SELECTING PLANTS FOR POLLINATORS

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

CENTRAL APPALACHIAN BROADLEAF FOREST

CONIFEROUS FOREST

MEADOW PROVINCE

INCLUDING THE STATES OF:

MARYLAND, PENNSYLVANIA,

VIRGINIA, WEST VIRGINIA

AND PARTS OF:

GEORGIA, KENTUCKY,

NORTH CAROLINA,

SOUTH CAROLINA, TENNESSEE

POLLINATOR PARTNERSHIP

and

NAPPC

TABLE OF CONTENTS

WHY SUPPORT POLLINATORS? 4

GETTING STARTED 5

CENTRAL APPALACHIAN BROADLEAF FOREST 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

Cover: silver spotted skipper courtesy www.dangphoto.net

SELECTING PLANTS FOR POLLINATORS

A REGIONAL GUIDE FOR FARMERS, LAND MANAGERS, AND GARDENERS

IN THE

ECOLOGICAL REGION OF THE

CENTRAL APPALACHIAN BROADLEAF FOREST CONIFEROUS FOREST MEADOW PROVINCE

INCLUDING THE STATES OF:

MARYLAND, PENNSYLVANIA, VIRGINIA,

WEST VIRGINIA

AND PARTS OF:

GEORGIA, KENTUCKY,

NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE

A NAPPC AND POLLINATOR PARTNERSHIP™ PUBLICATION

This guide was funded by the National Fish and Wildlife Foundation, the C.S. Fund, the Plant Conservation Alliance, the U.S. Forest Service, and the Bureau of Land Management with oversight by the Pollinator Partnership™ (www.pollinator.org), in support of the North American Pollinator Protection Campaign (NAPPC–www.nappc.org).

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, apples, blueberries, and strawberries are some of the crops raised in the Central Appalachian Broadleaf Forest 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.

Val Dolcini
President & CEO
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

GETTING STARTED

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.

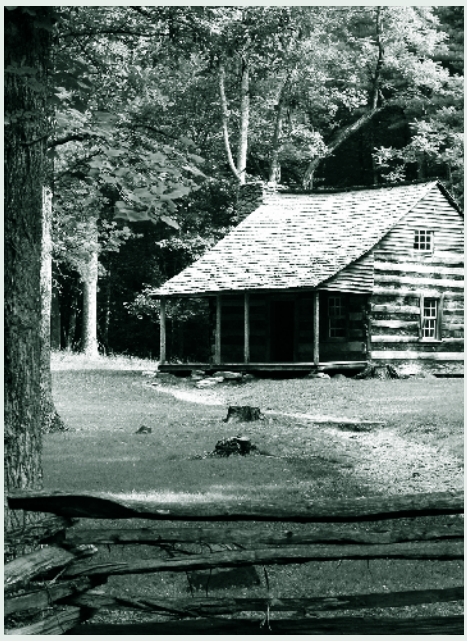
Bailey's Ecoregions of the United States, developed by the United States Forest Service, is a system created as a management tool and is used to predict responses to land management practices throughout large areas. This guide addresses pollinator-friendly land management practices in what is known as the Central Appalachian Broadleaf Forest, Coniferous Forest, Meadow Province.

Portions of nine states make up the 68,100 square miles of this forested, mountainous province. The topography is primarily composed of low mountains with greatly varied elevation, ranging from 300 to 6,000 feet. This province features a temperate climate with distinct winter and summer seasonal patterns, and all areas are subject to frost. Average annual temperatures are mild, ranging from 50° to 64°F. Average annual rainfall varies from 35 inches in the valleys to up to 80 inches on the highest peaks.

This province is characterized by vertical zonation. The southern Appalachian valleys feature a mixed oak-pine forest; above this zone lies the Appalachian oak forest, comprised of birch, beech, maple, elm, red oak, and basswood. Spruce-fir forests are also common on high peaks of the Allegheny and Great Smoky Mountains.

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.

