



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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Rearing Monarchs: Why or Why Not?

Rearing and Conservation

In the face of monarch population declines, passionate conservationists are fighting to save this winged icon. Rearing monarchs in classrooms and homes has been a valuable educational tool for teachers and for citizen science. Unlike many wildlife species, monarchs are easily reared and offer an up-close look at metamorphosis. As monarch populations have declined, some people have promoted rearing and releasing, and even purchasing, monarchs on a large scale as an attempt to boost wild populations.

While captive rearing and release has been an important conservation strategy for some species, releasing reared monarchs is not likely to be an effective monarch conservation strategy and could have negative effects. Potential risks include releasing monarchs that are adapted to captive conditions, increasing parasites and disease in wild monarch populations, and making it more difficult to understand natural monarch distributions.

There is a lack of scientific evidence that monarch rearing actually results in overall population increases, and it is known to carry risks. Many experts do not support large scale captive rearing for conservation purposes. Recommended strategies that do support monarch populations in the long-term include creating or improving habitat, minimizing monarch and habitat exposure to pesticides, and participating in citizen science or other research. However, there is little risk in responsibly raising a few monarchs for enjoyment, education, or citizen science, which can lead to stronger human connections with and better understanding of this amazing species.

Disease Concerns

Captive rearing often involves raising monarchs at higher densities than they occur in the wild, and repeated re-use of the same containers. Monarchs did not evolve under high density conditions, and thus caterpillars reared in close proximity to one another are highly susceptible to disease transmission. Re-use of the same rearing materials can allow parasites and pathogens to accumulate over time. If unhealthy monarchs survive rearing and are released into the wild, they could transmit diseases or parasites to wild monarchs, risking adverse effects on an already vulnerable population. Unhealthy monarchs may also experience lower survival, reproduction, and migration success relative to healthy butterflies.

Natural Distribution Concerns

Effective conservation requires understanding population distributions. If monarchs are seen in unusual places or times, we can learn about their movement patterns and habitat use. However, if the observer doesn't know if an unusual sighting involves a captive-reared monarch, our ability to understand natural population distributions is compromised.

Genetic Concerns

Species bred in captivity can adapt to captive settings in just a few generations. Differences in temperature, food, predation and density between wild and captive settings can favor different traits related to development rate, body size, feeding behavior, and defenses. Frankham (2008, [doi:10.1111/j.1365-294X.2007.03399.x](https://doi.org/10.1111/j.1365-294X.2007.03399.x)) suggests these genetic adaptations are overwhelmingly harmful when offspring of multiple generations of captive breeding are returned to the wild.



For more information about issues with captive breeding and mass releases, visit

<http://bit.ly/captivebreeding>.

Rearing Monarchs Responsibly

If you do rear monarchs for educational or citizen science purposes, we offer this guidance for responsible rearing.

Collect small numbers of monarch eggs or caterpillars from the wild as locally as possible. Do not buy or ship monarchs; be mindful of collection policies or restrictions if applicable and secure permission before collecting monarchs from the wild.

Monarch caterpillars require milkweed to grow and develop; there are over 100 species of milkweed native to North America. Look for eggs or larvae on the underside of milkweed leaves; they are also commonly found amongst buds or flowers at the top of the plant. When you find a caterpillar, remove the whole leaf on which you find it and transfer it to your rearing container. You need a reliable source of milkweed to feed larvae. When collecting milkweed, avoid plants that have been treated with insecticides.

Rinse leaves before feeding them to caterpillars. Rinsing will clean the leaves, and keep them fresher for longer. You should blot off extra water, and can keep extra leaves in an airtight container in your refrigerator. **Precaution:** Latex from milkweed is painful and can cause corneal damage if it is rubbed into eyes. Avoid touching your eyes and wash your hands after handling milkweed.

All reared monarch observations should be submitted to the Monarch Larva Monitoring Project (www.mlmp.org).

Test adult monarchs for the OE parasite with Project Monarch Health (www.monarchparasites.org).



Egg (1-5 days)

To keep the milkweed from drying out, keep eggs (on the milkweed on which you collected them) in a container lined with a moist paper towel.

