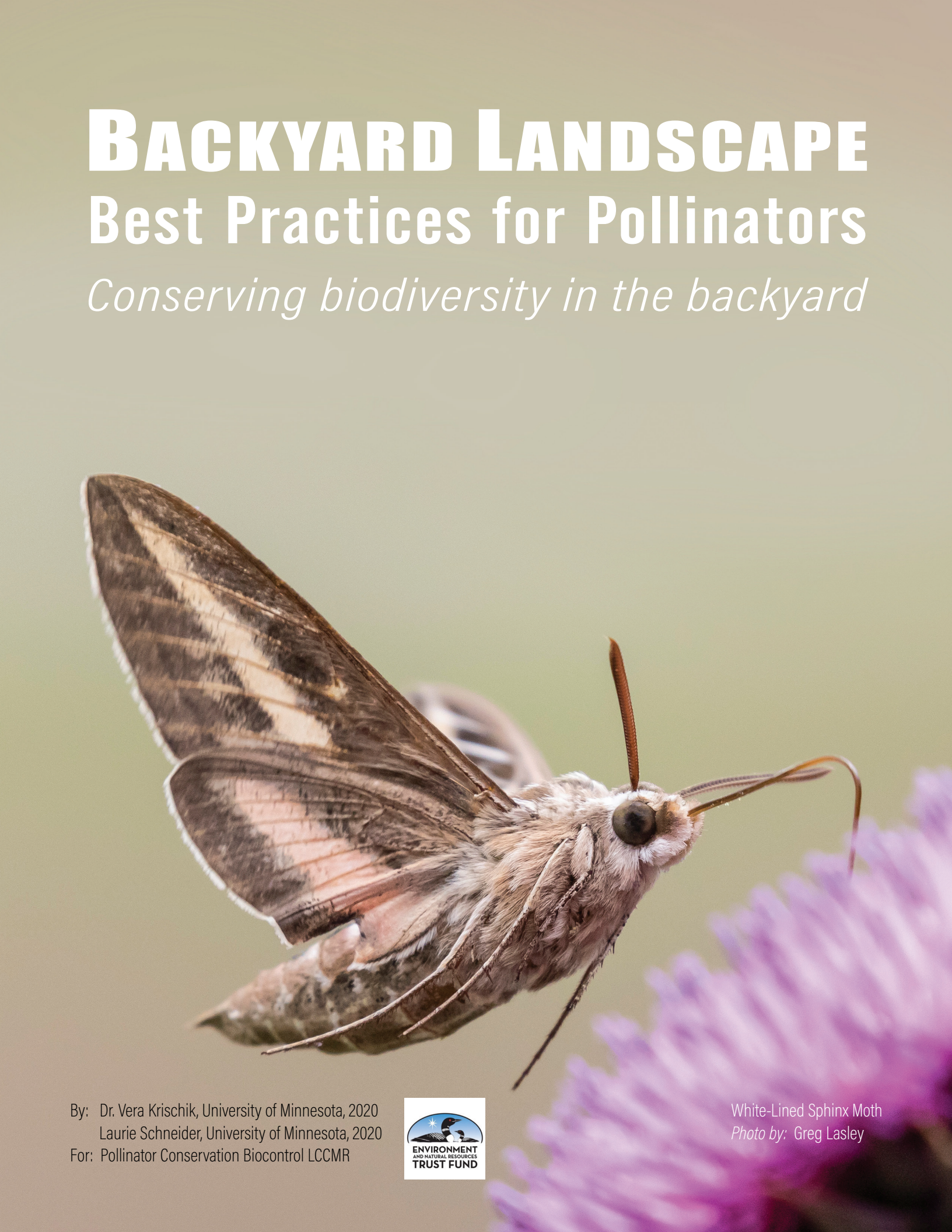
Backyard Landscape
Best Practices for Pollinators
Conserving biodiversity in the backyard



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For: Pollinator Conservation Biocontrol LCCMR

