MONARCH JOINT VENTURE

Partnering across the U.S. to conserve the monarch migration

www.monarchjointventure.org

The Monarch Joint Venture is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to protect the monarch migration across the lower 48 United States.

MISSION

Recognizing that North American monarch (*Danaus plexippus*) conservation is a responsibility of Mexico, Canada and the U.S., as identified in the North American Monarch Conservation Plan, this Joint Venture will coordinate efforts throughout the U.S. to conserve and protect monarch populations and their migratory phenomena by developing and implementing science-based habitat conservation and restoration measures in collaboration with multiple stakeholders.

Our mission will be achieved by coordinating and facilitating partnerships and communications in the U.S. and North America to deliver a combination of habitat conservation, education, and research and monitoring.

VISION

The vision of this Joint Venture is abundant monarch populations to sustain the monarch migratory phenomena into perpetuity, and more broadly to promote monarchs as a flagship species whose conservation will sustain habitats for pollinators and other plants and animals.

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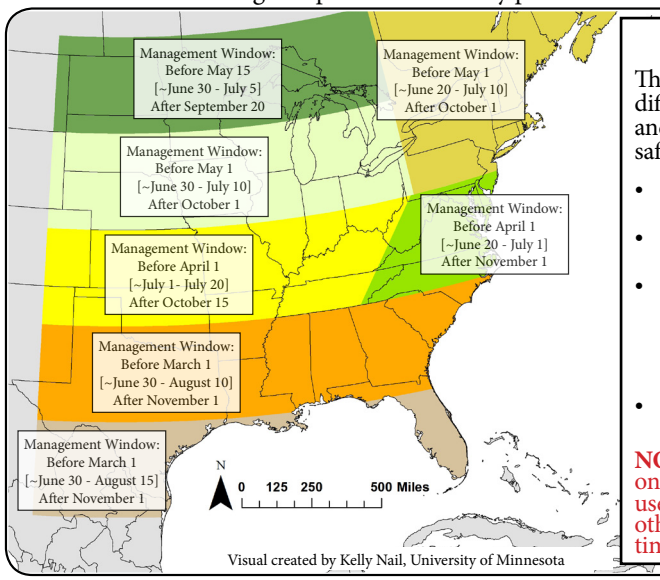
Mowing: Best Practices for Monarchs

Mowing can be an effective management tool to control woody and weedy species and manage undesirable species from setting seed if timed appropriately. However, mowing too often or during certain times of the year may result in higher mortality for monarchs and other wildlife, including important pollinators, using the habitat.

Maintaining high native plant diversity, including milkweed, will provide larval host plants and nectar sources for monarchs and other pollinators. In addition to providing ecological benefits, native plants require less maintenance than non-native plants once established. This document targets mowing practices, but it is also important to consider monarch timing and pollinator-friendly practices for other management techniques used.



Visual created by Kelly Nail, University of Minnesota

Management Windows

These regions, separated primarily by latitude, offer different management windows in spring, summer and fall when mowing or other management may be safer for monarchs.

- Spring recommendations are primarily based on monarch breeding activity.
- Fall windows account for both monarch breeding activity and peak migration activity.
- Options listed in [ ] are recommended only if necessary. These summer mowing intervals may still cause some mortality. The two southernmost regions have been adjusted to avoid the primary nesting season for other grassland species.
- Data are based on long-term trends and variation from year to year may occur.

NOTE: These recommendations are based primarily on monarch breeding and migration activity. Please use these in conjunction with recommendations for other priority species to identify the most appropriate timing for your situation.

Best mowing practices

Untimely mowing can result in high levels of insect mortality. Insect eggs, larvae, pupae and even adults may be killed directly by the mower, and mowing also destroys landscape features that provide structural diversity and may impact nesting areas used by pollinators. To limit mortality to monarchs and other pollinators, the following guidelines are recommended for established native plantings:

1. Avoid mowing the entire habitat to leave refuge areas for wildlife using the site at the time of mowing. This will allow for recolonization of the mowed site. Leave areas that may be good nesting or overwintering sites (leaf litter, dead stems, other ground cover) for pollinators or other wildlife, or known host plant areas if mowing during peak reproduction. Marking known areas may prevent accidental mowing.
2. Timing of mowing is critical (see map above for regional recommendations). Avoid mowing during times of peak insect activity; this timing will vary between species. If your goal is monarch habitat, do not mow during times of high monarch reproduction or migration. Some areas may benefit from summer management to promote fall milkweed growth (and thus, monarch reproduction); this is reasonable for the southern Great Plains where monarch activity is low for an extended period of the summer.
3. If possible, avoid mowing while native plants are in bloom or before they have dispersed seed.
4. Limit mowing to no more than twice per year, and even less if possible. Mowing too frequently disrupts plant growth and the ability of forbs to compete with grass species. However, during the first year of prairie restoration, more frequent mowing may be needed for weed control.
5. Use a flushing bar and cut at reduced speeds to allow wildlife to escape prior to mowing.
6. Use a minimum cutting height of 8-12 inches (shorter heights may be needed for early establishment mowing). Mowing at this height will effectively remove seed producing parts of most invasive plants while minimizing impact to native plants and many insects.
7. Avoid mowing at night, when insects are inactive and unable to escape.