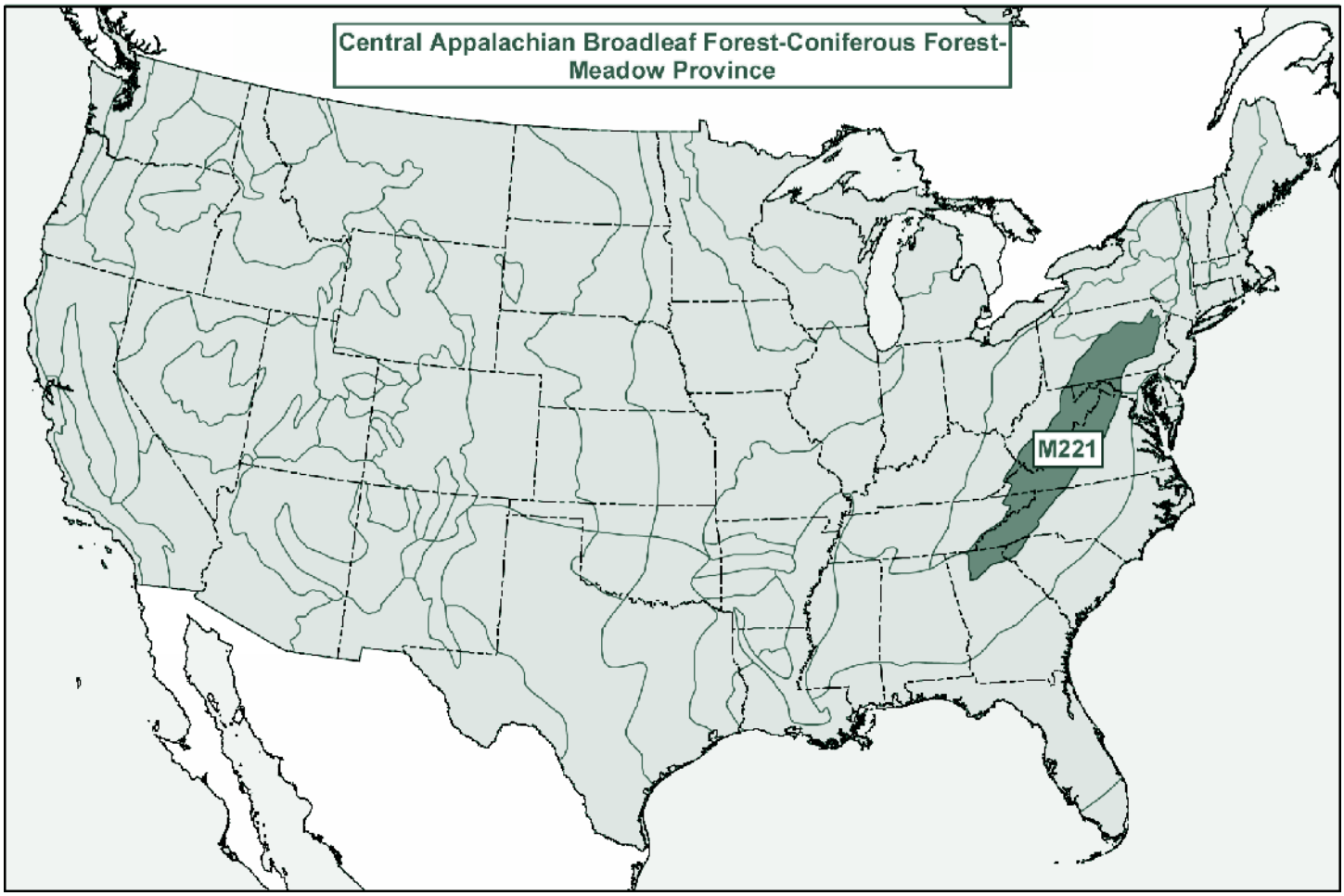
UNDERSTANDING THE CENTRAL APPALACHIAN BROADLEAF FOREST



- This region is designated **number M221** 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.
- 68,100 square miles within 9 states.
- Primarily forested and mountainous.
- Elevations ranging from 300 feet to 6,000 feet.
- Average annual temperature range from 50° to 64°F.
- Average year-round precipitation between 35-80 inches.
- USDA Hardiness Zones 5a-7a (1990 version).