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

White-Lined Sphinx Moth
Photo by: Greg Lasley

Best Practices for a biodiverse backyard

This bulletin strives to educate residential landowners about ways to embrace environmental stewardship by using ***best practices for pollinators****. Pollinators are keystone species in most terrestrial ecosystems and crucial for biodiversity in any landscape. However, they are at risk. Habitat alteration and fragmentation, pesticide use, and introduced diseases contribute to ongoing pollinator decline. In a world where green spaces are being replaced by urban sprawl and commercial agriculture,* ***creating vital habitat corridors in residential areas and backyards is increasingly important for pollinator survival****.*

Rusty patched bumble bee (*Bombus affinis*)
is an endangered species
photo: Marcie Forsberg

Monarch butterfly (*Danaus plexippus*)
is a threatened species
photo: Laurie Schneider

A landscape rich with diversity of flowering plants is beautiful and ***supports biodiverse species*** *such as pollinators, birds, beneficial insects and other wildlife. A biodiverse landscape also* ***supports soil and plant health*** *for natural control of pests and disease.*
ncipmhort.cfans.umn.edu

Harvesting native seed, photo: L.Schneider

Pesticides are harmful to pollinators and beneficial insects.

- Insecticides are toxic and have lethal and sublethal effects on pollinators.
- Herbicides kill plants that insects use for food and shelter.
- Fungicides can be toxic to bees.
- Some additives in pesticide formulations increase toxicity of pesticides to bees.
- Adding adjuvants to pesticides can increase their toxicity.
- ***Warning:*** Systemic insecticides such as neonicotinoids are translocated to the plant's vascular system and expressed in pollen and nectar, making the plant toxic to both target and non-target species.

Best Practices for pollinators

Habitat loss and fragmentation is one of the biggest issues contributing to declines of pollinators. Filling in the gaps of underutilized areas such as a strip of lawn between the sidewalk and street, an open lot, or replacing manicured turf, can create vital habitat.

What you can do:

Household yard maintenance choices have direct effects on species and ecosystems.

- **Eliminating pesticides** is a key ingredient in creating pollinator friendly habitat.
- **Follow tactics of Integrated Pest Management** (IPM), such as spot treating pests and not broadcast spraying pesticides-especially when pollinators are present. *See more on Integrated Pest Management at: ncipmhort.cfans.umn.edu/integrated-pest-management-ipm*
- **Plant native host and nectar plants.** Pollinators require both nectar and pollen for their life cycles. Planting native trees, shrubs, and flowers that bloom from April through September creates a consistent food supply so pollinators can complete their life cycles. Pollinator species are attracted by a variety of colors and shapes. Ground covers, such as ajuga, squill, crocus, clover, and creeping charlie, are also good bee plants. Heirloom garden plants also provide food for pollinators.
- **Provide nesting areas.** Just like us, pollinators need a nutritious diet and healthy places to nest and raise their young. Leave some areas untidy for good nesting in piles of grass clippings, leaf or mulch piles, compost piles, or in dead wood.
- **Leave the leaves.** Wait to do winter garden clean-up until late spring instead of fall so hibernating insects have places to overwinter.
- **Do not cut standing stems until May.** Pollinators rest in stiff standing plant stems over winter.
- **Add flowering trees, shrubs and hedgerows, and plants that make fruit,** such as serviceberry, to your backyard landscape design. These make good nesting and resting areas for pollinators and birds.
- **Provide a clean water source** with a pond, bird bath or other water feature. Pollinators not only use water for hydration but also create comb, cool down their nest/hive and re-hydrate winter food stores.
- **Promote nutrient rich soils with compost.** Healthy soil and plants support natural control of pests and disease.
- **Use elements of design** such as pathways, patios and benches to make a relaxed landscape that looks tended to.
- **Replace turf with prairies, gardens and pollinator lawns.** A pollinator lawn provides food for pollinators with grasses and low growing perennials.

