

Butterfly Gardening in North Dakota

Do you enjoy watching beautiful butterflies fluttering from one colorful flower to the next? If you do, you'll enjoy attracting butterflies to your own backyard or garden. Many people enjoy the delight and wonder of butterflies. Butterflies bring a sense of excitement to a flower garden and are relaxing and uplifting at the same time. Butterfly gardens are a simple and easy way to improve the quality of life for a person and to beautify a community or a backyard. This fact sheet describes how to get started on creating your own special butterfly garden and attract the species of butterflies found in North Dakota!



Figure 1. A colorful flower garden with a butterfly feeder can be attractive to butterflies.

Photograph by J. Knodel.

What is a butterfly garden?

A butterfly garden (Figure 1) is a flower garden designed to attract and retain butterflies. A successful butterfly garden must have nectar sources and host food plants. Flowers provide food and water for adult butterflies in the form of nectar, and host plants provide food for growing caterpillars. The garden should contain a variety of flowers that will bloom throughout the season. Remember, the greater the variety of floral colors and plants, the greater the variety of butterflies that will visit your garden.

Helpful hints in planning a butterfly garden

First and foremost: Location, location, location. What kinds of native and exotic flowers do well at your location? Also, knowing what butterfly species are found in your geographical location will help you decide what kind of flowers and host plants to select. Finally, pick a sheltered but sunny location.

Second: Create a habitat to which butterflies will be attracted. A sunny, south-facing butterfly garden will attract more butterflies and will cause their eggs to hatch sooner and caterpillars to develop more quickly, resulting in more

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butterflies! It is best to plant your butterfly garden in a sheltered spot that is protected from the strong northwest to western winds that we typically have in North Dakota. In sheltered areas, butterflies will expend less energy fighting the wind. Bushes, gazebos or trellises are often used as windbreaks. Plants should be arranged with shorter plants in the foreground to maximize sun exposure. A perch, such as sun dials or garden ornaments, located in the garden will provide butterflies with a place to bask in the sun (warming sites) as well as rest. Butterflies need sun to warm their bodies to 85-100 degrees, so they can easily fly. Some other ways to help attract butterflies are: a water source, like mud puddles (Figure 2) or wet sandy areas, which provide the necessary salts or minerals for butterflies (e.g., a salt or mineral block used for livestock); or butterfly feeders (Figure 1) filled

with a 10 percent sugar-water solution for an additional nectar source.

Third: A few things to avoid. Since bees and wasps are also nectar feeders and like to visit flowers, they will often nest in the vicinity of your garden. Any nests from bees or wasps under house eaves should be discouraged and removed for human safety. Also, butterflies are insects, so insecticides should NOT be used in the butterfly garden. Insecticides will kill the butterflies in addition to their real targets—the insect pest of the garden. Bacterial insecticides like Bt, *Bacillus thuringiensis*, will also kill the caterpillar of butterflies. Remember, most insecticides do not discriminate among insect species. Lastly, butterfly houses provide “lunch boxes” for squirrels, birds or even bats or ants, especially in suburban areas where at least birds and squirrels have been “trained” to investigate similar such

objects as a source of food. In wooded areas, a butterfly house may provide an overwintering site for species such as the Mourning cloak, Question mark or Comma, which hibernate as adults, but if these butterflies are present, the habitat will already provide plenty of overwintering sites.

Life cycle of butterflies

Butterflies transform from egg to caterpillar (or larva) to chrysalis (or pupa) to winged adult through a process called complete metamorphosis. This process begins with the overwintering stage as temperatures warm up in the spring. In North Dakota, different butterflies may overwinter as eggs, as partly grown larvae, as chrysalids or rarely as winged adults. Regardless of the overwintering life stage, the adult butterfly emerges from the chrysalis. Female butterflies typically mate within a day. The female butterfly then seeks out the proper host plant and deposits her eggs. She is very selective in searching for the correct host plants, looking for healthy plants which will provide food for developing caterpillars.

Caterpillars (or larvae, Figure 3) will emerge from the eggs in a few days. Caterpillars are often referred to as “eating machines” and pass through five stages, or instars, growing larger with each molting of the exoskeleton. The caterpillar stage may last for a week to several months, depending on species. When the caterpillar is mature, it forms a chrysalis (or pupa, Figure 4). During the chrysalis stage, the caterpillar transforms into the adult butterfly (Figure 5). The adult



Figure 2. Canadian swallowtails congregating at mud puddle.
Photograph by G. Fauske.

butterfly splits open the chrysalis and slowly crawls out, expanding and drying its wings for an hour or two. The newly emerged adult butterfly is ready for flight and the cycle continues.