CHARACTERISTICS

- Dominated by vertical zonation, with the lower limits of each forest belt rising in elevation toward the south.
- Common tree species include oak, pine, birch, beech, maple, elm, basswood, hemlock, and spruce.
- Chestnut was once abundant, but has now been greatly reduced because of blight.



The Central Appalachian Broadleaf Forest, Coniferous Forest, Meadow Province includes the states of:

Maryland, Pennsylvania,

Virginia, West Virginia

And parts of:

Georgia, Kentucky,

North Carolina, South Carolina,

Tennessee

"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

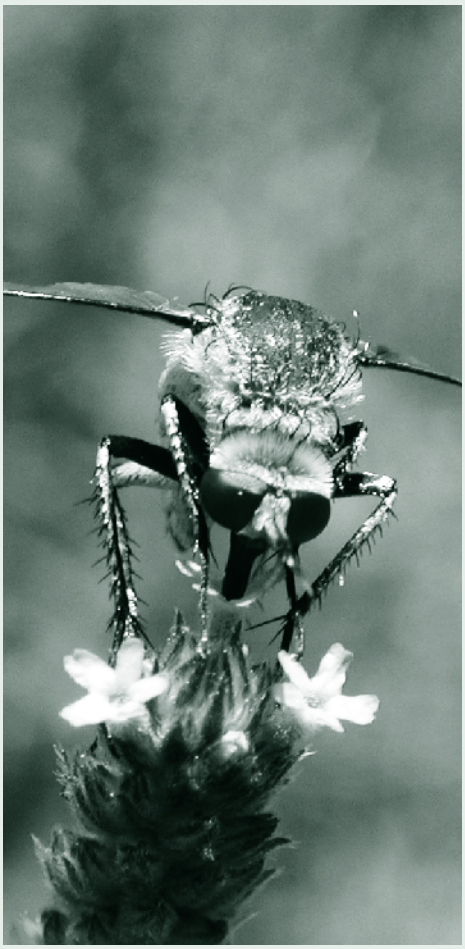


Photo Dave Green

Bombylid fly, or beefly.

Gulf Fritillary butterfly.

Photo courtesy www.dangphoto.net

WHO ARE THE POLLINATORS?

BEES

Bees are well documented pollinators in the natural and agricultural systems of the Central Appalachian Broadleaf Forest. A wide range of crops including apples, alfalfa, strawberries 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 Central Appalachian Broadleaf

Forest are Brush-footed, Gossamer-winged, Swallowtail, Parnassian, Skipper, White, Sulphur and Milkweed 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 (*Zenaida 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. Many tropical flowers, grown as annuals in the Central Appalachian Broadleaf Forest, along with native woodland edge plants, attract hummingbirds.

BATS

Though bats in the Central Appalachian Broadleaf Forest are not pollinators, bats play an important role in pollination in 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:

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, blueberries, apples and strawberries are a few of the food crops in the Central Appalachian Broadleaf Forest 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.

Illustrations by Carolyn Vibbert

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

-- DAN CUMMINGS, CHICO, CALIFORNIA ALMOND GROWER.

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 Central Appalachian Broadleaf Forest, forests have been cut to allow for roads, buildings, open lawn areas, boat ramps, and vistas. 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 CENTRAL APPALACHIAN BROADLEAF FOREST