Pollinators include: wild native bees, honey bees, butterflies, beetles, hummingbirds, wasps, moths, bats and **MORE!**

Integrated Pest Management for garden & yard maintenance

Integrated Pest Management (IPM)

is an approach that employs monitoring of plants, pests and weather to strategically manage pests. IPM addresses the source of pest problems, whereas pesticides simply respond to pests. IPM minimizes the use of chemicals harmful to pollinators and beneficial insects, and is less toxic to the environment. Using less pesticides promotes the survival of beneficial insects that kill pest insects.

ncipmhort.cfans.umn.edu/integrated-pest-management-ipm

- **THE FIRST STEP** is to accept that plants can handle some pest and disease pressure.
- **KEEP A JOURNAL** when pests appear, what works and doesn't work.
- **INSPECT** and monitor your plants on a regular basis, before problems are out of control. Set thresholds for pest populations and damage. Look for beneficial insects and determine if they are managing pests.
- **USE COMPOST** to improve soil and plant health. Healthy soil makes healthy plants that can tolerate some damage.
- **USE RESISTANT PLANTS.** If a plant species is struggling, remove it and plant a naturally resistant plant instead.
- **USE THE LEAST TOXIC OPTION.** If a pesticide must be used, only spot treat in the evening, and do not treat open blooms. Soft pesticides include horticultural soaps and oils, corn gluten, white vinegar spray, spinosad, B.T., and others.
- **BIOLOGICAL CONTROLS** include beneficial insects and pathogens naturally found in the environment, such as predatory insects, like lady beetles and lacewings.

Beneficial Insects

Meet a few lesser-known backyard friends:

Spider wasp

Sphex pensylvanicus

An efficient pollinator and helps control pest insects. Spider wasps flick their wings as they walk and feed.

photo: Laurie Schneider

Lacewing

Chrysoperla rufilabris

Larvae are highly effective predator of aphids.

photo: Joseph Berger

Lady beetle

Coccinellidae

Eats aphids, mealy bugs, soft scales, psyllids, whitefiles, mites and other pest insects. One lady beetle can eat nearly 1,000 aphids in its lifetime.

photo: Russ Ottens

Cicada killer

Sphecius speciosus

A large wasp that kills cicada for food for its larvae.

photo: Johnny Dell

Pollinator Lawn IPM

A pollinator lawn is a flowering blanket of grasses and low growing perennials which provides food for pollinators, requires very little mowing, enhances biodiversity, improves soil health, reduces herbicide and pesticide use, and promotes clean water and environment. Traditional turf lawns provide no food for pollinators.

Pussy toes

Blanket flower

Self heal

Creeping thyme

Pollinator lawn perennial flowers:

- **English daisy** *(Bellis perennis)*
- **White dutch clover** *(Trifolium repens)*
- **Common blue violet** *(Viola sororia)*
- **Calico aster** *(Symphyotrichum lateriflorum)*
- **Self heal** *(Prunella vulgaris)*
- **Blanket flower** *(Gaillardia)*
- **Creeping thyme** *(Thymus vulgaris)*
- **Wild strawberry** *(Fragaria virginiana)*
- **Lance-leaved coreopsis** *(Coreopsis lanceolata)*
- **Pussy toes** *(Antennaria plantaginifolia)*
- **Creeping charlie & dandelion are pollinator plants**
- **Anemones**

Fescue grasses to use: fine, creeping, chewings, hard (4 lbs seed / 1000 ft). Let grass grow longer to encourages deeper roots to keep lawn hydrated on hotter days.

How to install a pollinator lawn *(overseed method)*

1. Mow short or scalp existing lawn to 1" or less so you can see some dirt.
2. Aerate the lawn area by perforating the soil/lawn with small holes.
3. Add compost. Rake in compost with a hard rake leaving approx. 1" of compost over the top of the lawn. (6 yds/4000 sq ft).
4. Seed liberally over compost.
5. Water regularly for 2 weeks, and decrease watering over time.
6. Do not use herbicides, and avoid insecticides. For Japenese beetle grubs, use B.T.

