



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.

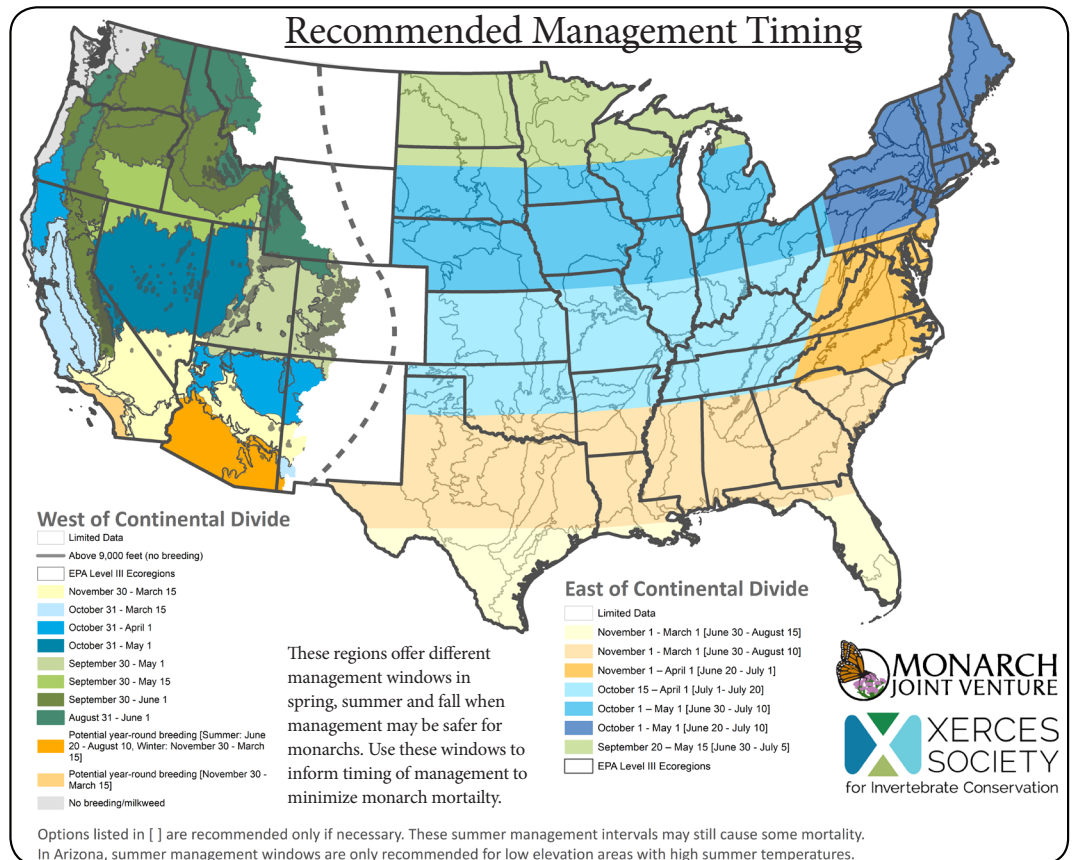
VISION

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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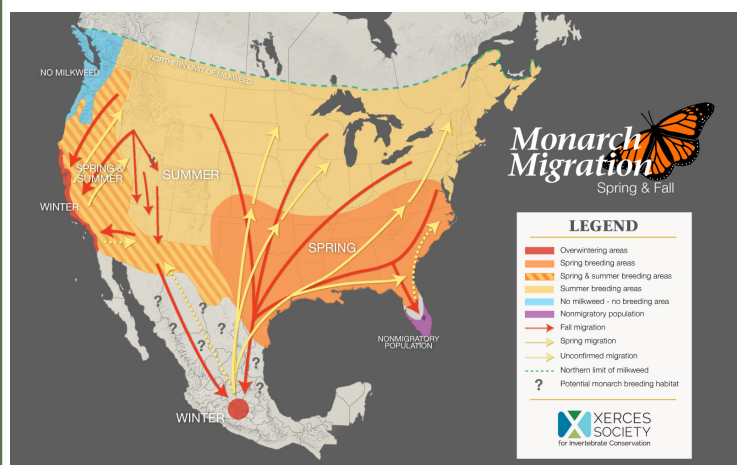
Mowing and Management: Best Practices for Monarchs

Understanding when monarchs are present allows land managers to time management practices like burning, mowing, grazing, or targeted pesticide application when they are least likely to harm monarchs. Monarchs can be harmed when eggs and caterpillars on milkweed plants or adult monarchs seeking nectar from flowers are present during management, or when habitat is removed at critical points in their life cycle. The following recommendations are intended to reduce harm to monarchs based on breeding and migration activity (see *How was this map made?* below). Use the management windows below in conjunction with recommendations for other species to inform the timing of management in your area.



