Verbesina virginica</i>	Frostweed	white	3-6'	Aug-Nov	full sun to shade	sand, loam, clay	bees, butterflies
<i>Vernonia baldwinii</i>	Western Ironweed	purple	2-4'	June-Sept	full sun to dappled shade	sand, loam, clay, caliche	bees, beetles, butterflies
Shrubs							
<i>Callicarpa americana</i>	American Beautyberry	purple	3-4'	May-July	dappled sun to shade	sand, loam, clay-well drained	bees
<i>Cephalanthus occidentalis</i>	Buttonbush	white	to 9'	June-July	sun	moist to flooded	bees, beetles, butterflies
<i>Dalea frutescens</i>	Black Dalea	purple	1-3'	July-Oct	full sun	sand, clay, caliche	bees
Vines							
<i>Campsis radicans</i>	Trumpetvine	orange		Jun-Sept	full to dappled sun	sand, loam, clay, caliche	hummingbirds
<i>Passiflora incarnata</i>	Passionflower	lavender		May-Aug	full to dappled sun	sand, loam, clay	bees, beetles, butterflies
Trees							
<i>Cercis canadensis</i> var. <i>texensis</i>	Texas Redbud	lavender	sm. tree	Mar-Apr	sun to partial sun	loam, clay, caliche	bees

HABITAT HINTS

FOR THE PRAIRIE PARKLAND (SUBTROPICAL)



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
MIDEWIN 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

fs.fed.us/land/ecosysmgmt/ecoregl_home.html

POLLINATION/POLLINATORS

Pollinator Partnership

pollinator.org

North American Pollinator Protection Campaign

nappc.org

Bee Friendly Gardening

pollinator.org/bfg

Natural Resources

Conservation Service

nrcs.usda.gov

USDA Forest Service

fs.fed.us/wildflowers/pollinators/

Wild Farm Alliance

wildfarmalliance.org

Xerces Society Pollinator Program

xerces.org

Illinois Natural History Survey

inhs.uiuc.edu

The Forgotten Pollinators

Buchmann, S.L. and G.P. Nabhan. 1997. Island Press: Washington, DC.

Status of Pollinators in North America

2007. The National Academies Press: Washington, DC.

NATIVE PLANTS/GARDENING

Plant Conservation Alliance

nps.gov/plants

Seeds of Success

nps.gov/plants/sos

Lady Bird Johnson Wildflower Center

wildflower.org/plants/

USDA Hardiness Zone Map

usna.usda/Hardzone/

U.S. National Arboretum

usna.usda.gov/Hardzone/ushzmap.html

USDA, NRCS. 2007. The PLANTS Database

plants.usda.gov

NATIVE BEES

Alternative Pollinators: Native Bees National Sustainable Information Service

by Lane Greer, NCAT Agriculture Specialist, Published 1999, ATTRA Publication #IP126
attra.ncat.org/attra-pub/nativebee.html

Plants Attractive to Native Bees Agriculture Research Service

ars.usda.gov/Research/docs.htm?docid=12052

Bees of the World

Christopher O'Toole and Anthony Raw. 1999. Blandford. London, UK.

BUTTERFLIES AND MOTHS

Butterflies and Moths of North America.

Opler, Paul A., Harry Pavulaan, Ray E. Stanford, Michael Pogue, coordinators. 2006.
butterfliesandmoths.org/

Butterflies of North America

Jim Brock and Kenn Kaufman. 2003. Houghton Mifflin. New York, NY.

North American

Butterfly Association

naba.org

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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

Protect their lives. Preserve ours.



NAPPC



Plant Conservation Alliance



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