Some butterflies produce several generations each year. Cabbage butterfly is an example of this in North Dakota. Other species have a short flight season and only one brood per year. An example is the Canadian tiger swallowtail. Others are single brooded but have a relatively long flight season, such as the Great spangled fritillary, which may fly for more than a month, or the Mourning cloak, which may live for almost a year as a butterfly. Some species, such as the Variegated fritillary, regularly immigrate into the state on an annual basis and survive until the first frost of autumn. Still others, like the Monarch butterfly, migrate to and from North Dakota each year because they cannot survive the cold winters in any life stage. *(For a detailed explanation of Monarch migration, refer to the article listed in the reference section.)*

Adult butterflies visit flowers for sugar, a source of energy and water (to prevent dehydration). Exceptions to the nectar-feeding butterflies are the woodland butterflies, which are attracted to fermenting fruit or sap. However, the majority of the butterfly species of North Dakota are nectar feeders and this brings us back to the theme of a butterfly garden.



Figure 3. Caterpillar (or larvae) of Black swallowtail. Photograph by L. Oslie.

Figure 4. Chrysalis (or pupae) of Black swallowtail. Photograph by L. Oslie.



Figure 5. Adult butterfly of Black swallowtail. Photograph by L. Oslie.

Butterfly attractants – Flowers

The primary purpose of most flowers is to attract insects for pollination. Their bright colors are advertising banners. Many flowers have additional light patterns in the ultraviolet part of the spectrum, visible to bees and butterflies but not humans. These floral patterns accent the flower center and are called nectar guides, like airport runway lights.

Particularly good early-season flowers include lilac, dame's rocket (Figure 6) and spiraeas. Also good are chokecherry and dogwoods. Mid-summer flowers include phlox, purple coneflower, sunflowers, gaillardia (Figure 7), thistles and milkweeds, especially utterflyweed and bee balm (Figure 8). Good late-season attractants are rabbit-brush, asters and zinnias (Figure 9).

In general, smaller, “shallower” flowers will attract smaller butterflies with shorter tongues; milkweeds and asters are beloved by Hairstreaks and Crescents. Dame's rocket and bee balm are “deeper” flowers, which attract butterflies with longer tongues like Painted ladies and Swallowtails. Besides the plants mentioned here, almost any colorful, heavily scented flower is likely to be some butterfly's favorite.

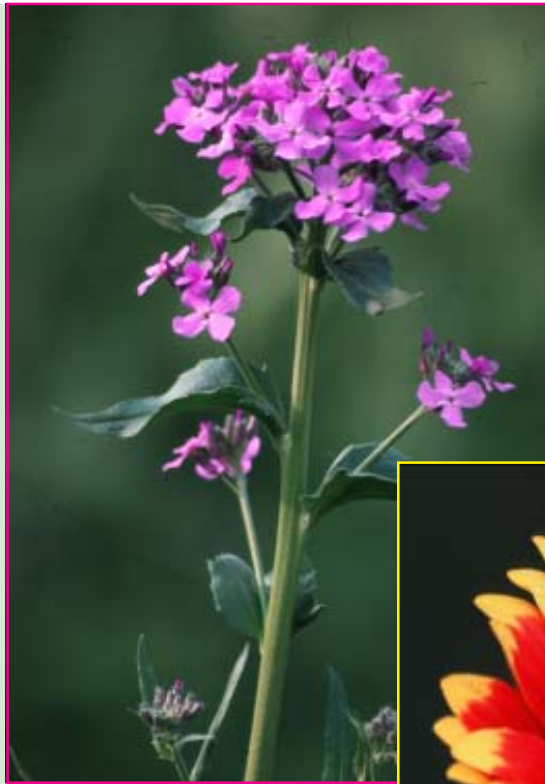


Figure 6. Dame's rocket – an early season flower for attracting butterflies.
Photograph by G. Fauske.



Figure 7. Gaillardia – a mid-season flower for attracting butterflies.
Photograph by G. Fauske.

