Western Monarch Call to Action

XERCES SOCIETY
for Invertebrate Conservation

Protecting the Life that Sustains Us

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Introduction

This **Western Monarch Call to Action**, led by the Xerces Society for Invertebrate Conservation, aims to provide a set of rapid-response conservation actions that, if applied immediately, can help the western monarch population bounce back from its critically low overwintering size. We recognize and support longer-term recovery efforts in place for western monarchs such as the Western Association of Fish & Wildlife Agencies (WAFWA) plan and Monarch Joint Venture (MJV) implementation plan. The goal of this call to action, however, is to identify actions that can be implemented in the short-term, to avoid a total collapse of the western monarch migration and set the stage for longer-term efforts to have time to start making a difference.

A tree full of orange butterflies was once a common sight in California's monarch groves. Since 2018, the numbers of monarchs has hit an all-time low, with fewer than 30,000 butteflies counted each year. (Photo: Xerces Society / Candace Fallon.)

The five key steps to recovering the western monarch population in the short term are:

1. Protect and manage California overwintering sites
2. Restore breeding and migratory habitat in California
3. Protect monarchs and their habitat from pesticides
4. Protect, manage, and restore summer breeding and fall migration monarch habitat outside of California
5. Answer key research questions about how to best aid western monarch recovery

Western monarchs need everyone's help. Once, millions of monarchs overwintered along the Pacific coast in California and Baja, Mexico. In the 1980s, it is estimated, at least 4.5 million butterflies migrated to the coast annually. But by the mid-2010s the population had declined to 200,000–300,000 butterflies, a fall of ca. 97% (Schultz et

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al. 2017). Starting in 2018, monarch butterflies had tough seasons in their migratory and breeding grounds in the western states and, in the following two winters, the annual Xerces Western Monarch Thanksgiving Count showed that the population hit a new low: In both 2018 and 2019, volunteers counted under 30,000 monarchs—less than 1% of the population's historic size. In 2020, volunteers counted less than 2,000 monarchs, less than 0.01% of the historic size. While we do not know how small the population can shrink before the migration simply collapses, 30,000 butterflies is the number researchers set as their most educated guess of that limit ("quasi-extinction threshold"; Schultz et al. 2017). Whether or not the population can bounce back from this new low will only become apparent in the coming years.

While these dwindling numbers are alarming, the real issue is the longer-term decline of the butterfly due to stressors such as habitat loss and degradation, pesticides, and climate change—as well as other pressures on the migratory cycle of the monarch that we still have yet to fully study or comprehend. There are no quick fixes to solve all these large and complex forces, but we can still take actions NOW to help save the western population.

The most vulnerable periods of the western monarchs' annual life cycle are thought to be overwintering (Pyle and Monroe 2004), when the population is concentrated in a relatively small area, and early spring (Espeset et al. 2016), when the individuals leaving overwintering sites are more exposed to the elements while being at the end of their life and when the population is at its smallest.

In recent years, deteriorating conditions at overwintering sites and/or changing climatic conditions like warmer winter nights and earlier springs may be causing higher overwintering mortality and may also be causing monarchs to abandon overwintering sites earlier, at a time when critical resources such as milkweed might not be above ground and nectar plants not yet blooming. Focusing on this key period (overwintering and spring), when the population is at its lowest, is potentially the most effective way to help the population rebound. Areas close to overwintering sites and further afield in California will be critical for this.

Additional efforts to support the other stages of the annual cycle, including protecting and managing summer breeding habitat and fall migratory habitat and lowering monarch exposure to pesticides across the western states are also vital. Through this work, we can continue to think about how to address stressors such as climate change, which is an important driver for the crisis facing monarchs as well as so many other insects and wildlife species.

The Xerces Society is taking action for monarchs across the United States, with a special focus on restoring breeding and overwintering habitat for the western population in California:

- We are pushing for protection for overwintering sites and working with partners, including some California State Parks, to restore habitat at multiple overwintering sites.
- Working with farmers, natural area managers, California cities, and others, we are planting and restoring habitat across the Central Valley—a key breeding and migration area for monarchs. Hedgerows and other plantings provide essential nectar sources, milkweed for breeding, and an unsprayed refuge in a largely inhospitable landscape.
- Recognizing the challenges of creating habitat for monarchs, Xerces staff are working with the USDA-Natural Resources Conservation Service Plant Materials Center in California to conduct planting trials of milkweed and monarch nectar plants to develop best practices for establishing these plants in the state.

We encourage you to join us and our colleagues in the western monarch science and conservation community in taking meaningful, swift action to help save the western monarch migration.

Top 5 Actions to Help Save Western Monarchs

The science investigating monarch declines is active and ongoing, but the severity of the recent declines means that we need to act based on the available evidence. The western monarch population may collapse completely if we wait until all of the answers are fully in focus. Thus, the actions listed below are based on our current understanding of stressors that impact the monarch, as well as butterflies more generally, and on a precautionary principle that suggests we should always act to reduce harm.