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	March	April	May	June	July	Aug	Sept	Oct	Nov
Trees & Shrubs										
Aesculus flava	Yellow Buckeye		yellow							
Alnus serrulata	Tag Alder	brown								
Betula nigra	River Birch	bownish-green	bownish-green							
Calycanthus floridus	Sweet Shrub		red	red						
Cladrastis kentukea	Yellow-wood		white	white						
Clethra acuminata	Mountain Pepperbush					white	white			
Cornus alternifolia	Pagoda Dogwood			white	white					
Cornus amomum	Silky Dogwood			white	white					
Cornus florida	Flowering Dogwood		white	white						
Diervilla sessilifolia	Southern Bush Honeysuckle				yellow	yellow	yellow			
Euonymus americanus	Hearts-a-bustin'			greenish-white	greenish-white					
Halesia tetraptera var. *tetraptera*	Silverbell		white	white						
Hydrangea arborescens	Smooth Hydrangea			white	white					
Hypericum densiflorum	Bushy St. John's-wort				yellow	yellow	yellow			
Kalmia latifolia	Mountain Laurel			pale pink	pale pink					
Leucothoe fontanesiana	Doghobble		white	white						
Liriodendron tulipifera	Tulip Poplar		light orange	light orange						
Magnolia acuminata	Cucumber Tree		white	white						
Oxydendrum arboreum	Sourwood				white	white				
Prunus serotina	Black Cherry		white	white						
Rhododendron arborescens	Sweet Azalea				white to pink	white to pink				
Rhododendron calendulaceum	Flame Azalea			orange, yellow, reddish-orange	orange, yellow, reddish-orange					
Rhododendron carolinianum	Punctatum		pink	pink						
Rhododendron catawbiense	Catawba Rhododendron				red to reddish-pink					
Rhododendron maximum	Great Laurel				white	white				
Rhus copallinum var. *copallinum*	Winged Sumac				greenish-yellow	greenish-yellow	greenish-yellow			
Rosa carolina	Carolina Rose			pink	pink					
Rubus odoratus	Flowering Raspberry				purple-rose	purple-rose	purple-rose			
Stewartia ovata	Mountain Camellia				white	white				
Viburnum cassinoides	With-rod			white	white					
Xanthorhiza simplicissima	Yellowroot	purplish-brown	purplish-brown	purplish-brown						
Perennial Flowers										
Actaea racemosa	Black Cohosh			white	white	white	white	white		
Actaea podocarpa	Yellow Cohosh			white	white					
Aruncus dioicus var. *dioicus*	Eastern Goatsbeard				white	white				
Asclepias exaltata	Tall Milkweed				yellow	yellow				
Baptisia tinctoria	Yellow Wild indigo									
Chelone lyonii	Appalachian Turtlehead					pink	pink			
Coreopsis pubescens var. *pubescens*	Hairy Coreopsis					golden-yellow	golden-yellow	golden-yellow		