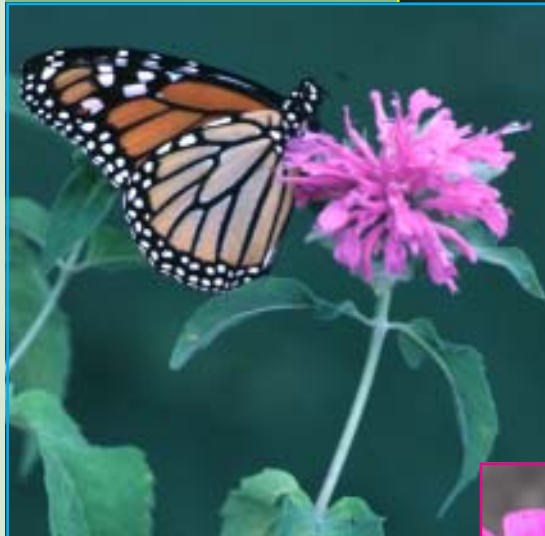


Figure 8. Bee balm with Monarch – a mid-season flower for attracting butterflies.
Photograph by G. Fauske.

Nectar sources of common North Dakota butterflies

Flowers are listed roughly in order from earliest to latest flowering dates. This is not an exclusive list and many exotic annual plants are highly attractive to our butterflies. Some flowers may not be suitable for growing in all areas of North Dakota, because of our variable weather or not suitable at a given location every year.



Figure 9. Zinnia with Painted lady – a late-season flower for attracting butterflies. Photograph by L. Tobias.

Common Nectar Sources of Widespread North Dakota Butterflies

	Lilac Dogwood Spirea Fleabane Dandelion	Phlox Bee balm Sunflower Purple coneflower Thistle Milkweed Alfalfa Vervain Marigold	Blazingstar Rabbitbush Zinnia Aster
	Early Flowering	Mid-Season Flowering	Late Flowering
Silver spotted skipper	■	■ ■ ■ ■ ■ ■ ■	■
Checkered skipper	■ ■	■ ■ ■ ■ ■	■ ■ ■
Long dash skipper		■ ■ ■ ■ ■ ■ ■	■ ■ ■
Peck's skipper		■ ■ ■ ■ ■ ■ ■	■ ■ ■
Black swallowtail		■ ■ ■ ■ ■ ■ ■	■
Canadian tiger swallowtail	■ ■	■	
Checkered white		■ ■ ■ ■ ■	■
European cabbage butterfly	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■	■ ■ ■
Alfalfa butterfly	■	■ ■ ■ ■ ■	■ ■ ■
Common sulphur	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■	■
Bronze copper		■ ■	
Gray copper		■ ■	
Gray hairstreak		■ ■ ■	
Coral hairstreak	■	■	
Summer azure	■ ■ ■ ■		
Eastern tailed blue	■ ■ ■ ■	■	
Orange-bordered blue	■ ■ ■ ■	■ ■ ■	■ ■ ■
Variiegated fritillary	■	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■
Great spangled fritillary		■ ■ ■ ■ ■ ■ ■	■
Regal fritillary		■ ■ ■	■
Gorgone checkerspot	■	■ ■ ■ ■ ■ ■ ■	
Pearl Crescent	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■
Question mark	■	■	
Comma	■ ■ ■ ■		
Mourning cloak	■	■	
Red admiral	■ ■ ■ ■	■ ■ ■ ■ ■	
Painted lady	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■	■ ■ ■
White admiral	■	■ ■ ■ ■	
Viceroy		■ ■ ■ ■ ■	■ ■ ■
Monarch		■ ■ ■ ■ ■	■ ■ ■
Common wood nymph	■	■ ■ ■	

Caterpillar host plants

Most butterfly caterpillars feed on plant parts: leaves, flowers, buds or seeds. While nectar sources will attract many species of butterflies, providing larval food sources will augment local populations of widespread butterflies. The following is a list of commonly used host plants of 30 widespread butterflies.

