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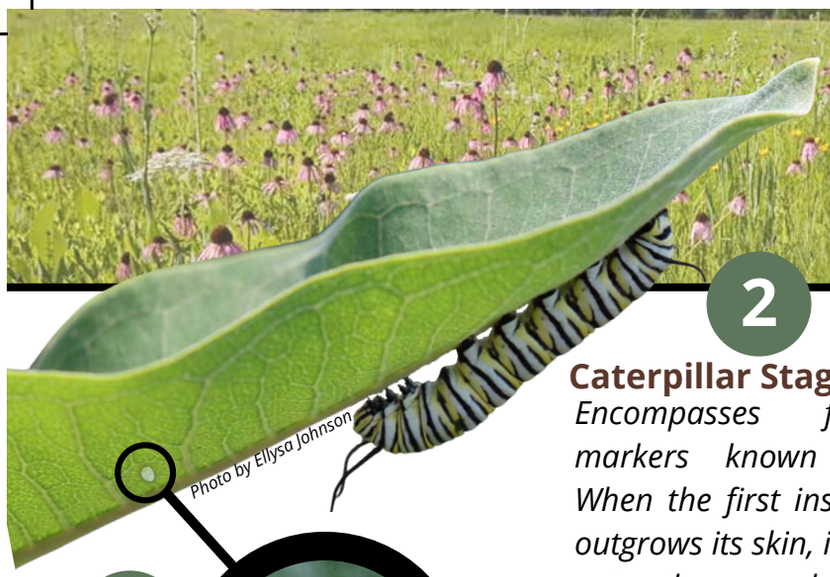
MONARCH CONSERVATION
IN THE NORTHERN GREAT PLAINS

Life History | Distribution | Status Update | Conservation Tips

MONARCH LIFE HISTORY



2

Caterpillar Stage 9 - 14 days

*Encompasses five growth markers known as **instars**. When the first instar caterpillar outgrows its skin, it will molt and enter the second instar, and so on. Caterpillars consume a chemical called **cardenolides** from the milkweed which makes them taste bad to predators.*

3

Chrysalis Stage 8 -12 days

*The caterpillar will multiply its body mass 2,000 times, then pupate and go through a process called **metamorphosis**.*

MONARCH LIFE HISTORY

1

Egg Stage 4 days

A female monarch lays between 300-400 eggs in her lifetime on milkweed (Asclepias spp.) host plants. Only fertilized eggs will grow into caterpillars.

MONARCH BUTTERFLY

Scientific name: *Danaus plexippus*

Family: Nymphalidae

Order: Lepidoptera

Male monarchs have subtle black dots on their hindwings and thinner veins than females. This dichotomy between male and female monarchs is called **sexual dimorphism.**