Botanical Name	Common Name	March	April	May	June	July	Aug	Sept	Oct	Nov
Dicentra eximia	Wild Bleeding Heart		rose-pink	rose-pink	rose-pink					
Diphylleia cymosa	Umbrella Leaf			white	white					
Eupatoriadelphus fistulosus	Hollow-stem Joe-pye-weed					lavender pink	lavender pink	lavender pink		
Eurybia divaricata	White Wood Aster						white with yellow center	white with yellow center	white with yellow center	
Galax urceolata	Galax			white	white	white				
Gentianella quinquefolia ssp. *quinquefolia*	Eastern Aqueweed						blue	blue	blue	
Geranium maculatum	Wild Geranium		pink to rose	pink to rose						
Helianthus atrorubens	Appalachian Sunflower					yellow with purple center	yellow with purple center	yellow with purple center		
Helianthus microcephalus	Small-headed Sunflower						yellow	yellow		
Heuchera villosa	Rock Alumroot					white	white			
Hexastylis shuttleworthii var. *shuttleworthii*	Large-flowered Heartleaf			brown	brown					
Hylotelephium telephioides	Appalachian Live-forever					pink	pink	pink		
Iris cristata	Crested Iris		blue	blue						
Liatris scariosa var. *scariosa*	Northern Blazing-star						rosy-pink	rosy-pink		
Liatris spicata var. *spicata*	Dense Blazing-star					rosy-pink	rosy-pink	rosy-pink		
Lilium michauxii	Carolina Lily					orange-red with purple spots	orange-red with purple spots			
Lilium superbum	Turk's-cap Lily					orange to yellow	orange to yellow			
Lobelia cardinalis	Cardinal Flower					red	red	red		
Lobelia siphilitica	Great Blue Lobelia					blue	blue	blue		
Monarda didyma	Bee Balm					scarlet red	scarlet red	scarlet red		
Penstemon canescens	Appalachian Beardtongue			violet	violet					
Penstemon smallii	Blue Ridge Beardtongue			deep pink to purple	deep pink to purple					
Phemeranthus teretifolius	Appalachian Fameflower				pink	pink	pink	pink		
Phlox divaricata ssp. *divaricata*	Eastern Blue Phlox		blue	blue						
Phlox stolonifera	Creeping Phlox		blue	blue						
Rudbeckia laciniata	Green-headed Coneflower					yellow	yellow	yellow	yellow	
Rudbeckia triloba	Brown-eyed Susan					yellow	yellow	yellow		
Sanguinaria canadensis	Bloodroot	white	white							
Sedum glaucophyllum	Cliff Stonecrop			white	white					
Silene virginica	Fire Pink			red	red	red				
Solidago curtisii	Curtis's Goldenrod						yellow	yellow	yellow	
Solidago roanensis	Roan Mt. Goldenrod					yellow	yellow	yellow		
Symphyotrichum cordifolium	Blue Wood Aster							blue	blue	
Symphyotrichum undulatum	Wavy-leaved Aster						blue to lilac	blue to lilac	blue to lilac	blue to lilac
Thermopsis villosa	Aaron's-rod			yellow	yellow					
Tiarella cordifolia	Foamflower		white	white						
Trillium luteum	Yellow Trillium		yellow	yellow	yellow					
Vernonia noveboracensis	Ironweed						purple	purple		
Vines										
Aristolochia macrophylla	Dutchman's Pipe			brown	brown					
Clematis virginiana	Virgin's Bower					white	white	white		
Parthenocissus quinquefolia	Virginia Creeper				yellowish-green	yellowish-green				