Maintenance:

- **Pollinator lawns require a medium level of maintenance** until they are established. Once established (2-3 years), pollinator lawns are low maintenance.
- **Mowing:** Keep lawn at least 4" tall. Taller lawns shade the ground, help prevent soil from drying and discourage weed seeds from sprouting. Refrain from mowing especially when flowers are blooming. Optimally, mow lawn to 4" inches or more. Use mulching mower.
- **Soil health:** Compost will help improve soil immensely, as well as nitrogen-fixing plants such as White clover. Lower rates of organic fertilizer such as 10-0-10, Sustane greens grade or milorganite can be added later in spots where needed.
- **Weeding:** Use hand weeding to remove unwanted weeds. Diligent weeding at the start will pay off later as the weeds subside and the new pollinator lawn prospers.
- **Overseed:** Add more perennials over time, and selectively seed areas in subsequent seasons to achieve desired flower/grass ratio.

Mining bees - Andrena
ground nesters

Resin bees - Megachile (family)
nest in hollow stems or wood

Cuckoo bees
of different bee lineages

Rusty patched bumble bee - Bombus affinis
if you see me, report sighting to bumblebeewatch.org
www.fws.gov/midwest/endangered/insects/rpbb

Mason bees - Osmia
cavity nesters, use mud

Digger bees - Anthophorini
ground nesters

Share your space with the docile wild native bees

460+ species of wild bees are estimated in Minnesota

Sweat bees - Halictidae
nest in ground or wood

Cellophane bees - Colletes
nest in hollow twigs or ground

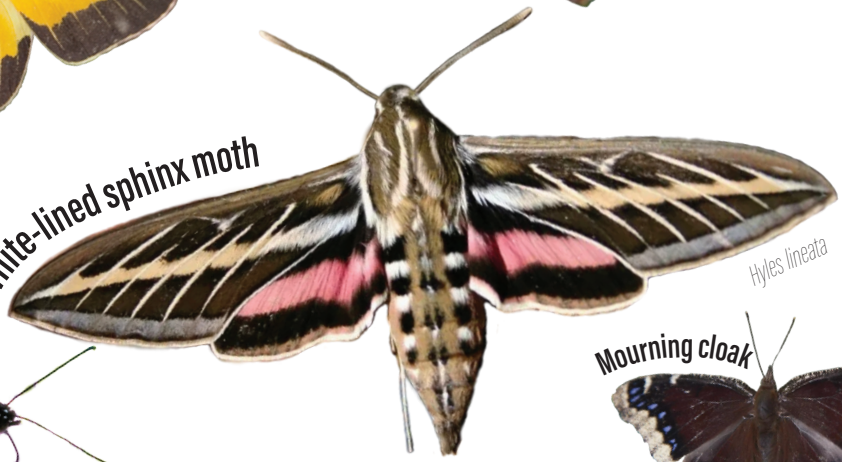
Small carpenter bees - Ceratina
nest in wood