1. Protect and manage California overwintering sites

We need to halt the destruction of overwintering habitat. We need to work at local, regional, and state levels to ensure that overwintering sites in California have sufficient legal and enforced protection.

- Each year, overwintering sites—even some which are legally protected—are destroyed or damaged by human actions like development or inappropriate tree trimming, sometimes leading to total abandonment of a site by the butterflies.

We need to create and implement overwintering site management plans at as many overwintering sites as possible that have hosted significant numbers of monarchs in recent years.

- See *Protecting California's Butterfly Groves: Management Guidelines for Monarch Butterfly Overwintering Habitat*, published by the Xerces Society, for guidance on managing overwintering sites.
- You can adopt an overwintering site and become an advocate for the site's protection and active management. Contact your local elected official to ask that monarch overwintering sites in your area be protected.

Preventing destruction of overwintering groves and planning appropriate management is an essential step in securing a future for the western monarch migration. (Photo: Xerces Society / Carly Voight.)

2. Restore breeding and migratory habitat in California

The primary focus for habitat restoration should be the Coast Range, Central Valley, and the foothills of the Sierra Nevada—areas critical to producing the first generation of monarchs in the spring.

We need Californians to plant nectar species, especially flowers that bloom in the early spring (February–April) to provide critical nectaring resources for monarchs.

- Plant flowers which are attractive to monarchs and other butterflies. Ideally, these would be native species which are adapted for climate change and which benefit other insects as well, but monarchs are fairly generalized in their nectar habits and can benefit from a wide range of flowering plants.
- Particular emphasis should be placed on planting species which bloom early in the spring (blooming February–April), but also the fall (September–October). If you live near the coast, winter blooming (November–January) species are also valuable for overwintering monarchs to nectar on.
- Go to savewesternmonarchs.org to download nectar plant lists.

We need Californians to plant native milkweed, especially species which emerge earliest and are already at the seedling or transplant stage.

- Early emerging species native to California include woollypod (*Asclepias eriocarpa*), California (*A. californica*), and heartleaf (*A. cordifolia*) milkweeds; later-emerging native species with more seed availability include narrowleaf (*A. fascicularis*) and showy (*A. speciosa*) milkweeds.
- In the desert southwest of California, plant rush (*A. subulata*) and desert (*A. erosa*) milkweeds.
- In all cases, plant milkweed species native to California, and ideally, to your area.
- Also, ideally, plant milkweed greater than 5 miles inland from the coast, if you live north of Santa Barbara. Milkweed doesn't naturally grow close to the coast north of Santa Barbara and milkweed at overwintering sites can interrupt natural monarch overwintering behavior.
- Go to savewesternmonarchs.org to access the **Milkweed Seed Finder** to get regional lists of plant nurseries and seed companies.

Planting native flowers and native milkweeds will support monarchs leaving the overwintering sites and searching for places to lay eggs. This woollypod milkweed (*Asclepias eriocarpa*) growing in southern California provides food for hungry monarch caterpillars. (Photo: Xerces Society / Scott Hoffman Black.)

We need to work towards increasing native milkweed and nectar plant availability for both seeds and transplants.

- Ask your local nursery to start supplying native milkweed. Organize a group to collect milkweed seed and propagate it.

Engage with seed companies, plant nurseries, and land management entities to work together to ramp up production and ensure a diverse supply of native milkweeds and nectar plants which are insecticide free.

We need to plant more native milkweed from seed and remove tropical milkweed to replace it with native milkweed and nectar plants.

- Tropical milkweed—a nonnative species which stays evergreen and does not die back in areas with mild winters—interrupts the monarchs' natural migratory cycle, leading to disease build-up and winter breeding which are both associated with poorer outcomes for monarchs, further exacerbating other stressors on the population. If you already have tropical milkweed in your garden, it is very important to cut it back to the ground in the fall (October/November) and repeatedly throughout the winter to mimic native milkweed phenology and break the disease cycle. Ideally, tropical milkweed should be removed entirely and replaced with native milkweed and/or nectar species.

3. Protect monarchs and their habitat from pesticides

We need to halt all cosmetic use of pesticides. Seek out non-chemical options to prevent and manage pests in your garden and landscaping.

We need to push to suspend the use of neonicotinoids in the commercial production of milkweed plants.

- Check out pesticide reduction resources on the Xerces Society website (xerces.org/pesticides)

We need to work to reduce herbicide and insecticide use in and around overwintering sites and in key breeding regions.