Larva/Caterpillar (10-14 days)



Monarch caterpillars can be kept in an aquarium, large jar, bug cage, or other roomy containers. Rearing containers should have adequate ventilation, which can be provided by a screened lid or sides. The container should be large enough for the adult to expand its wings when it emerges. To minimize disease spread and keep accurate records for citizen science projects, it is best to raise monarchs singly (one per container). Overcrowding monarchs can lead to starvation, cannibalism, rapid spreading of disease, and death. Keep rearing containers clean and sterilize after each use (when a monarch emerges as an adult, or dies) using a 20% bleach solution.

Continue to keep a damp (NOT dripping wet) paper towel at the bottom of the container. Replace it often to prevent the buildup of waste. Protect the container from direct sunlight; high temperatures can kill larvae. Some larvae collected from the wild will have tachinid fly parasitoids, which emerge from monarchs around the time of pupation. Send emerged flies to MLMP, using their protocol.

Mortality may be caused by a virus or bacterial infection, or by contaminated milkweed. Handle larvae as little as possible to avoid hurting them or spreading disease. Very small larvae may be moved with a small, clean paintbrush. Caterpillars that stop moving and turn brown or black should be removed immediately; they could rupture and spread infection. Remove dead or unhealthy pupae and caterpillars from the rearing containers as soon as you see them, and sterilize the container. You may keep them in a separate container for a few days to determine if they are parasitized.



Photos: Tom Collins, Diane Rock, Kaitlyn Creasey, Wendy Caldwell

Caterpillars that are motionless on the side or top of the cage (not feeding) are especially vulnerable to injury because they are probably preparing for or recovering from a molt. Be careful not to disturb or move them during these periods of apparent inactivity. When ready to pupate, larvae will crawl to the top of their cage, attach themselves with silken thread, and form a pre-pupal 'J' before shedding their skin for the last time.

To reduce risk of spreading the protozoan parasite OE (*Ophryocystis elektroscirrha*), and other diseases, do not keep adults in the same container as immatures, and do not allow adults to emerge in a container in which larvae are feeding. Adult monarchs can spread dormant parasite spores to milkweed plants and to their eggs. When a caterpillar consumes these spores, they become infected.

Pupa/Chrysalis (9-14 days)

To re-attach a fallen pupa, tie a piece of thread or floss around the cremaster (small black attachment at top) and secure it to a lid.

The day before adults emerge, their wings become visible through the pupal skin. Adult butterflies usually emerge in the morning; their wings will be soft and wet when they first emerge. If they fall, carefully pick them up by holding the thorax (body segment to which the legs are attached), and place them on the top or side of the cage. They need to hang with their wings pointed downwards for several hours. A pupa that has been very dark for more than 2 days is likely dead.

Adult Butterfly



Recently emerged butterflies should be tested for the protozoan OE (Project Monarch Health), and can be kept in the cage for up to a day before being released or fed. Monarchs held for longer than one day need to be fed nectar. If flowers are not available, you can offer a clean sponge or cotton ball saturated with a 20% honey or sugar water solution. A warm sunny day is an ideal day to release them. Hold the butterflies carefully with their wings closed when you release them, or simply open the cage to let them fly out. Release adults close to where they were collected as eggs or caterpillars - do not translocate them long distances.

Quick Tips for Raising Healthy Monarchs

Keep the cage clean. Rearing containers need to be cleaned of frass and old milkweed daily to prevent mold growth. Clean containers with a 20% bleach solution and rinse before putting monarchs inside.

Keep milkweed fresh. Add fresh milkweed every day to ensure monarch larvae have quality food.

Avoid extreme temperature and moisture conditions. Keep rearing containers out of direct sunlight and make sure that there is not too much moisture (paper towel should be moist, but not dripping wet). Temperatures that are too cold will delay monarch development. If the container is in direct sun, it will act like a greenhouse, and heat up to potentially lethal temperatures.

Be conscious of disease. Viral and bacterial infections spread very quickly from one caterpillar to another, so keep containers clean and sterilize them often.

Why to rear (or not)? Mass rearing of monarchs for release into the wild is not an appropriate conservation strategy. People who wish to rear monarchs should do so in small numbers, for outreach, personal enjoyment, or citizen science.