Considerations when using these recommendations

- Monarch breeding and migrating activity can vary from year to year. Verify monarch presence or absence using real-time observations on Journey North (<https://journeynorth.org/monarchs>) or Western Monarch Milkweed Mapper (www.monarchmilkweedmapper.org), or survey for monarch eggs and larvae. This is especially important near the beginning/end of a management window or in unusual weather years.
- We have more to learn about breeding in MT, WY, CO, and NM. These states may be very important for monarch production. We will create recommendations for these states as more data become available.
- Year-round monarch breeding can occur in areas with mild winter climates on non-native milkweeds. See the Monarch Joint Venture handout "Potential Risks of Growing Exotic Milkweeds for Monarchs" to learn more.
- In southern Arizona, monarchs have been occasionally documented breeding year-round on native milkweed species such as rush milkweed (*A. subulata*), and management actions in winter months may still cause harm.
- If you must manage while monarchs are present, try to minimize disturbance to milkweed and blooming flowers. For example, limit to one mow, mow only where necessary (e.g., exclude ditches and back slopes), avoid milkweed and blooming plants during management, and manage only a portion of an area if possible.



Best mowing practices for monarchs

Mowing can be an effective management tool to control woody and weedy species and manage undesirable species from setting seed. Mowing also may stimulate the growth of desirable nectar plants. However, mowing too often or during certain times of the year may result in higher mortality for wildlife, including monarchs and other pollinators. Monarch eggs, larvae, pupae and even adults may be killed directly by the mower, and mowing can remove critical habitat for monarchs and other species. To limit monarch mortality, use the following recommendations:

- Avoid mowing the entire habitat. Leaving refuge areas for wildlife 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. Marking habitat areas may prevent accidental mowing, and signage helps communicate why an area is not mowed.
- Avoid mowing monarch habitat when monarchs are present (see Recommended Management Timing map above). Mowing milkweed mid-summer in areas where there is a lull in monarch activity, such as the Southern Great Plains, may promote milkweed growth and late summer or early fall breeding (Baum and Mueller 2015; Fischer et al. 2015). Always survey for monarchs before conducting mid-season mowing.
- Mow after native plants finish blooming and dispersing seed.
- Mow once or twice per year. Consider mowing within an integrated vegetation management framework on just the areas of heaviest weed infestation. Mowing too frequently disrupts growth and the ability of flowering plants to compete with grass. During the first year of some restoration projects (e.g., prairies), more frequent mowing may help with weed control. Many DOTs have adopted deferred mowing programs to benefit monarchs and other species.
- Use a minimum cutting height of 10-12 inches (shorter may be needed for early establishment mowing). This effectively removes seed producing parts of most invasive plants and minimizes wildlife impact.
- Use a flushing bar and cut at reduced speeds to allow wildlife to escape prior to mowing.



Right: Look for signs of monarch presence such as small chewed holes from first instar caterpillars and frass from fifth instars.

When are monarchs present in your area?

Each spring, monarchs disperse from overwintering grounds in Mexico and the California coast to spread across the U.S. and southern Canada in search of milkweed plants (*Asclepias* spp.) on which to lay their eggs. On both sides of the continental divide, monarchs breed and lay eggs from spring to fall, ending when the migratory adults migrate to their overwintering grounds. However, different regions have different windows during which breeding activity is observed. The migration map pictured here depicts the progression of the spring migration in the eastern and western U.S. The fall migratory generation, as illustrated in red on the map, completes the migration to the overwintering grounds, spends the winter there, and begins the return journey in the spring.

How was this map made?

Data used to create management windows during the monarch breeding season were provided by the Monarch Larva Monitoring Project from 1997-2014, (www.mlmp.org) and Journey North (<https://journeynorth.org/monarchs>) for the East, and Xerces Western Monarch Milkweed Mapper, (www.monarchmilkweedmapper.org) for the West. Peak migration estimates from Monarch Watch (www.monarchwatch.org) and Xerces Western Monarch Milkweed Mapper were used to generate recommendations for management during fall migration. Expert opinion by field biologists and scientists was also used to inform management windows. In the West, management windows were customized by EPA Level III ecoregion, and in the East they are separated by latitude with ecoregions visible. Based on the availability of data, some ecoregions in the West were combined into the same window and one ecoregion in southern California (the Sonoran Desert 10.2.2) was split into two management windows.

Resources

For additional guidance on managing monarch habitat and surveying for monarchs, visit the Monarch Joint Venture (www.monarchjointventure.org) and the Xerces Society (www.xerces.org) websites.

Information on this handout is adapted from the Managing Monarchs in the West: Best Management Practices for Conserving the Butterfly and its Habitat: (www.xerces.org/managing-monarchs-in-the-west/).

References

- 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
- 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.
- 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.