4

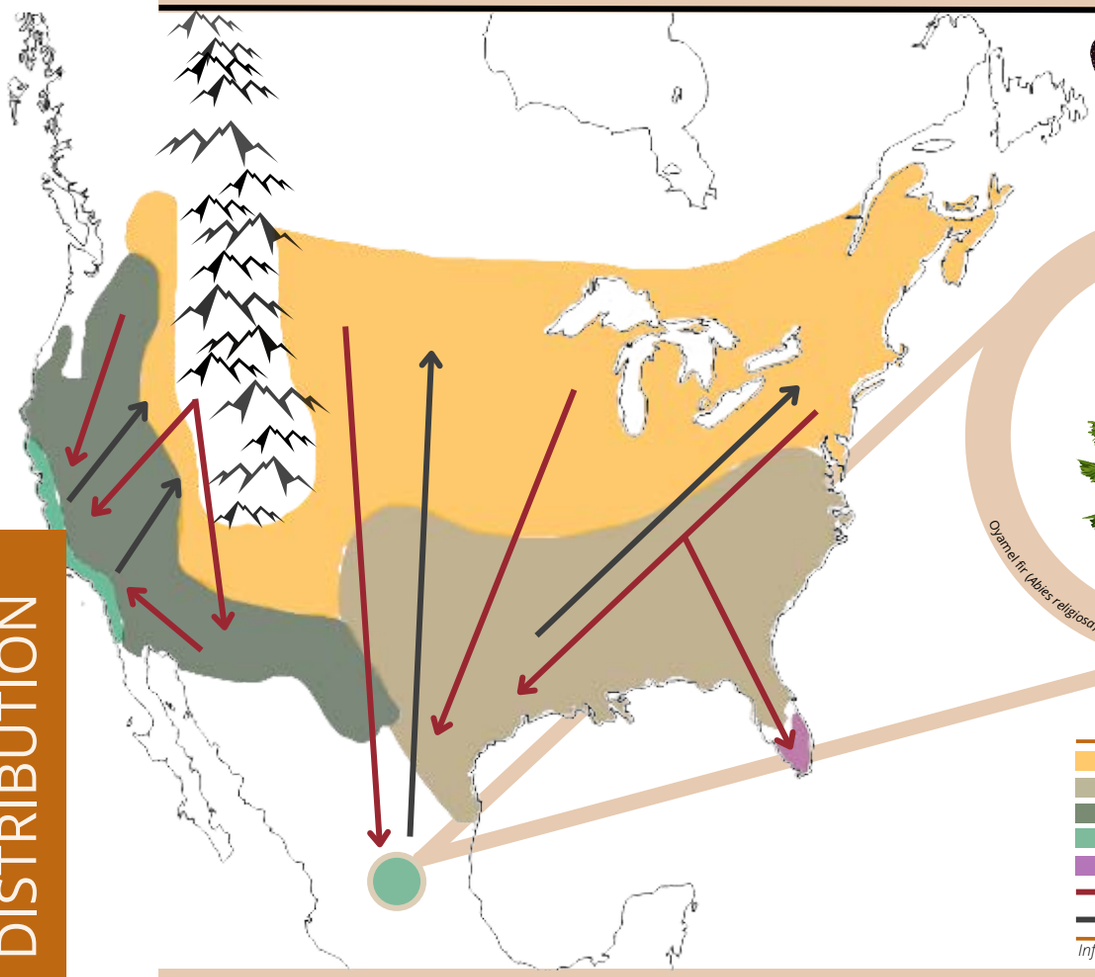
Butterfly Stage 2 - 6 weeks (8 - 9 months if part of overwintering generation)

An adult monarch can fly up to 150 miles to forage for food resources!

Careful of the Trickster!

Viceroy butterflies (*Limenitis archippus*) look very similar to monarchs, but you can tell them apart by the black, horizontal line on their hindwings.

MONARCH DISTRIBUTION



Oyamel fir (*Abies religiosa*) trees provide shelter for overwintering eastern monarchs.

LEGEND

- Summer breeding areas
- Spring breeding areas
- Spring & summer breeding areas
- Overwintering areas
- Resident population
- Fall migration
- Spring migration

Information in map adapted from Xerces Society

MAGNIFICENT MIGRATION

The Rocky Mountains separate North American monarchs into two distinct populations: eastern and western,[1] as well as a residential, or non-migratory population in the southern tip of Florida.[2] The eastern population is the largest of the three, overwintering in oyamel fir (*Abies religiosa*) trees within the Sierra Madre Mountains in Mexico. In the spring, they migrate north to Canada, and in the fall return south–that's up to 3,000 miles! Eastern monarchs have a multi-generational life-cycle, meaning it takes three to four generations to complete the annual migration. The western population overwinters along the California coast near Santa Cruz and migrates north towards Washington and back down again in the fall. Monarchs are one of the only butterfly species in the world that perform an annual migration, using environmental cues to mark when it is time to migrate.

AROUND THE WORLD

Although monarch butterflies originate from North America, they have since spread to other countries. These include Australia, New Zealand, Spain and most tropical islands in the Caribbean. Milkweed in these areas grows year-round and the temperatures stay warm, so monarchs outside of North America do not need to migrate.

DID YOU KNOW?

Southern monarch butterflies (*Danaus erippus*) are the South American relative to the monarchs we see. They are a bit more orange in color and the black lines are not as dark, but they still use milkweed (*Asclepias* spp.)

Southern monarch butterfly (*Danaus erippus*)

STATUS UPDATE

Current Population Sizes and Management

North American migratory monarch populations are much smaller today compared to their historic numbers. In the last 50 years, the eastern population has declined by 80%[3] and the western population has declined about 97%.[4] Due to this severe decline, monarchs were placed under consideration for the U.S. Endangered Species Act in 2020.