Honey bees ** - Apis
nest in colony hives

Long horned bees - Melissodes
nest in ground or banks

Leafcutter bees - Megachilidae (family)
cavity nesters

photos: Heather Holm, Laurie Schneider

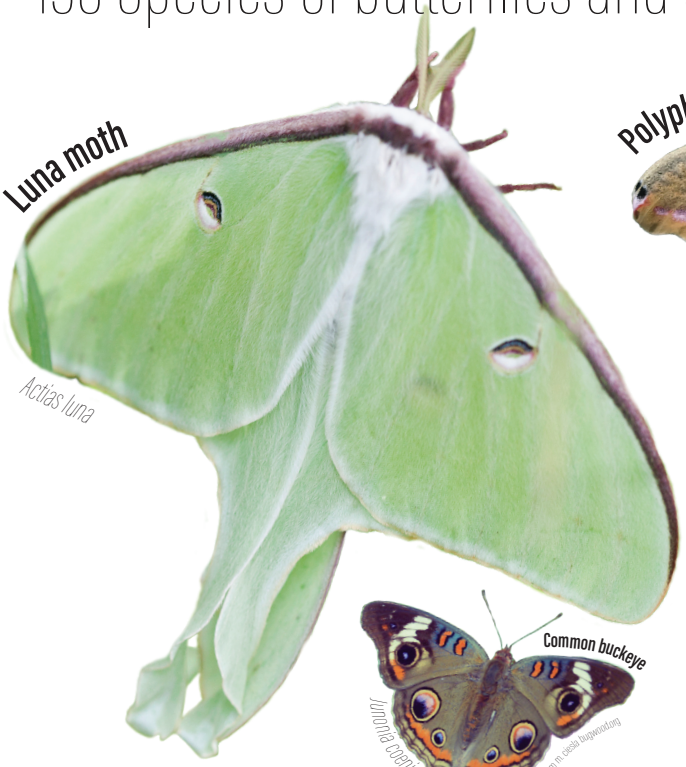


LEPIDOPTERA: Butterflies, Moths, & Skippers

butterflies need both host and nectar plants

Butterfly Gardening: ncipmhort.cfans.umn.edu/butterflies

150 Species of butterflies and skippers are estimated in Minnesota



MINNESOTA BUTTERFLIES

www.butterfliesandmoths.org

Family Hesperiidae

Subfamily Pyrginae

Silver-spotted Skipper
Epargyreus clarus

Hoary Edge
Achalarus lyciades

Southern Cloudy Wing
Thorybes bathyllus

Northern Cloudy Wing
Thorybes pylades

Dreamy Dusky Wing
Erynnis icelus

Sleepy Dusky Wing
Erynnis brizo

Juvenal's Dusky Wing
Erynnis juvenalis

Horace's Dusky Wing
Erynnis horatius

Mottled Dusky Wing
Erynnis martialis

Columbine Dusky Wing
Erynnis lucilius

Wild Indigo Dusky Wing
Erynnis baptisiae

Persius Dusky Wing
Erynnis persius

Grizzled Skipper
Pyrgus centaureae

Checkered Skipper
Pyrgus communis

Common Sooty Wing
Pholisora catullus

Subfamily Hesperiinae

Arctic Skipper
Carterocephalus palaemon

Least Skipper
Ancyloxypha numitor

Poweshiek Skipperling
Oarisma poweshiek

Garita Skipperling
Oarisma garita

European Skipper
Thymelicus lineola

Fiery Skipper
Hylephila phyleus

Uncas Skipper
Hesperia uncas

Common Banded Skipper
Hesperia comma assiniboia

Laurentian Skipper
Hesperia comma laurentina

Ottoe Skipper
Hesperia ottoe

Leonard's Skipper
Hersperia leonardus

Pawnee Skipper
Hesperia leonardus pawnee

Pahaska Skipper
Hesperia pahaska

Cobweb Skipper
Hesperia metea

Dakota Skipper
Hesperia dacotae

Indian Skipper
Hesperia sassacus

Peck's Skipper
Polites peckius

Tawny-edged Skipper
Polites themistocles

Crossline Skipper
Polites origenes origenes

Long Dash
Polites mystic

Northern Broken Dash
Wallengrenia egeremet

Little Glassywing
Pompeius verna

Sachem
Atalopedes campestris

Arogos Skipper
Atrytone arogos

Delaware Skipper
Atrytone logan

Mulberry Wing
Poanes massasoit

Hobomok Skipper
Poanes hobomok

Broad-winged Skipper
Poanes viator

Dion Skipper
Euphyes dion

Black Dash
Euphyes conspicuus

Two-spotted Skipper
Euphyes bimacula

Dun Skipper
Euphyes vestris

Dusted Skipper
Atrytonopsis hianna

Pepper and Salt Skipper
Amblyscirtes hegon

Roadside Skipper
Amblyscirtes vialis

Family Papilionidae

Subfamily Papilioninae

Pipevine Swallowtail
Battus philenor

Zebra Swallowtail
Eurytides marcellus

Black Swallowtail
Papilio polyxenes

Giant Swallowtail
Papilio cresphontes

Family Pieridae

Subfamily Pierinae

Pine White
Neophasia menapia

Checkered White
Pontia protodice

Western Checkered White
Pontia occidentalis

Mustard White
Pieris napi

Subfamily Anthocharinae

Large Marble
Euchloe ausonides

Olympian Marble
Euchole olympia

Subfamily Coliadinae

Common (clouded) Sulphur
Colias philodice

Alfalfa Butterfly
Colias eurytheme

Giant Sulphur