PLANTS THAT ATTRACT POLLINATORS
FOR THE CENTRAL APPALACHIAN BROADLEAF FOREST

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 plant
Trees & Shrubs								
Aesculus flava	Yellow Buckeye	yellow	80'+	April	sun to shade	moist, well drained	hummingbirds, bees	X
Alnus serrulata	Tag Alder	brown	12-20'	February-March	sun to partial shade	moist to wet	bees, wind	X
Betula nigra	River Birch	bownish-green	50-75'	March-April	shade to partial shade	moist	wind	X
Calycanthus floridus	Sweet Shrub	red	4-6"	April-May	shade to partial shade	moist	beetles	
Cladrastis kentukea	Yellow-wood	white	30-50'	April-May	shade to sun	moist	bees, butterflies	
Clethra acuminata	Mountain Pepperbush	white	7-12'	July-August	shade to sun	moist	hummingbirds, butterflies, honeybees	
Cornus alternifolia	Pagoda Dogwood	white	15-25'	May-June	partial shade	moist	butterflies, bees, flies	X
Cornus amomum	Silky Dogwood	white	4-10'	May-June	sun	moist to wet	bees, flies, butterflies	X
Cornus florida	Flowering Dogwood	white	15-30'	April-May	sun to partial shade	moist, well-drained	butterflies, bees, flies	X
Diervilla sessilifolia	Southern Bush Honeysuckle	yellow	4-5'	June-August	sun to partial shade	moist	bumblebees, hummingbirds	
Euonymus americanus	Hearts-a-bustin'	greenish-white	3-6'	May-June	shade to partial shade	moist	bees, beetles, flies, ants	X
Halesia tetraptera var. tetraptera	Silverbell	white	30-40'	April-May	shade to sun	moist	butterflies, bees	
Hydrangea arborescens	Smooth Hydrangea	white	4-5'	May-June	shade to partial shade	moist	butterflies, bees	
Hypericum densiflorum	Bushy St. John's-wort	yellow	2-6'	June-August	sun	moist to wet, acidic	bees	
Kalmia latifolia	Mountain Laurel	pale pink	8-20'	May-June	shade to partial shade	dry to moist, well-drained	butterflies, hummingbirds	
Leucothoe fontanesiana	Doghobble	white	18-24"	April-May	shade to partial shade	moist	bees, butterflies	
Liriodendron tulipifera	Tulip Poplar	light orange	to 100'	April-May	shade to partial shade	moist	bees	X
Magnolia acuminata	Cucumber Tree	white	60-80'	April-May	sun to shade	moist, calcareous or mafic	bees, beetles	
Oxydendrum arboreum	Sourwood	white	to 50'	June-July	sun to shade	dry to dry-mesic, acidic	bees, butterflies	X
Prunus serotina	Black Cherry	white	60-90'	April-May	shade to sun	moist	butterflies, bees, flies, wasps	X
Rhododendron arborescens	Sweet Azalea	white to pink	8-12'	June-July	sun to partial shade	moist, acidic	butterflies, hummingbirds	X
Rhododendron calendulaceum	Flame Azalea	orange, yellow, reddish-orange	4-8'	May-June	sun to shade	dry to moist, well-drained, acidic	butterflies, hummingbirds	X
Rhododendron carolinianum	Punctatum	pink	3-6'	April-May	sun to partial shade	dry, acidic	hummingbirds, butterflies	
Rhododendron catawbiense	Catawba Rhododendron	red to reddish-pink	6-10'	June	sun to partial shade	moist	hummingbirds, butterflies	
Rhododendron maximum	Great Laurel	white	6-25'	June-July	shade to shade	moist, acidic	hummingbirds, butterflies	
Rhus copallinum var. *copallinum*	Winged Sumac	greenish-yellow	20-30'	June-July	sun to partial shade	dry	butterflies, wasps, flies, bees	X
Rosa carolina	Carolina Rose	pink	3-6'	May-June	sun to partial shade	moist	bees, flies, beetles	X
Rubus odoratus	Flowering Raspberry	purple-rose	4-6'	June-August	sun to partial shade	moist	butterflies, flies, wasps, bees	
Stewartia ovata	Mountain Camellia	white	10-15'	June-July	shade to partial shade	moist, acidic	beetles, bees, flies	
Viburnum cassinoides	With-rod	white	5-6'	May-June	shade to sun	moist	butterflies	X
Xanthorhiza simplicissima	Yellowroot	purplish-brown	2-3'	March-May	shade to partial shade	moist to wet	bees	
Perennial Flowers								
Actaea racemosa	Black Cohosh	white	36-60"	May-July	shade to partial shade	moist	butterflies, hummingbirds	X
Actaea podocarpa	Yellow Cohosh	white	30-48"	July-Sept	shade to partial shade	moist	butterflies, hummingbirds	X
Aruncus dioicus var. dioicus	Eastern Goatsbeard	white	48-60"	May-June	shade to partial shade	moist	butterflies, bees, beetles	X
Asclepias exaltata	Tall Milkweed	white	36-48"	June-July	shade to partial shade	moist	butterflies, hummingbirds	X