EASTERN POPULATION

The eastern migratory monarch population decline is in response to multiple drivers such as climate change, loss of overwintering sites due to the logging of oyamel fir trees (*Abies religiosa*), land-use change, chemical application, lack of food resources, and breeding habitat loss.[5] Prairies, particularly those of the Great Plains and Midwest regions, largely encompass the heart of the monarch breeding range.[7] Unfortunately, prairies are also one of the most converted ecosystems in the United States, usually into urban cities or agriculture.[12]

WESTERN POPULATION

The western migratory monarch population is declining due to habitat loss and degredation.[8] Pesticide use and climate change[4] are secondary drivers of the decline. The western population is feared to have entered an **extinction vortex** with numbers so low they may not rebound. As of 2020, there were less than 2,000 monarch butterflies. However, with conservation efforts, this population grew to 250,000 in 2021.[13]

MANAGEMENT IN PROGRESS

Many organizations prioritize monarch conservation, including the Monarch Joint Venture, Save Our Monarchs, Xerxes Society, Monarch Butterfly Fund, and Monarch Watch. Citizen science projects like Xerces Society's Western Monarch Count, which includes the annual Thanksgiving Count and Milkweed Mapper, the North American Butterfly Association (NABA), and Journey North also contribute to conservation. These programs offer volunteer opportunities to observe and report monarch sightings to get a sense of year to year population size at various points in the migration.

Apart from volunteering or recording data, there is also the option to plant and support monarch waystations, which are patches of ideal monarch habitat in home gardens, around schools, in parks, etc. This can be as simple as adding a few milkweed plants to a garden that already exists; no effort is considered too small!

For more information on how to volunteer with these organizations, please visit the following websites:
Thanksgiving Count www.westernmonarchcount.org
Milkweed Mapper www.monarchmilkweedmapper.org
NABA www.nababis.org

Photo by C.K. Pei

One of the main causes for monarch decline in the Northern Great Plains is a lack of habitat and food resources.[6] Adult monarch butterflies depend on diverse nectar resources in this area from May to September for energy during both their northward and southward migration. An inadequate supply of milkweed or nectar resources at any point during migration could negatively impact the overwintering population numbers.

There is evidence to suggest that monarchs prefer small, dispersed pockets of habitat composed of diverse, native food resources.[9] By planting species suggested in Table 1, we can aid monarchs by giving them the energy and habitat they require while migrating through the Northern Great Plains. Most monarch nectar resources perform best in open, sunny sites. Monarchs also require larger structures for overnight protection against harsh elements and predators. Having either trees, shrubs or other sheltered areas can keep monarchs safe.

Bloom	Common Name	Scientific Name	Flower Color	Max. Height (Feet)	Water Needs (Low, Medium, or High)
Summer	Prairie coneflower	Ratibida columnifera	Yellow/red	3	L
	Swamp milkweed	Asclepias incarnata	Pink	4	M/H
	Common milkweed	Asclepias syriaca	white/purple/pink	8	M
	Showy milkweed	Asclepias speciosa	White/pink	4	L
	Narrow-leaved purple coneflower	Echinacea angustifolia	Pink/purple	2	L
	Wild bergamont	Monarda fistulosa	White/pink/purple	5	M
	Flodman's thistle	Cirsium flodmanii	Pink/purple	3	L
Summer to Fall	Spotted joe pye weed	Eutrochium maculatum	Pink/purple	6	M/H
	Common sunflower*	Helianthus annuus	Yellow	8	M
	Stiff sunflower	Helianthus pauciflorus	Yellow	6	L/M
	Dotted blazing star	Liatris punctata	Pink/purple	2	M
	Tall goldenrod	Solidago altissima	Yellow	4	M
	White heath aster	Symphyotrichum ericoides	White	3	L
	Praire ironweed	Vernonia fasciculata	Purple	5	M/H

Table 1. Recommended plant species to provide quality monarch habitat with both milkweed species for larvae and nectar resources for adults.[10] All species are perennials unless otherwise denoted (*) and are native to the Northern Great Plains region. Please consult the USDA's PLANTS database (plants.usda.gov) for more details on native species in your area.