Colias gigantea

Pink-edged Sulphur
Colias interior

Dogface
Colias cesonia

Cloudless Sulphur
Phoebis sennae

Orange-barred Sulphur
Phoebis philea

Mexican Sulphur
Eurema mexicana

Little Sulphur
Eurema lisa

Dainty Sulphur
Nathalis iole

Family Lycaenidae

Subfamily Miletinae

Harvester
Feiseca tarquinius

Subfamily Lycaeninae

American Copper
Lycaena phlaeas

Great Copper
Lycaena dione

Bronze Copper
Lycaena hyllus

Bog Copper
Lycaena epixanthe

Dorcas Copper
Lycaena dorcas

Purplish Copper
Lycaena helloides

Subfamily Theclinae

Coral Hairstreak
Satyrium titus

Acadian Hairstreak
Satyrium acadicum

Edwards' Hairstreak
Satyrium edwardsii

Banded Hairstreak
Satyrium calanus

Hickory Hairstreak
Satyrium caryaevorum

Striped Hairstreak
Satyrium liparops

Olive Hairstreak
Mitoura grynea

Brown Elfin
Incisalia augustinus

Hoary Elfin
Incisalia polia

Frosted Elfin
Incisalia irus

Henry's Elfin
Incisalia henrici

Eastern Pine Elfin
Incisalia niphon

MINNESOTA BUTTERFLIES

Subfamily Theclinae
Western Pine Elfin
Incisalia eryphon

Gray Hairstreak
Strymon melinus

Subfamily Pollyommatinae
Marine Blue
Leptotes marina

Reakirt's Blue
Hemiargus isola

Eastern Tailed Blue
Everes comyntas

Western Tailed Blue
Everes amyntula

Spring Azure
Celastrina argiolus

Silvery Blue
Glaucopsyche lygdamus

Northern Blue
Lycaeides idas

Karner Blue
Lycaeides melissa samuelis

Melissa Blue
Lycaeides melissa melissa

Greenish Blue
Plebejus saepiolus

Acmon Blue
Plebejus acmon

Family Riodinidae
Swamp Metalmark
Calephelis mutica

Family Nymphalidae
Snout Butterfly
Libytheana carinenta

Gulf Fritillary
Agraulis vanillae

Subfamily Heliconiinae
Variegated Fritillary
Euptoieta claudia

Great Spangled Fritillary
Speyeria cybele

Aphrodite
Speyeria aphrodite

Regal Fritillary
Speyeria idalia

Atlantis Fritillary
Speyeria atlantis

Mormon Fritillary
Speyeria mormonia

Bog Fritillary
Boloria eunomia

Silver-bordered Fritillary
Boloria selene

Meadow Fritillary
Boloria bellona

Frigga Fritillary
Boloria frigga

Freija Fritillary
Boloria freija

Titiania Fritillary
Boloria titania

Subfamily Nymphalinae
Bordered Patch
Chlosyne lacinia adjustrix

Gorgone Checkerspot
Chlosyne gorgone

Silvery Checkerspot
Chlosyne nycteis

Harris' Checkerspot
Chlosyne harrisi

Texas Crescent
Phyciodes texana

Pearl Crescent
Phyciodes tharos

Tawny Crescent
Phyciodes batesii

Northern Crescent
Phyciodes cocyta

Anicia Checkerspot
Euphydryas anicia

Baltimore Checkerspot
Euphydryas phaeton

Question Mark
Polygonia interrogationis

Hop Merchant or Comma
Polygonia comma

Satyr Anglewing
Polygonia satyrus

Green Comma
Polygonia faunus

Hoary Comma
Polygonia gracilis

Gray Comma
Polygonia progne

Compton's Tortoise Shell
Nymphalis vau-album

Mourning Cloak
Nymphalis antiopa

Milbert's Tortoise Shell
Nymphalis milberti

American Painted Lady
Vanessa virginiensis

Painted Lady
Vanessa cardui

Red Admiral
Vanessa atalanta

Buckeye
Junonia coenia

Subfamily Limenitidinae
White Admiral