Butterfly	Caterpillar Food Plants
Silver spotted skipper	Woody legumes such as wild licorice, false indigo, hog peanut, showy tick trefoil and black locust.
Checkered skipper	Wild mallows such as scarlet mallow or introduced horticultural species such as rose mallow.
Peck's skipper	Grasses such as Kentucky bluegrass, smooth brome, and rice cutgrass.
Long-dash skipper	Grasses, including Kentucky blue grass, timothy, quackgrass and barnyard grass.
Black swallowtail	Wild plants of the dill family including heart-leaved alexanders, water hemlock, meadow and water parsnips. Larvae are called parsley worms and are a minor garden pest of dill, parsley and carrots.
Canadian tiger swallowtail ..	Leaves of ash, poplar, willow, birch and wild cherry.
Checkered white	Plants of the mustard family, including cabbage, turnip, various wild mustards and shepherd's purse.
Cabbage butterfly	Plants of the mustard family. Often damages lettuce, cabbage and other cole crops such as cauliflower and broccoli. The larva is known as the imported cabbageworm.
Alfalfa butterfly	Legumes with a preference for alfalfa and vetches.
Clouded sulphur	Legumes with a preference for white and sweet clovers; also locoweed and alfalfa.
Bronze copper	Curled and water dock; also knotweed.
Gray copper	Curled and western dock, probably other dock species.
Gray hairstreak	Prefers legumes and mallows, but has a wide variety of hosts: hops, mallow, knotweeds, beans, hawthorns, cotton, oak, strawberry and mint. Eat fruits and seeds of host.
Coral hairstreak	Flowers and fruits of wild cherry and plum.
Summer azure	Flower and leaf buds of dogwood and spiraea.
Eastern tailed blue	Flower, leaf buds and leaves of white and red clovers, vetches, also other legumes.
Melissa blue	Leaves of alfalfa, lupines, and less frequently other legumes such as wild licorice and vetches.
Variegated fritillary	Primarily violets, but also flax (wild and cultivated), stonecrop, purslane and sunflowers. The larvae, known as the pansy caterpillar, is a minor horticultural pest of cultivated violets.
Great spangled fritillary	Violets
Regal fritillary	Violets
Gorgone checkerspot	Asters, black-eyed susan, soybean and sunflowers.
Pearl crescent	Smooth-leaved asters.
Question mark	Leaves of elm, hackberry, hops and nettle.
Comma	Leaves of hops, nettle and hackberry. Larva known as the hop merchant.
Mourning cloak	Leaves of willow, elm, birch, aspen and cottonwood. Occasionally a defoliator of elm. Larva is the elm caterpillar.
Red admiral	Nettle and thistle.
Painted lady	Thistle, hollyhock, mallows. The thistle caterpillar is occasionally a minor pest of sunflower and soybean.
White admiral	Leaves of birch, poplar, aspen and wild cherry.
Viceroy	Leaves of willow and poplar.
Monarch	Milkweeds, including butterfly weed.
Common wood nymph	Wide variety of grasses including wild oats.

Common North Dakota Butterflies

North Dakota butterflies (Figure 10) are easily placed into recognizable groups. For each general group the following information is given: identification hints, habits, life history data and number of North Dakota species.

Skippers

are small to medium-sized butterflies. Unlike all other butterflies, the antennal club in skippers is about twice as long as wide and narrowed or even hooked at the tip. Skippers hold their antennae widely spread rather than the narrow “V” often observed in other butterflies. Skippers have a more stoutly built body compared to other butterflies. When visiting flowers, most skippers appear as small orange “right-triangles.” Caterpillars are distinctive in having a constriction or “neck” behind the head. Larvae feeding on broad-leaved plants construct a silken shelter within a rolled leaf where they hide in the day; those feeding on grasses construct a silken tube at the base of the plant. Resident skippers overwinter as eggs, early stage larvae or chrysalids. At least 42 species of skippers are found in North Dakota. Pictured in Figure 10: Peck’s skipper (33), Long-dash skipper (34), Silver-spotted skipper (35) and Checkered skipper (36).

Swallowtails

are large to very large butterflies with one or more tails on each hindwing. Females have a blue submarginal band or row of spots on hindwings. The same area is largely black in males. Larvae possess an orange or red Y-shaped, reversible structure, the osmeterium, displayed when the caterpillar is threatened. This defensive structure, located behind the head, resembles a snake’s tongue and releases a pungent odor (like dill or

musty apple sauce). Resident swallowtails overwinter as chrysalids. Nine species of swallowtails occur in North Dakota. Pictured in Figure 10 are the Canadian tiger swallowtail (31) and Black swallowtail (32).