Botanical Name	Common Name	Color	Height	Flower Season	Sun	Soil	Visitation by Pollinator	Also a host plant
Baptisia tinctoria	Yellow Wild indigo	yellow	2-3′	June-July	sun to partial shade	dry	butterflies, bees	X
Chelone lyonii	Appalachian Turtlehead	pink	24-48″	July-August	sun to partial shade	wet to moist	bees, butterflies, hummingbirds	X
Coreopsis pubescens var. *pubescens*	Hairy Coreopsis	golden-yellow	36-48″	July-Sept	sun to partial shade	dry to dry-mesic	butterflies, beetles, hummingbirds	
Dicentra eximia	Wild Bleeding Heart	rose-pink	12-18″	April-June	shade to partial shade	moist, well-drained, thin	hummingbirds, bees	
Diphylleia cymosa	Umbrella Leaf	white	18-30″	May-June	shade to partial shade	moist to wet	bees, beetles, flies	
Eupatoriadelphus fistulosus	Hollow-stem Joe-pye-weed	lavender pink	3-5′	July-Sept	sun to partial shade	moist to wet	bees, butterflies	X
Eurybia divaricata	White Wood Aster	white with yellow center	24-30″	August-Oct	shade to partial shade	moist	butterflies, bees	X
Galax urceolata	Galax	white	4-6″	May-July	shade to sun	moist to dry	bees, flies	
Gentianella quinquefolia ssp. *quinquefolia*	Eastern Aqueweed	blue	6-24″	August-Oct	sun to partial shade	dry to moist	bees, flies	
Geranium maculatum	Wild Geranium	pink to rose	18-24″	April-May	shade	moist	butterflies, bees	X
Helianthus atrorubens	Appalachian Sunflower	yellow with purple center	4-7′	July-Sept	sun to partial shade	dry	butterflies, bees	X
Helianthus microcephalus	Small-headed Sunflower	yellow	3-6′	August-Sept	shade to partial shade	moist to dry	bees, bees	X
Heuchera villosa	Rock Alumroot	white	8-24″	July-August	shade to partial shade	dry to moist, well drained thin soils, acidic	hummingbirds, butterflies	
Hexastylis shuttleworthii var. *shuttleworthii*	Large-flowered Heartleaf	brown	4-6″	May-June	shde	mesic, acidic	beetles, flies	
Hylotelephium telephioides	Appalachian Live-forever	pink	18″	July-Sept	sun	dry	butterflies	
Iris cristata	Crested Iris	blue	6-10″	April-May	shade to partial shade	moist	hummingbirds, bees	
Liatris scariosa var. *scariosa*	Northern Blazing-star	rosy-pink	15-24′	August-Sept	sun	dry	butterflies, bees	
Liatris spicata var. *spicata*	Dense Blazing-star	rosy-pink	20-40′	July-Sept	sun	dry to wet	hummingbirds, butterflies, bees	
Lilium michauxii	Carolina Lily	orange-red with purple spots	30-40″	July-August	partial shade	dry	hummingbirds, butterflies	
Lilium superbum	Turk's-cap Lily	orange to yellow	to 8′	July-August	shade to partial shade	moist to wet	hummingbirds, moths, bees, butterflies	
Lobelia cardinalis	Cardinal Flower	red	36-48″	July-Sept	sun to partial shade	moist to wet	hummingbirds, butterflies, bees	
Lobelia siphilitica	Great Blue Lobelia	blue	24-40″	July-Sept	sun to partial shade	moist to wet	hummingbirds, bees, butterflies	
Monarda didyma	Bee Balm	scarlet red		July-September	sun to partial shade	moist to wet	hummingbirds, butterflies, bees	X
Penstemon canescens	Appalachian Beardtongue	violet	12-30″	May-June	sun to partial shade	dry to dry-mesic	hummingbirds, bees, butterflies	X
Penstemon smallii	Blue Ridge Beardtongue	deep pink to purple	12-24″	May-June	sun to partial shade	dry to dry-mesic	butterflies, bees, hummingbirds	X
Phemeranthus teretifolius	Appalachian Fameflower	pink	8-10″	June-Sept	sun	dry	butterflies	
Phlox divaricata ssp. *divaricata*	Eastern Blue Phlox	blue	12-15″	April-May	shade	moist	bees, butterflies	
Phlox stolonifera	Creeping Phlox	blue	6-8″	April-May	shade	moist	bees, butterflies	
Rudbeckia laciniata	Green-headed Coneflower	yellow	48-84″	July-October	sun to partial shade	moist to wet	bees, flies, wasps, butterflies, moths	X
Rudbeckia triloba	Brown-eyed Susan	yellow	24-42″	July-September	sun to partial shade	dry to moist	bees, flies, wasps, butterflies, moths, beetles	X
Sanguinaria canadensis	Bloodroot	white	6-12″	March-April	shade	moist	bees, beetles, flies	
Sedum glaucophyllum	Cliff Stonecrop	white	2-4″	May-June	partial shade	moist	butterflies	
Silene virginica	Fire Pink	red	8-12″	May-July	sun to partial shade	moist	hummingbirds, flies, bees, butterflies	
Solidago curtisii	Curtis's Goldenrod	yellow	1-2′	Aug-Oct	shade to partial shade	moist	butterflies, beetles, bees	X
Solidago roanensis	Roan Mt. Goldenrod	yellow	8-15″	July-Sept	sun	dry	butterflies, beetles, bees	X
Symphyotrichum cordifolium	Blue Wood Aster	blue	2-3′	Sept-Oct	shade to partial shade	moist	butterflies, bees, wasps, flies, beetles	X
Symphyotrichum undulatum	Wavy-leaved Aster	blue to lilac	3-4′	Aug-Nov	sun to partial shade	dry	butterflies, bees	X
Thermopsis villosa	Aaron's-rod	yellow	3-7′	May-June	sun to partial shade	dry to moist	butterflies	
Tiarella cordifolia	Foamflower	white		April-May	shade		butterflies, bees	
Trillium luteum	Yellow Trillium	yellow	4-12″	April-June	shade, higher calcium	moist	bees, beetles	X
Vernonia noveboracensis	Ironweed	purple	3-7′	August-Sept	sun to partial shade	moist to wet	butterflies, honeybees	X
Vines								
Aristolochia macrophylla	Dutchman's Pipe	brown	15-30′	May-June	shade to partial shade	moist	flies	X
Clematis virginiana	Virgin's Bower	white	to 30′	July-Sept	sun to shade	moist	butterflies, bees, wasps	
Parthenocissus quinquefolia	Virginia Creeper	yellowish-green	30-45′	June-July	sun to partial shade	moist	bees	X