- Avoid herbicide applications that might damage monarch breeding and migratory habitat such as milkweed and flowering plants. Use targeted application methods, avoid large-scale broadcast applications of herbicides, and take precautions to limit off-site movement of herbicides.
- Neonicotinoid insecticides, in particular, should be avoided at all times in monarch habitat due to their persistence, systemic nature, and toxicity.
- Check out pesticide reduction resources on the Xerces Society website (xerces.org/pesticides)

Garden plants are frequently treated with insecticides to prevent unsightly holes rather than to promote healthy plants. Such cosmetic use should be banned as the chemicals can harm flower-visiting insects. (Photo: Xerces Society / Matthew Shepherd.)

4. Protect, manage, and restore summer breeding and fall migration monarch habitat outside of California

Identify existing monarch habitat so you can work to protect it from destruction.

- Plan field surveys, use the habitat suitability model to identify key areas, and learn milkweed species which may occur in your area. (More information available from monarchmilkweedmapper.org/habitatsuitabilitymodels/.)
- Make a plan on how to protect that habitat this year.

Manage monarch habitat in a way that minimizes harm.

- Conduct management activities such as mowing, burning, and grazing in monarch breeding and migratory habitat outside of the period when monarchs are present.
- See the Xerces Society fact sheet on Timing Management in Monarch Breeding Habitat (available from savewesternmonarchs.org) to learn when it's best to manage habitat without harming monarchs.

The monarch is a renowned traveler. During the summer, butterflies spread out from California and across the western states. Habitat to support their breeding and migration is necessary to sustain population growth and ensure their return. (Photo: Xerces Society / Stephanie McKnight.)

Restore monarch habitat, particularly in areas highly suitable for monarchs and where habitat has been lost.

- Habitat restoration in regions where monarch habitat historically occurred, but has been lost (such as the Columbia Plateau, Snake River Plain, and riparian areas) is of the highest priority outside of California. See monarchmilkweedmapper.org/habitatsuitabilitymodels to preview maps of the areas with the highest monarch habitat suitability in the West. Contact monarchs@xerces.org if you are interested in receiving copies of the associated map products for planning or research purposes.
- We do not generally recommend planting milkweed outside of its native range (e.g., coastal Washington or in high elevation forests); while planting milkweed in these areas may not be harmful, it is unlikely to be effective for monarch conservation in the near-term.
- While milkweed may not be a limiting factor for monarchs in all parts of their western range, restoring natural habitat or planting a pollinator garden that includes milkweed may be beneficial to monarchs and other pollinators.
- As with all habitat restoration, consider how restoration actions can be made to be as climate-resilient as possible.

5. Answer key research questions about how to best aid western monarch recovery

We need Californians and Arizonans to collect observations of monarchs and milkweeds, especially in the early spring (February–April), the period in which monarchs leave the overwintering sites.

- This is the period of the year we know the least about monarch location and behavior, as well as milkweed availability.

We need research at overwintering sites and suspected early spring breeding sites to understand when monarchs are leaving the overwintering sites, if they are leaving earlier than in the past.

- This requires additional late winter/early spring monitoring at overwintering sites and targeted research to analyze existing datasets.

We need eyes looking out for monarchs across the rest of the West, too, in particular, in New Mexico, Colorado, Utah, Wyoming, and Montana.

- Together these observations will help answer questions about monarch breeding phenology and whether the West sees an influx of monarchs returning from Mexico. Answering these questions will directly help inform conservation strategies. Report all monarch adult, caterpillar, egg, nectaring, and milkweed sightings to the Western Monarch Milkweed Mapper (monarchmilkweedmapper.org).

We need more research to answer other key questions to help target and refine conservation efforts. For example: Where are monarchs facing high levels of pesticide contamination and how can we minimize negative impacts of pesticides on monarchs? What are the causes of high overwintering mortality and how can we lower mortality risk at overwintering sites?

How Xerces Can Help You

Do you need help translating this call to action into action? Providing technical assistance to create, restore, manage, and protect monarch and pollinator habitat to agencies, tribes, nonprofits, and others is a core part of Xerces work. Check out the links at savewesternmonarchs.org for more information and resources first. If you have further questions or want to connect your work as part of this call to action, contact us at monarchs@xerces.org.

Thank You

Thank you to the western monarch researchers and partners with whom conversations about the most effective actions we need to take helped form the basis of this call to action, including Wendy Caldwell, coordinator of the Monarch Joint Venture; Abi Convery, planning biologist for Ventura County; Elizabeth Crone, professor at Tufts University; Matt Forister, professor at University of Nevada–Reno; Jessica Griffiths, Charis van der Heide, and Dan Meade, overwintering site biologists in California; David James, associate professor at Washington State University; Karen Miner, biologist with California Department of Fish and Wildlife; Mia Monroe, cofounder of the Western Monarch Thanksgiving Count; Gail Morris, coordinator of the nonprofit Southwest Monarch Study; Ann Potter, biologist for Washington Department

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Thank you to all the Western Monarch Thanksgiving Count volunteers and regional coordinators whose dedication makes understanding the population's status possible.

Thank you, too, to all the individuals and groups already doing good work on behalf of monarch conservation. Your work is critical—keep it up!

References

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