Sulphurs and whites

are usually white or yellow in color, as their common name implies. Most of their caterpillars are green, usually with one or more pale lateral stripes. Their body surface is covered with minute hairs, which gives them a velvety appearance. Larvae form a chrysalis which is oriented head upward and supported about the middle with a silken strap like a window-washer’s belt. Resident species overwinter as chrysalids. At least 14 species of this group occur in North Dakota. Pictured in Figure 10: Clouded sulphur (21-23), Checkered white (24 & 29), Cabbage butterfly (25 & 30) and Alfalfa butterfly (26-28).

Gossamer-winged butterflies

are small to medium-sized butterflies, recognized by the lustrous wings and/or the presence of hair-like tails on hindwings. In the hand, they are recognized by the fact that their eyes touch the bases of the antennae. Larvae are somewhat slug-like with a velvety appearance due to the presence of minute hairs. Larvae of many species are attended to by ants in a symbiotic relationship. Larvae secrete a sugary liquid (honeydew), which ants drink. Ants in turn protect the caterpillars from insect predators.

Many species feed on buds, flowers or seeds. At least 29 species of Gossamer-winged butterflies occur in North Dakota. Pictured in Figure 10: Melissa blue (12-13), Eastern tailed blue (14-15), Summer azure (16-17), Gray hairstreak (37), Coral hairstreak (38), Gray copper (39) and Bronze copper (40-41).

Brush-footed butterflies

are distinguished from other butterflies in that the front legs are reduced in size, used to clean eyes or antennae and to “taste” flowers. These butterflies therefore have only four walking legs. The caterpillars of most have branching spines. At least 54 species occur in North Dakota. For identification purposes, these butterflies are broken down into seven smaller groups.

Fritillaries are medium-sized to large butterflies. Most have silver spots on the ventral surface of the hindwings. Larvae feed on violets. At least 11 species occur in North Dakota. Pictured in Figure 10 are: Variegated fritillary (20), Great spangled fritillary (42) and Regal fritillary (43).

Checkerspots and Crescents are medium-sized to small butterflies with an orange and black dorsal pattern similar to Fritillaries but tending to have solid black wing margins. Like Fritillaries, their antennal clubs are spatulate (spoon-shaped). At least eight members of this group occur in North Dakota. Pictured in Figure 10 are the Northern crescent (18) and Gorgone checkerspot (19).

Angle-wings and Tortoise-shells are medium to large butterflies, whose scalloped wing margins impart a ragged appearance. Most are brightly colored above and resemble tree bark or dried leaves beneath. These butterflies are rarely attracted to flowers but are common at sap flows in the spring and fermenting fruit in mid-summer and fall. They hibernate as butterflies in crevices or cracks in tree bark. At least 10 species occur in North Dakota. Pictured in Figure 10 are: Comma butterflies (3-4), Question mark (5-6) and Morning cloak (9).

Thistle butterflies are medium-sized butterflies having bright colors, pale-tipped antennae and

eyesspots on the ventral hindwings. These butterflies, in common with Angle-wings, have a spiral flight pattern and may be territorial. Thistle butterflies are annual immigrants and do not survive North Dakota winters. Four species have been found in the state. Pictured in Figure 10 are the Red admiral (10) and Painted lady (11).

Admirals are large butterflies, with bold black and white, black and blue or orange with black veins and lines. The antennal club is very weak in all species and hardly more than a gradual thickening. They often circle with a flat-winged glide. North Dakota species overwinter as partially grown larvae within a rolled leaf. Three admirals

occur in North Dakota. Pictured in Figure 10 are the Viceroy (1) and White admiral (2).

Milkweed butterflies are large butterflies, that are orange with black veins. When resting on a flower, the antennae with the downturned club is used to identify our only common species, the monarch, from the viceroy, one of the admirals. Flight is characterized by a few vigorous flaps followed by long glide with wings held as a “V.” Monarchs are our only regular, annual migrant butterfly. Occasionally, a second species, the Queen butterfly strays into the northern United States. The Monarch (7) is pictured in Figure 10.

Satyrs are medium-sized butterflies. Most are somber uniform brown or dull orange in color with one or more eye spots on the ventral wing surfaces. Swollen veins at the base of the forewings, which function as a tympanum (ear) are visible at close range. Satyrs overwinter as partially grown larvae or less commonly as eggs. There are at least 11 species in North Dakota. The Common wood nymph (8) is pictured in Figure 10.



