



IOWA'S WOODLANDS VITAL HABITAT FOR NATIVE POLLINATORS



Clockwise: Oak species can support at least 534 species of butterfly/moth in habitat needs. The banded hairstreak uses many species of oak, walnut and hickory as host trees and uses dogwood as a nectar source. The eastern tiger swallowtail uses wild cherry, basswood, birch and cottonwood as a host tree, and wild cherry and lilac as nectar sources.

Prairies, milkweed and monarchs often come to mind when many people think of pollinators. Native trees, shrubs and woodlands play a critically important role in the life cycle of these imperiled species. With the decline of these pollinators affecting both natural ecosystems and agricultural production, it is crucial to provide sound woodland management.

Pollinators are essential in Iowa's environmental and agricultural systems, for both biodiversity and crop production. All pollinators, including a wide range of native species, are in decline due to disease, improper pesticide use and habitat decline. Woodlands fulfill the needs of many pollinators by providing food and nectar as well as providing quality habitat. Pollinators include butterflies, moths, honey bees, many species of native bees as well as some beetles and flies. To attract and sustain native pollinators, an area must have adequate sources of food, water, shelter and nesting sites. Many of the suggestions in this guide are aligned with commonly recommended plantings and forest stand improvement practices.

PROVIDING HABITAT FOR A HEALTHY ECOSYSTEM

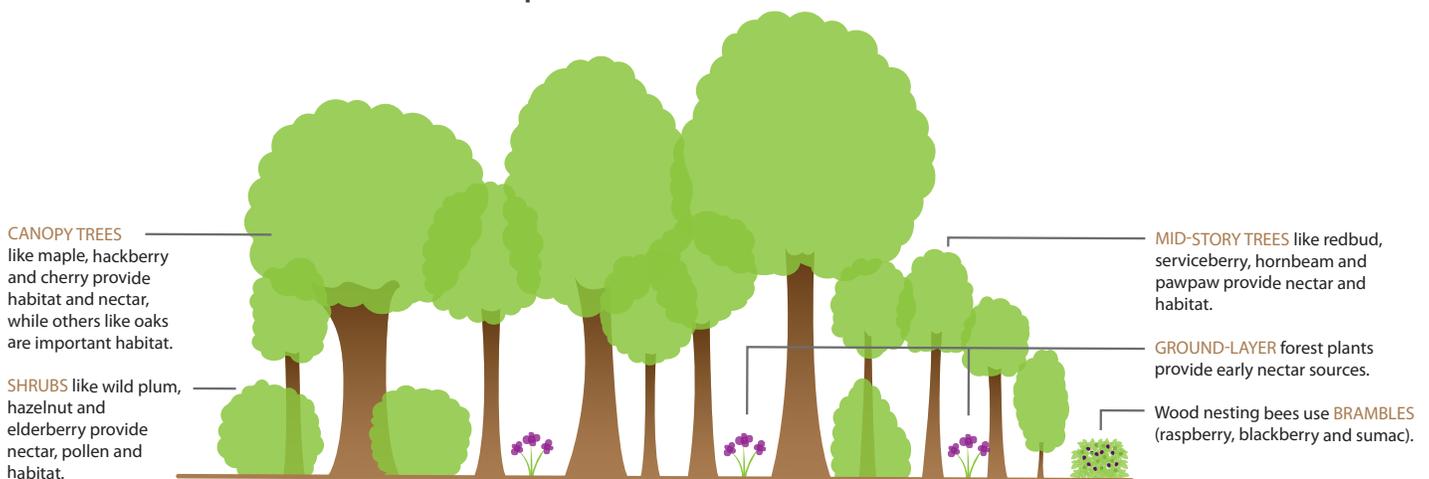
Tree and Shrub Planting

Native trees and shrubs are vital to the habitat and nectar needs of pollinators. Oaks alone support at least 534 species of butterflies and moths with habitat needed for reproduction. Willow, cherry, plum, maple, box elder, hickory and elm support 400 or more butterfly and moth species. Native shrubs such as hawthorn, redbud, elderberry, chokecherry, plum, highbush cranberry, serviceberry and arrowwood act as a host for different pollinators and provide nectar.