Limenitis arthemis arthemis

Banded Purple
Limenitis arthemis X proserpinus

Red-spotted Purple
Limenitis arthemis astynax

Viceroy
Limenitis archippus

Amymone
Mestra amymone

Subfamily Danainae
Monarch

Subfamily Apaturinae
Hackberry Emperor
Asterocampa celtis

Tawny Emperor
Asterocampa clyton

Subfamily Satyrinae

Northern Pearly Eye
Enodia anethedon

Eyed Brown
Satyrodes eurydice

Appalachian Eyed Brown
Satyrodes appalachia

Little Wood Satyr
Megisto cymela

Common Ringlet
Coenonympha tullia

Common Wood Nymph
Cercyonis pegala

Disa Alpine
Erebia disa

Red-disked Alpine
Erebia discoidalis

Macoun's Artic
Oeneis macouni

Uhler's Arctic
Oeneis uhleri

Jutta Artic
Oeneis jutta

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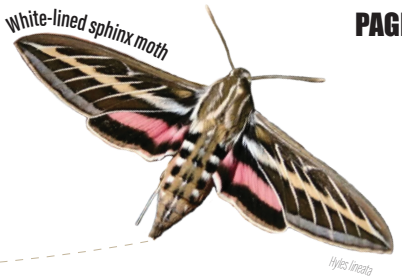
(based upon Ronald L. Huber's list, original publish 9/1981. Nomenclature updated 9/1995)

Backyard Blooms for pollinators



Honey bee
on hyssop

Hairstreak
on butterfly weed

Bumble bee
on tomato

Monarch
on blazing star

Latin name	Common name	Bloom Color(s)	Early bloom	Mid bloom	Late bloom
Agastache	Anise hyssop	Purple		X	X
Amelanchier	Serviceberry	White	X		
Allium	Onions	Purple	X	X	X
Asclepias	Milkweeds	Variety		X	X
Coreopsis	Coreopsis	Yellow	X	X	X
Echinacea	Coneflowers	Pink-purple	X	X	X
Eurybia	Asters	Variety			X
Eutrochium	Joe-pye weeds	Pink		X	X
Helianthus	Sunflowers	Yellow		X	X
Liatris	Blazing stars	Purple		X	X
Lupinus perennis	Wild lupine	Purple	X	X	
Malus	Crabapples	Pink-red	X		
Melilotus officinalis	Yellow sweet clover	Yellow		X	X
Monarda	Bee balm, Wild bergamot	Pink, purple, red		X	X
Nepeta	Catnip, catmint	White-purple	X	X	X
Pycnanthemum	Mountain mints	White		X	X
Salix	Willows	White	X		
Salvia	Sages	Purple	X	X	X
Sedum	Stonecrop sedum	Pink	X	X	X
Solidago	Goldenrods	Yellow		X	X
Tradescantia	Spiderworts	Purple	X	X	
Trifolium	Clovers	Variety	X	X	X
Vaccinium	Blueberries	White		X	
Verbena	Verbenas, vervains	Purple	X	X	X
Zizia	Golden alexander	Yellow	X	X	

Expanded list here: xerces.org/publications/plant-lists/pollinator-plants-great-lakes-region

Other Resources:

- **Pollinator Conservation Biocontrol and Best Practices,** University of Minnesota, Krischik: *ncipmhort.cfans.umn.edu*
- **Beneficial insects,** University of Minnesota, Krischik: *ncipmhort.cfans.umn.edu/beneficial-insects*
- **Pollinator plant list,** Xerces Society: *xerces.org/publications/plant-lists/pollinator-plants-great-lakes-region*
- **Bee and plant species lists,** Heather Holm: *www.pollinatorsnativeplants.com/plant-lists--posters.html*
- **Planting guide,** Pollinator partnership: *www.pollinator.org/guides*
- **Attracting pollinators,** US Forest Service: *www.fs.fed.us/wildflowers/pollinators/documents/AttractingPollinatorsV5.pdf*
- **Habitat and gardening factsheets,** Pollinator friendly alliance: *www.pollinatorfriendly.org/plants-and-gardening*
- **Monarchs,** Monarch Joint Venture: *monarchjointventure.org*
- **Rusty patch bumble bee:** *Bumblebeewatch.org*