Cecropia moth. Photograph by G. Fauske.

Seasonal Calendar

of Common North Dakota Butterflies

In the following table, a '-' indicates presence, either early individuals or older, worn butterflies later in the season, while a '■' indicates peak flight periods.

Species	May	June	July	Aug.	Sept.
Silver spotted skipper		- ■ ■	- -		
Checkered skipper		- ■	■ - -	- ■ ■	■ ■ -
Long dash skipper		- - ■	■ ■ -	-	
Peck's skipper		- ■	■ ■ -	- - -	
Black swallowtail	- ■	- - -	■ ■ ■	- - -	- -
Canadian tiger swallowtail	-	■ ■ ■	- -		
Checkered white	- -	- - -	- - -	- - -	- ■ ■
European cabbage butterfly	- -	- ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Alfalfa butterfly	-	- - -	- ■ ■	■ ■ ■	■ ■ -
Common sulphur	- - -	- ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Bronze copper		- -	■ - -	- ■ ■	- -
Gray copper		■	■ ■ -		
Gray hairstreak	- - -	- - -	- - -	- - -	- -
Coral hairstreak		-	■ ■ ■	- - -	
Summer azure		-	- ■ -	- - -	- - -
Eastern tailed blue	- - -	- - -	- - -	- - -	- - -
Orange-bordered blue		- ■ ■	■ - -	- ■	■ - -
Variiegated fritillary		- -	- - ■	■ - -	- -
Great spangled fritillary		- -	■ ■ ■	- - -	-
Regal fritillary		- - -	■ ■ ■	■ ■ ■	- - -
Gorgone checkerspot		■ ■ -		■	- -
Pearl Crescent	-	■ ■ ■	■ ■ ■	■ ■ ■	■ - -
Question-mark	- - -	- - -	■ ■ ■	■ ■ ■	- - -
Comma	- - -	- - -	■ ■ ■	■ ■ ■	■ ■ -
Mourning cloak	- - -	- - -	■ ■	- - -	■ - -
Red admiral	-	- -	- - -	- - -	- - -
Painted lady		- - -	- - -	- - -	- - -
White admiral		- ■ ■	■ ■ -	- - -	-
Viceroy	-	- ■ ■	■ - -	■ ■ ■	- - -
Monarch		- - -	- - -	- ■ ■	■ ■ -
Common wood nymph			■ ■ ■	- - -	- - -

Figure 10. Key to Color Plate

1. Viceroy - *Limenitis archippus*
2. White admiral - *Limenitis arthemis*
3. Comma/Hop merchant - *Polygonia comma*, winter form
4. Comma/Hop merchant - *Polygonia comma*, summer form
5. Question-mark - *Polygonia interrogatoris*, winter form
6. Question-mark - *Polygonia interrogatoris*, summer form
7. Monarch - *Danaus plexippus*
8. Common wood nymph - *Cercyonis pegala*
9. Mourning cloak - *Nymphalis antiopa*
10. Red admiral - *Vanessa atalanta*
11. Painted lady - *Vanessa cardui*
12. Melissa blue - *Lycaeides melissa*, ♂
13. Melissa blue - *Lycaeides melissa*, ♀
14. Eastern tailed blue - *Everes comyntas*, ♂
15. Eastern tailed blue - *Everes comyntas*, ♀
16. Summer azure - *Celastrina neglecta*, ♂
17. Summer azure - *Celastrina neglecta*, ♀
18. Northern crescent - *Phyciodes cocyta*
19. Gorgone checkerspot - *Charidryas gorgone*
20. Variegated fritillary - *Euptoieta claudia*
21. Clouded sulphur - *Colias philodice*, ♂
22. Clouded sulphur - *Colias philodice*, ♀
23. Clouded sulphur - *Colias philodice*, ♀, albino
24. Checkered white - *Pontia protodice*, ♂
25. Cabbage butterfly - *Pieris rapae*, ♂
26. Alfalfa butterfly - *Colias eurytheme*, ♂
27. Alfalfa butterfly - *Colias eurytheme*, ♀
28. Alfalfa butterfly - *Colias eurytheme*, ♀, albino
29. Checkered white - *Pontia protodice*, ♀
30. Cabbage butterfly - *Pieris rapae*, ♀
31. Canadian tiger swallowtail - *Papilio canadensis*
32. Black swallowtail - *Papilio polyxenes*
33. Peck's skipper - *Polites peckius*
34. Long dash skipper - *Polites mystic*
35. Silver spotted skipper - *Epagyreus clarus*
36. Checkered skipper - *Pyrgus communis*
37. Gray hairstreak - *Strymon melinus*
38. Coral hairstreak - *Satyrus acadicum*
39. Gray copper - *Lycaena dione*
40. Bronze copper - *Lycaena hyllus*, ♂
41. Bronze copper - *Lycaena hyllus*, ♀
42. Great spangled fritillary - *Speyeria cybele*
43. Regal fritillary - *Speyeria idalia*