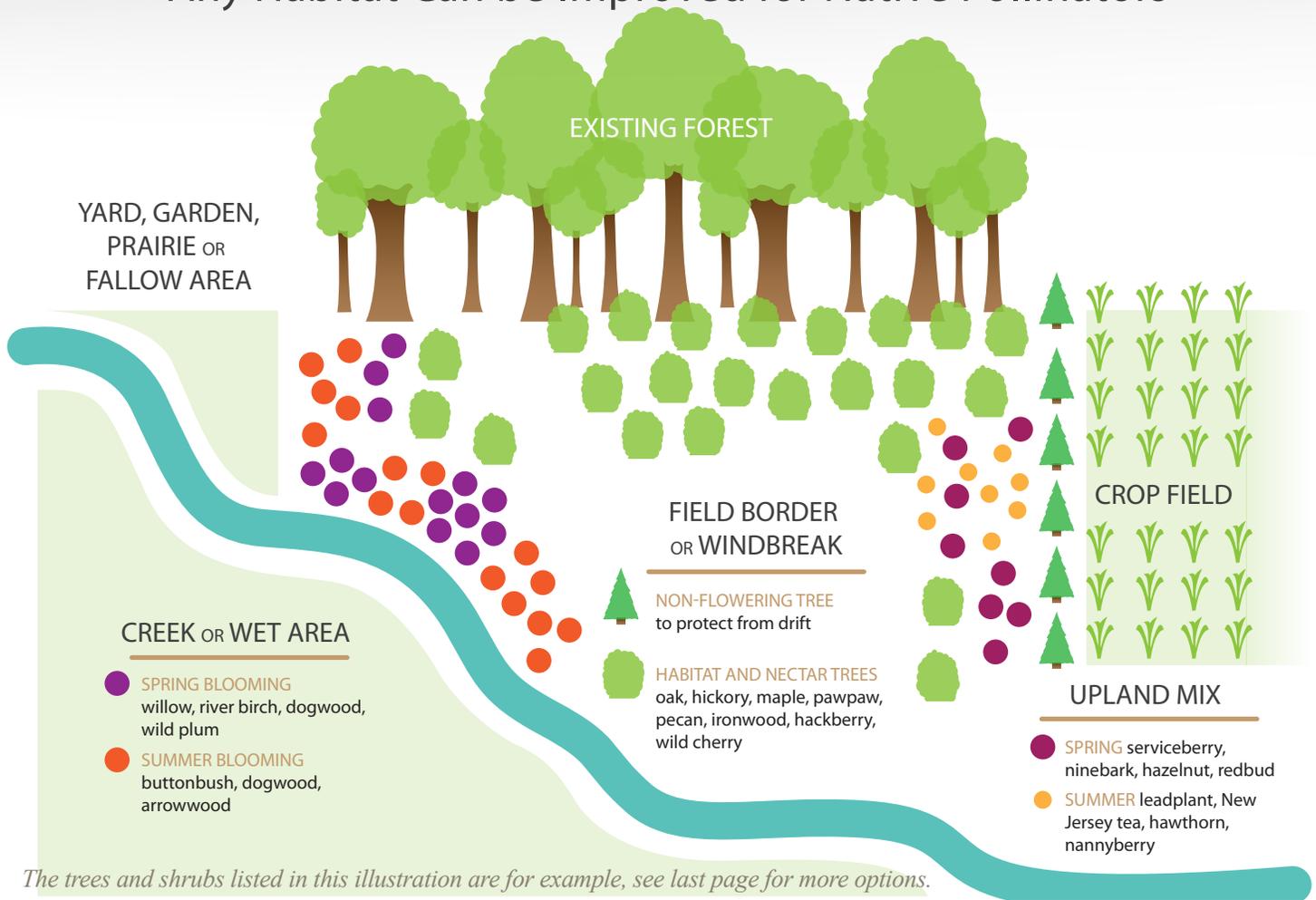
What can you do?

- Providing a diverse mix of tree and shrub species is key to pollinator habitat. Plant a variety of native trees and shrubs that support both nectar and larval host needs of pollinators. Include at least 4 species each of spring flowering and summer flowering trees and shrubs in every tree planting.
- Consider herbaceous native plants within and around tree and shrub plantings to provide at least three blooming species each season (spring/summer/fall). Many native trees and shrubs bloom in the spring, so choosing summer and fall blooming forb/flower species complement shrubs and trees.
- During tree establishment (the first 3-4 years) mow according to your tree planting project plan, but mow as high as possible (6-12 inches) to avoid disturbing ground-nesting pollinators. After tree establishment, reduce mowing to no more than once per year, and stagger mowing time. If possible, divide your tree planting area into 4 sections, and mow each section in a different month.
- To reduce drift from herbicides and pesticides, plant a hedgerow between a crop field and existing pollinator areas (prairie/tree planting). Rows closest to the crop field should be planted to trees and shrubs that are not suitable for pollinators. As a result pollinators will not be attracted to areas closest to herbicide and pesticide spray. Another way to reduce damage from drift is to plant species that bloom when spray is unlikely.