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

A BASIC CHECKLIST

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

The Xerces Society
www.xerces.org

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/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

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)

Pyle, Robert Michael. 1981. National Audubon Society Field Guide to Butterflies. Alfred A. Knopf: New York, NY.

North American Buterfly 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

NRCS

USGS
science for a changing world

conserving natural resources for our future

RESEARCH AND WRITING: **ELIZABETH L. LEY, STEPHEN BUCHMANN, PH.D., GARY KAUFFMAN, KATHERINE MCGUIRE**

EDITORIAL: **LAURIE DAVIES ADAMS AND LARRY STRITCH, PH.D.**

PRODUCTION SUPERVISION: **KATHERINE MCGUIRE**

DESIGN: **MARGUERITE MEYER**

CONCEPT REVIEW:

American Farm Bureau Federation, Ron Gaskell
Bureau of Land Management, Peggy Olwell, Carol Spurrier, Mary Byrne, Mary Tisdale, Elizabeth Wooster
National Garden Association, Susanne DeJohn
Plant Conservation Alliance – Edward Fletcher, Jean Giblette, Mary Ann Lawler, Ron Smith
Smithsonian Institute, Department of Botany, Gary Krupnick, Ph.D.
USDA - CSREES, Greg Crosby, Ph.D., Leslie Gilbert, Ph.D.
USDA - Forest Service, David Pivorunas, Larry Stritch, Ph.D.
USDA - Natural Resource Conservation Service, Doug Holy, Hilda Diaz-Soltero
USDOI - US Fish and Wildlife Service, Karen Anderson, Don MacLean, Patricia DeAngelis, Ph.D.
USGS - Steve Hilburger, Elizabeth Sellers

PHOTO CONTRIBUTORS:

www.dangphoto.net and Dave Green

ILLUSTRATIONS:

Carolyn Vibbert

For a copy of this brochure, or for another region, visit www.pollinator.org

The Pollinator Partnership™/North American Pollinator Protection Campaign

423 Washington St., 5th Floor, San Francisco, CA 94111 – 415-362-1137

www.pollinator.org www.nappc.org