Figure 10. Color Plate of butterflies of North Dakota. Photographs by G. Fauske.



Further Information

Web sites on butterfly gardening

Using **'butterfly gardening'** as search terms will yield more than 250,000 educational and commercial sites. A few of the regional and best national ones are:

- www.ndsu.nodak.edu/instruct/brewer/dept/garden.htm
- www.extension.umn.edu/distribution/horticulture/components/DG6711e.html
- www.uky.edu/Agriculture/Entomology/entfacts/misc/ef006.htm
- www.duke.edu/~cwcook/plants4leps.html
- www.mnh.si.edu/museum/butterfly.html
- www.amnh.org/exhibitions/butterflies/garden.html
- www.milkweedcafe.com/bflygarden.html
- www.electronicvalley.org/derby/rec/state/Butterflygarden.HTM
- <http://forums.gardenweb.com/forums/butterfly>

Books on butterfly gardening

There are many excellent references on designing a butterfly garden. Two examples are listed below.

- Mikula, Rick. 1997. **Garden Butterflies of North America**. Willow Creek Press. Minocqua, Wisconsin. 143 pp.
- Stokes, Donald and Lillian, and Ernest Williams. 1991. **Stokes Butterfly Book: The Complete Guide to Butterfly Gardening, Identification, and Behavior**. Little, Brown, and Company. Boston, New York, London. 96 pp.

Web sites on butterflies (and moths)

Atlas of North Dakota butterflies

www.npwrc.usgs.gov/resource/distr/lepid/bflynd/bflynd.htm

Butterflies of North America

www.npwrc.usgs.gov/resource/distr/lepid/bflyusa/bflyusa.htm

Moths of North Dakota

www.ndsu.nodak.edu/ndsu/ndmoths/

Moths of North America

www.npwrc.usgs.gov/resource/distr/lepid/moths/mothsusa.htm

Books on butterflies (and moths)

References are listed in order of usefulness to butterfly gardeners in North Dakota to broader geographic coverage.

- Royer, Ronald R. 2003. **Butterflies of North Dakota - An atlas and guide**. Minot State University, Science Monograph #2: 192 pp.
- McCabe, Tim L. and Richard L. Post. 1977. **Skippers (Hesperioidea) of North Dakota**. North Dakota Insects Publication #11. Schafer-Post series. North Dakota State University. 70 pp.
- Opler, Paul, and George O. Krizek. 1984. **Butterflies east of the Great Plains. An illustrated natural history**. Johns Hopkins University Press. Baltimore/ London. 294 pp.
- Glassberg, Jeffrey. 1999. **Butterflies through binoculars – the East**. Oxford University Press, New York, Oxford. 242 pp.
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- Klassen, Paul, Richard Westwood, Bill Preston, and Brian McKillop. 1989. **The Butterflies of Manitoba**. Manitoba Museum of man and Nature. Winnipeg. 290 pp.
- Brock, Jim P. and Kenn Kaufman. 2003. **Butterflies of North America**. Kaufman focus guide. Houghton Mifflin Co., New York. 384 pp.
- Layberry, Ross A., Peter W. Hall and J. Donald Lafontaine. 1998. **The butterflies of Canada**. University of Toronto Press. Toronto, Ontario, Canada.
- Covell, Charles C. 1984. **A field guide to the moths**. Houghton Mifflin Co., New York. 496 pp. Currently out-of-print but still found at used bookstores and accessible through libraries.

For detailed information on Monarch migration, see the research article:

- Brower, Lincoln P. 1996. **Monarch butterfly orientation: missing pieces of a magnificent puzzle**. The Journal of Experimental Biology. 199: 99-103.

For more information on this and other topics, see: www.ag.ndsu.nodak.edu



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