Diversity of Species AND Forest Layers Ensures Optimal Use of Pollinators



Any Habitat Can be Improved for Native Pollinators



Forest Stand Improvement

Most native species already present in your woodlands are benefiting pollinators for both food and habitat. Forest stand improvement practices, which can be used to achieve your specific woodland goals, include tree thinning, crop tree release, weed tree removal and prescribed burning. Fortunately, the actions often recommended for improving your woodlands for wildlife, tree growth and health are closely aligned with the needs of declining species of bees, butterflies, bats, birds and insects. Thirty percent of native bees are wood nesters and forest improvement practices leave plenty of these needed habitats through downed logs and dead standing trees. Managing for native growth of plants, shrubs and trees and controlling invasive species can contribute enormously to the health and productiveness of pollinators.

What can you do?

Contact your DNR district forester to develop a management plan specific to your site and goals, and to learn how to achieve the following:

- Leave standing dead trees and downed logs in your timber. This provides habitat to pollinating insects and a wide variety of birds and mammals. Having five to ten standing dead trees of varying sizes per acre, including large and mature trees, is a good goal. These trees can be created by girdling or ringing

around trunk of trees to kill foliage but leave structure remaining for habitat.

- Control invasive plants to encourage native plant growth. A forest floor with little to no invasive species provides more open habitat that is useful to pollinators for foraging and nesting. Native plants, especially spring woodland wildflowers, provide an important nectar source in early and mid-spring.
- Manage for species and structural diversity. A woodland with an upper canopy, mid-story layer, under-story layer and ground layer will provide habitat for the widest array of pollinator species.

Did you know?

95% or more of all insects are not pests, and they are often providing beneficial services that we don't even realize such as keeping other insects in check.

Did you know?

Roughly 35% of all crops worldwide are animal pollinated, and 60-80% of all flowering plants depend on animal pollination.

ATTRACTING NATIVE POLLINATORS

Planting a variety of native trees, shrubs and flowers is the easiest way to attract native pollinators. Providing this variety of trees and plants, which have various bloom times, heights and flower types will allow use by the widest range of native pollinators for nectar, pollen and/or larval host plants. Trees and shrubs also provide important nesting, shelter and over-wintering sites for many species of pollinators.

Many species of pollinators don't fly very far, so having many types of habitat as close as possible would be helpful. Clumping like species together, such as a larger bramble patch or a flowering shrub, help pollinators to be more efficient in their foraging. Great additions to any pollinator habitat nearby would include:

Gardens

Gardens are used and pollinated by many species and can be sources of nectar, fruit and flowers. Species like lettuce and broccoli that are left to bolt (or seed) can be a needed fall food source. Herb gardens, particularly those with native herbs, are also beneficial to pollinators.

Fruit bearing trees and shrubs

Apple, pears and peaches are traditional fruit examples, but native shrubs such as wild plum, elderberry, blackberry and raspberry provide flowers for pollinator use as well as fruit for humans to enjoy.

Thickets and hedgerows of flowering shrubs

Hedgerows were once a common feature of the landscape of Iowa, but have been disappearing in recent decades. Hedgerows provide protection from the wind, travel lanes that connect larger pieces of habitat and food sources for a wide range of wildlife.

Set aside (non-mowed) or fallow areas

Leaving areas that are not a nuisance to grow "weeds" are often not given the credit they deserve as important pollinator nesting and foraging sites. Plants such as goldenrods, joe-pye weed, volunteer sunflowers, milkweed, clovers and even dandelions can be needed food and habitat.