Karen Oberhauser

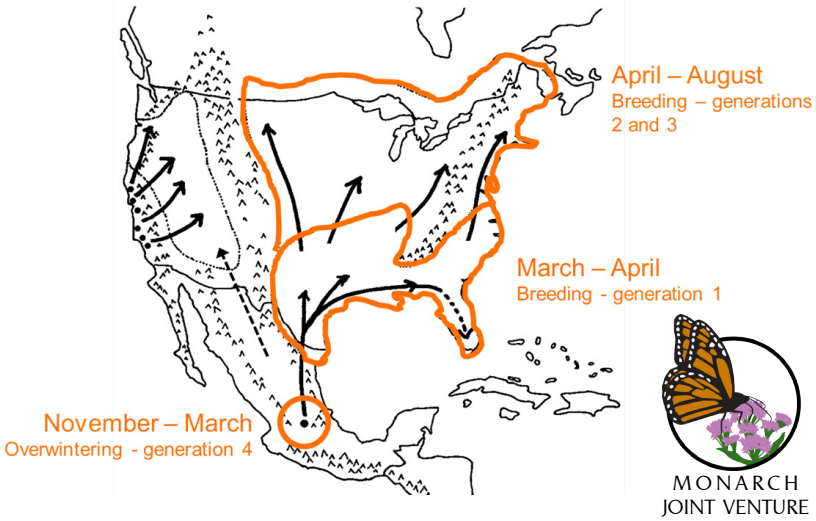
Improve public awareness of pollinators by sharing information and displaying educational signs.

Milkweed and Nectar Resources

Timely mowing can promote milkweed growth, but if done during times of peak reproduction or migration it can be detrimental to monarchs. The most appropriate timing for mowing to promote monarch survival will vary with milkweed species and region. Fischer et al. (2015) found that mowing in early July in upstate New York could promote the growth of fresh foliage on milkweed plants, which is preferred for egg-laying by monarchs. Mowing or burning milkweed habitat during the summer in the southern Great Plains (OK, and parts of TX, NM, KS, CO, and NE) can promote milkweed growth to support late summer or early fall breeding in the region (Baum and Mueller, 2015). Research is ongoing to refine regional recommendations.

Nectar resources are needed by adult monarchs throughout their breeding and migration seasons. Thus, it is important to delay fall mowing activity until nectar sources have finished blooming to ensure abundant resources for monarchs' journey to their overwintering grounds. Mowing too frequently may impact floral resource diversity and abundance, in addition to putting monarchs and other pollinators at higher risk of being directly killed by the mower.

Spring Migration and Breeding

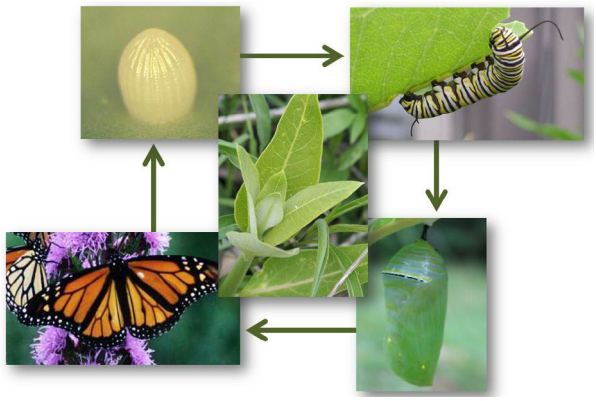


When are monarchs present in your area?

Monarchs east of the Rocky Mountains migrate south to the mountains of central Mexico for the winter. They depart from their overwintering colonies beginning in March, laying eggs in Texas and other southern states in mid-March through early-April. These eggs take a month or more to become adults; the adults expand northward, laying eggs on milkweeds along the way and reaching the northern parts of their range in early to mid-June. As long as milkweed is present in the landscape, there is a chance that monarchs are also there and that mowing could result in direct monarch mortality. Check milkweed plants for monarch eggs and larvae, or for telltale signs that monarchs may be present, such as chewed leaves and caterpillar frass. If you find signs of monarchs, consider delaying mowing.

The timing of peak monarch breeding and migrating activity can vary from year to year. The recommendations presented here illustrate long term trends shown by data from Journey North, Monarch Watch, and the Monarch Larva Monitoring Project, but to verify monarch presence, we recommend you visit the Journey North interactive maps frequently to see real-time observations of monarch activity each year:

www.learner.org/jnorth/monarch



Above: Monarch Life Cycle (egg, larva, pupa, adult), photos: Michelle Solensky, Denny Brooks, Wendy Caldwell, Dave Astin, Mary Holland
Left: Small chewed hole from first instar monarch caterpillar, and frass from fifth instar, photos: Wendy Caldwell

Resources

- Data used to calculate management windows during the monarch breeding season were provided by the Monarch Larva Monitoring Project from 1997-2014, www.mlmp.org.
- Peak migration estimates from www.monarchwatch.org were used to generate recommendations for management during fall migration.
- Fischer, S. J., E. H. Williams, L. P. Brower, and P. A. Palmiotto. 2015. Enhancing monarch butterfly reproduction by mowing fields of common milkweed. Am. Midl. Nat. 173: 229–240.
- Baum, K. A., and E. Mueller. 2015. Grassland and roadside management practices affect milkweed abundance and opportunities for monarch recruitment, pp 197–202. In K. S. Oberhauser, K. R. Nail, and S. M. Altizer, (eds.), Monarchs in a changing world: Biology and conservation of an iconic butterfly. Cornell University Press, Ithaca, New York
- Hopwood, J., S. H. Black, E. Lee-Mader, A. Charlap, R. Preston, K. Mozumder, and S. Fleury. 2015. "Literature Review: Pollinator Habitat Enhancement and Best Management Practices in Highway Rights-of-Way." Prepared by The Xerces Society for Invertebrate Conservation in collaboration with ICF International. 68 pp. Washington, D.C.: Federal Highway Administration.

www.plantmilkweed.org