Information in table adapted from Fallon, C., N.L. Adamson, A. Stine, S. Jepsen, and M. Vaughan. 2016. *Monarch Nectar Plants: Northern Plains*. Monarch Joint Venture, Xerces Society, and Garden for Wildlife.

URBAN GARDEN PLOTS

A small yard in urban, northern Minnesota that was turned into a pollinator haven. Photo by Xerces Society, Sarah F. Jordan

Monarchs rely on milkweed and flowers for food. By planting a diverse set of native species, even in small areas, you can provide them habitat. Although we focus on monarchs, other pollinators such as bees can benefit from these resources as well. Below is the Triple-P framework to establish a pollinator garden: Postpone, Plant and Protect. By following these tips, you can create a safe environment for monarchs and other pollinators in your yard, whether you are in the city or the suburbs.

POSTPONE SPRING CLEANUP

Many pollinators are cavity-nesting or ground-nesting and are heavily reliant on dead plant stems or leaf litter to survive the cold season. Gardeners may be tempted to clear the old vegetation early in the spring, but this could be detrimental to pollinators seeking refuge from cold temperatures. A good rule of thumb is to wait until the weather has been >50 degree Fahrenheit for over seven consecutive days. The pollinators will thank you!

PLANT NATIVE

Although monarchs are able to use the nectar from a multitude of species, including exotic invasives, planting native species is more beneficial to the ecosystem. Native plants are also generally adapted to local soil and climate conditions and are therefore easier to maintain for the landowner while providing resources for other native insect and animals species.

PROTECT FROM PESTICIDES

Pesticides like insecticides and herbicides can be harmful to monarchs and other pollinators. Insecticides such as neonicotinoids can poison insects through direct contact or indirectly through consumption of contaminated plants. Herbicides can also decrease available floral and host plants. For example, the rise in glyphosate herbicides in the 1990s led to a large decrease in milkweed stems across the Midwest.[6] If pesticides are used in the garden, it can unintentionally create an **ecological trap**, where rapid environmental change (e.g., pesticide application) leads to pollinators settling in or using poor-quality habit (e.g., food resources that can chemically harm them). Instead, we encourage gardeners to minimize the usage of pesticides and follow the integrated pest management (IPM) model.

For more information on IPM, please visit:
https://www.ag.ndsu.edu/publications/crops/ipm-basics-integrated-pest-management-in-north-dakota-agriculture

LANDSCAPE MANAGEMENT

Landowners with more acreage can take additional steps to aid the monarch butterfly and other wildlife. Carefully following historic disturbance regimes, such as burning and grazing, can create a diverse plant community at the landscape level. This diversity in plant species (composition) and plant heights (structure) attracts and supports migratory monarchs via resource and habitat availability.

PRESCRIBED BURNS

Historically, fire was a semi-frequent (every 3-5 years) occurrence in the Northern Great Plains. Fire suppression tends to lead to a build-up of vegetation which can create dangerous wildfire conditions. By conducting prescribed burns, the vegetation does not build up to those dangerous standing litter levels. In addition, fire has been observed to regulate some exotic invasive species, such as Kentucky bluegrass (*Poa pratensis*), or native species that dominate the plant community due to the lack of disturbance like western snowberry (*Symphoricarpos occidentalis*). Allowing other fire-adapted plant species to compete adds to diversity in vegetation **composition.**

PYRIC HERBIVORY

Fire alone is not always effective. Large grazers such as bison (*Bison bison*) once roamed the Great Plains in large numbers. Today, we mostly have domesticated livestock. Cattle are attracted to the new, nutritious growth from burned patches and tend to leave other areas alone, allowing some vegetation to grow taller than others. This makes a mosaic, or adds to diversity in vegetation **structure**.[11]

Photo by Hailey Keen

IMPORTANCE OF REST

If disturbance and severe drought occur concurrently, it can result in poor vegetation growth and floral expression. In a water stressed environment, plants may not recover from a burn or heavy grazing. With climate change likely increasing the frequency and severity of droughts in the Northern Great Plains, it may be wise to set aside land that is neither burned nor grazed. These sections can act as refuges for monarchs and other wildlife should a drought occur. It is important to rotate the location of this rested section to avoid single species takeover in the vegetation community.

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