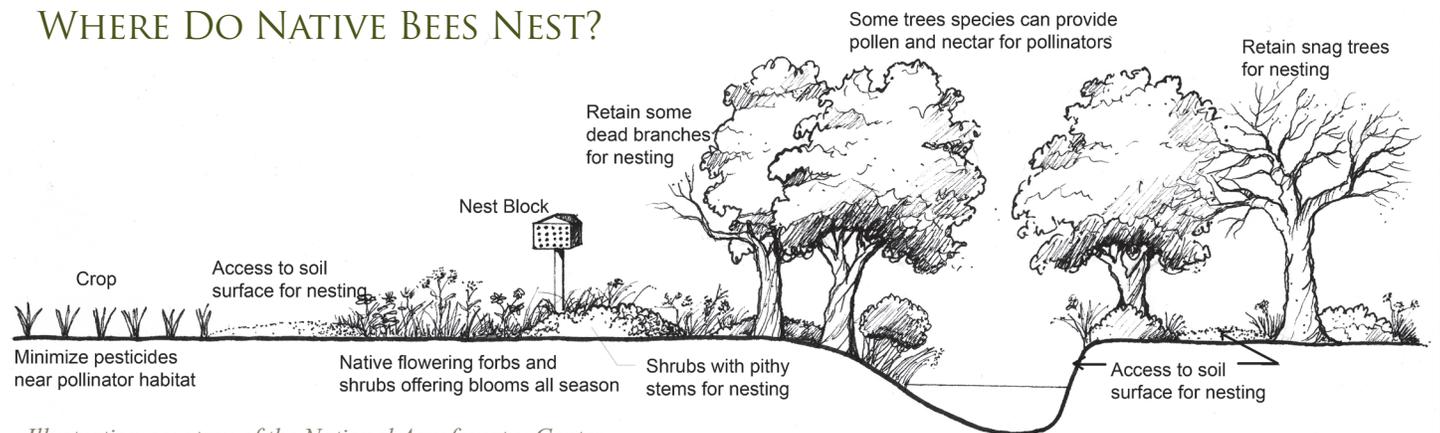
POLLINATOR HABITAT REQUIREMENTS

Pollinators	Food	Shelter
Bumble bees	Nectar for adults; nectar and pollen collected as provisions for larvae	Nest in small cavities, underground in abandoned rodent nests, under clumps of grass, or in hollow trees, bird nests, or walls
Ground-nesting bees	Nectar for adults; nectar and pollen collected as provisions for larvae	Nest in bare or partially vegetated, well-drained soil
Tunnel-nesting bees	Nectar for adults; nectar and pollen collected as provisions for larvae	Nest in narrow tunnels in dead standing trees, or excavate nests in pith of stems and twigs. Some construct domed nests of mud, plant resins, saps, or gums on the surface of rocks or trees
Beetles	Pollen and nectar as adults; vegetation as larvae or prey such as aphids, slugs, insect eggs	Larvae overwinter in loose soil or leaf litter; Adults shelter under rocks, logs, brush
Butterflies and moths	Leaves of larval host plants; nectar; some males obtain nutrients, minerals, and salt from rotting fruit, tree sap, animal dung and urine, carrion, clay deposits, and mud puddles	Host plants; protected site such as a tree, bush, tall grass, or a pile of leaves, sticks, or rocks
Flies	Nectar and sometimes pollen as adults; insect prey such as aphids, scales, mites, thrips	Larvae found on plants near prey Pupae and adults overwinter in soil or leaf litter
Wasps	Nectar as adults; insect prey such as caterpillars, aphids, grasshoppers, planthoppers, and true bugs as larvae	Many nest in the ground; others nest in tunnel nests in wood or cavities in mud or resin
Hummingbirds	Nectar, insects, tree sap, spiders, caterpillars, aphids, insect eggs, and willow catkins	Trees, shrubs, and vines near suitable foraging habitat

THE IMPORTANCE OF NATIVE BEES

Both native and honey bees provide much value, however, when bees are mentioned, many people only think of honey bees, which are not actually native to the U.S. and migrated here with European settlers. The U.S. has around 4,000 species of native bees that are a range of ground, plant and wood nesters, and at least 300 species are here in Iowa. It is important to note that native bees also provide a wide range of ecological services vital to our economies and, perhaps more importantly, our ecosystems. Soybeans, alfalfa, squash and watermelon are just some of the crops that rely on native and honey bees for pollination, and when there is a healthy population of native pollinators then biodiversity and wildlife food sources increase. All pollinators have been in decline due to habitat loss, improper and excessive use of pesticides and disease. Native bee populations do not nest in the same manner as honey bees and have not had the same decline due to colony collapse and other issues that face non-native honey bees. Below are some ways to improve habitat for native bees.

WHERE DO NATIVE BEES NEST?



Early blooming species of woodland wildflowers, and spring blooming trees and shrubs provide an important early nectar source for the common eastern bumblebee, improving the yearlong success of its colony.



This native sweat bee species benefits from habitat that native woodlands provide.

Did you know?

Native bees pollinate crops such as apple, blueberries, cherries, cucumber, pears, pumpkins and tomatoes, and are more efficient than honey bees at pollinating some of these crops. Collectively, native bees are more versatile than honey bees. For example, some native bees are active when conditions are too cold and wet for honey bees.

PROTECTING OUR POLLINATORS

Pesticides, including herbicides and insecticides can be very harmful to bees and other pollinators over a wide range of exposure types. Poisoning of pollinators can occur from contaminated food (pollen or nectar) from that plant being treated with pesticide, or directly from florets, leaves, soil, water or other materials that were sprayed. Even plants treated days or weeks prior can have harmful effects on pollinators. Pollinators can be affected by becoming unable to fly, being disoriented and unable to forage, reproduction issues, transferring of poison to nest and affecting entire colony, or death. Since the majority of pesticides affect more than just one species, chemical application for any reason could have some negative effect on non-target (species other than those you are spraying for) pollinators. Whenever possible, avoid applying any insecticide and try to minimize herbicide spray to avoid unwanted effects to bees, butterflies, moths, and other non-target insects, as well as birds and bats.

What Can You Do?

- Apply powder or liquid insecticide only when major damage has occurred. Spraying for just a few problem bugs or minor plant damage may be lethal to beneficial insects.
- Follow federal pesticide labels and state regulations when applying pesticides labeled as toxic to bees to avoid unnecessary exposure to pollinators.
- Reduce drift by applying in morning or evening when winds are likely less (and when pollinators are less likely to be foraging) and try to plan sprays when wind directions are moving away from pollinator habitat.
- Provide refuge. Tree and shrub windbreaks, field borders and hedgerows to act as permanent barriers to protect commonly sprayed areas such as crop fields.
- Avoid applying pesticides during the common foraging times of 10 a.m. - 6 p.m. and when species are flowering nearby. Because different pollinators forage at all times of day and night, it is important to consider all aspects of location, season and habitat when deciding if pesticide application is the best method for control.
- Avoid using neonicotinoid insecticide, which studies have linked to decline in honey bees. Read the label to find out what chemicals or class of chemicals are used, and what insects that chemical can affect.
- Use local, native seed or plants whenever possible. These will be better suited to native insect populations and will generally have fewer insect and disease issues. Check with your local DNR forester or private lands wildlife staff, NRCS, Pheasants Forever or County Extension office for more information on local and native nurseries.
- Create patches of pesticide free, pollinator friendly flowers in your garden or yard.

Prescribed Burning

Use prescribed burning as a possible tool for controlling invasive species in woodlands, encouraging native species and managing for open ground. Many species of native solitary bees nest in open ground or ground with a light leaf layer. Providing ground where soil is exposed will provide this important habitat for ground nesting insects. Prescribed burning can be useful for encouraging an open forest floor, native wildflower and plant growth and even oak regeneration. Because 534 species of butterflies and moths use oak species for larval nesting, encouraging oak regeneration is paramount to overall butterfly and moth diversity and habitat.

Prescribed burning can also be a very useful tool in controlling invasive plant growth such as honeysuckle, autumn and Russian olives, multi-flora rose and other common woodland exotic and invasive growth. In addition to decreasing exotic growth, prescribed burns can encourage native growth, as many of our native woodland plants, shrubs and trees are adapted to fire.

To allow for pollinators to forage and nest during the growing season, carry out prescribed burns during late fall or winter. Burning only part of woodlands in any given year will allow for refuge areas. Your DNR district forester can give you information to decide if prescribed burning is right for you and your woodlands.

Mowing

Once trees and shrubs are established mow only during dormant season to allow nesting in grasses and weeds. If mowing is needed during the growing season mow as high as possible to avoid disturbing larva or insect nests.

ADDITIONAL INFORMATION AND RESOURCES

DNR District Foresters <http://www.iowadnr.gov/Conservation/Forestry/Forestry-Landowner-Assistance/District-Forester-Contacts>

USFS <https://www.fs.fed.us/wildflowers/pollinators/>

USDA Agroforestry <http://nac.unl.edu/>

Xerces Society <http://www.xerces.org/pollinator-conservation/>

Pollinator Partnership <http://www.pollinator.org/guides.htm>

Plant. Grow. Fly. <https://www.blankparkzoo.com/conservation/plantgrowfly/>

Directory of Native Seed Producers <http://www.plantiowanative.com/resources/#services>

Did you know?

Many pollinator species are generalists, meaning they can feed and nest on a variety of different species. Some species of pollinators, called specialists, have one specific host (habitat) plant that is needed for their survival. For instance, the zebra swallowtail uses only the Pawpaw tree as a host plant.



Depending on the species, trees and shrubs can provide important early nectar/pollen sources in addition to habitat.

This silver spotted skipper uses legumes such as honey locust and gathers nectar from buttonbush.



Did You know?

Many pollinators benefit from a water source like a bird bath, small pond, fountain, or mud puddle. Salt is a mineral that many butterflies and bees need. You can provide this by mixing sea salt or wood ashes into a damp area (like a mud puddle) for pollinators to use.

NATIVE TREES/SHRUBS BENEFITTING POLLINATORS

Common name, <i>Genus species</i>	Habitat*	Nectar/Forage	Bloom Time**
American Hornbeam, <i>Carpinus caroliniana</i>	X		
Basswood, Linden, <i>Tilia americana</i>	X	X	SP
Black Walnut, <i>Juglans nigra</i>	X		
Blackberry^, Raspberry^, <i>Rubus spp.</i>	X	X	SP, SU
Buttonbush, <i>Cephalanthus occidentalis</i>		X	SU
Cottonwood, Aspen, <i>Populus spp.</i>	X		
Dogwood, (pagoda, redosier, gray, silky) <i>Cornus spp.</i>	X	X	SP, SU
Eastern Red Cedar, <i>Juniperus virginiana</i>	X		
Elderberry^, <i>Sambucus canadensis</i>	X	X	SP, SU
Elm (American, red), <i>Ulmus spp.</i>	X	X	SP
Hackberry, <i>Celtis occidentalis</i>	X	X	SP
Hawthorn, <i>Crataegus spp.</i>	X	X	SP, SU
Hazelnut, <i>Corylus spp.</i>		X	SP
Honeylocust, <i>Gleditsia triacanthos</i>	X	X	SP, SU
Leadplant, <i>Amorpha canescens</i>		X	SU
Maple (black, silver, sugar, red), Box Elder, <i>Acer spp.</i>	X	X	SP
Nannyberry, Highbush Cranberry, Arrowwood, <i>Viburnum spp.</i>	X	X	SP, SU
New Jersey Tea, <i>Ceanothus americanus</i>	X	X	SU
Ninebark, <i>Physocarpus opulifolius</i>		X	SP
Oaks (white, red, black, bur, swamp white, pin, chinkapin, shingle) <i>Quercus spp.</i>	X		
Ohio Buckeye, <i>Aesculus glabra</i>		X	SP
Pawpaw, <i>Asimina triloba</i>	X		
Pecan, Hickory (shellbark, shagbark), <i>Carya spp.</i>	X		
Persimmon, <i>Diospyros virginiana</i>	X	X	SP, SU
Prickly Ash, <i>Zanthoxylum americanum</i>	X	X	SP
Redbud, <i>Cercis canadensis</i>	X	X	SP
River Birch, <i>Betula nigra</i>	X	X	SP
Sassafras, <i>Sassafras albidum</i>	X	X	SP
Serviceberry, <i>Amelanchier spp.</i>	X	X	SP
Spicebush, <i>Lindera benzoin</i>	X	X	SP
Sumacs^, <i>Rhus spp.</i>	X	X	SP, SU
Wild Cherry, Wild Plum, Chokecherry, <i>Prunus spp.</i>	X	X	SP, SU
Willow (black, sandbar), <i>Salix spp.</i>	X	X	SP, SU

Habitat*: Mostly referring to known larval host for butterfly/moth species. When twigs are clipped on these plants marked with ^, the soft pith provides nesting opportunities for small, tunnel nesting bees.

Bloom Time**: SP-Spring, SU-Summer, F-Fall, Species listed with no bloom time are not known to have nectar food value for pollinators.

Note that some species like pawpaw, spicebush, hackberry, prickly ash, willow, oak and many others are the only host species available for certain pollinators, with some of those pollinators listed as "special concern."



IOWA DEPARTMENT OF NATURAL RESOURCES
IN PARTNERSHIP WITH UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE

