

# Frequency Asked Questions: Monarch Butterfly Handling in California

## 1. Do I need a permit to handle monarchs in California?

Yes, a permit is required to handle wild monarchs. Wildlife does not only occur on public lands; species also inhabit private property, including backyards. Therefore, the permit requirement applies to handling activities wherever monarchs occur.

California Fish and Game Code Section 1002 authorizes the California Department of Fish and Wildlife (CDFW) to issue permits for scientific, educational, and propagation activities with wild animals, including monarchs, in accordance with regulations adopted by CDFW in Title 14 of the California Code of Regulations (CCR). Section 650(a), Title 14, CCR states: “Except as otherwise authorized by the Fish and Game Code or regulations adopted pursuant thereto, it shall be unlawful for any person or entity to take and/or possess live or dead wildlife, or parts thereof in any part of the State of California, for scientific, educational, and/or propagation purposes except as authorized by a permit issued by the department [of fish and wildlife].” For purposes of SCPs, “take” is defined to include hunt, pursue, catch, capture, handle, kill, collect, mark or conduct other procedures, or attempt to conduct these activities.

Captive rearing is considered “propagation,” which is defined by Section 650(b)(21), Title 14, CCR as “captive breeding, captive rearing, and other activities that help sustain or increase wildlife populations for scientific, conservation, management, or educational purposes.” Propagation may be in-situ (in place) or ex-situ (off site) and includes short distance movements out of harm’s way.

## 2. Who can obtain a scientific collection permit (SCP)?

SCPs may be issued to individuals or entities who are employees, contractors, and/or volunteers of government agencies, Native American tribes, zoological gardens, museums and aquariums, non-governmental and non-profit organizations, biological consulting firms, educational or academic institutions, and appropriate businesses (e.g., timber and forest management, utilities, and biomedical research). Private citizens may also apply. Community science groups can cover some research activities by public volunteers under a SCP (see Q4).

All applications must include a project proposal as well as resume and/or statement of qualifications that provide evidence of expertise in the methods that will be employed. Applicants must also provide a list of references that can speak to the applicant’s experience with monarchs.

When applying for a SCP, please note that due to the current status of the migratory monarch population, there is a moratorium on certain activities covered within an SCP, which are described in Q3 below.

To learn more about obtaining a SCP, [please visit our webpage](#).

### **3. Why is there a moratorium on certain activities typically covered by a scientific collection permit?**

In January 2021 there was a drastic decline in migratory monarch numbers to less than 2,000 individuals, revealed by the annual overwintering population census ([Xerces Thanksgiving and New Year's Counts](#)). In response, CDFW assessed the potential for species impacts and determined a more cautious approach to permitting was required to aid population recovery and help ensure unique genetic material was not lost to future generations of migratory monarchs. Limiting the size of the population bottleneck that might occur when the population rebounds is advantageous as bottlenecks can cause deleterious impacts, such as the rise of nonadaptive alleles or inbreeding depression that can negatively affect population recovery.

Following this assessment, CDFW determined a moratorium on certain activities was necessary to protect the migratory population. The activities limited by this moratorium include lethal take (see definition in Q1 above), invasive genetic sampling (that causes mortality or could impact vitality or survival), and captive rearing. We recognize that some research may be necessary to help guide monarch recovery efforts, therefore CDFW has granted some researchers limited exemptions on a case-by-case basis.

Other activities are still allowed with a valid permit. These include tagging of adult monarchs and sampling adult monarchs for *Ophyrocystis elektroscirra* (Oe). Netting of monarchs to conduct these activities is also permitted, though researchers need to take measures to prevent disease spread between localities such as sanitizing nets and other collection equipment.

### **4. How can I participate in monarch-related community science projects?**

Several community science projects are photo or survey based (no handling), therefore no SCP is required. These include [Western Monarch Milkweed Mapper](#), [Integrated Monarch Monitoring Program](#), and [Western Monarch Count](#).

For the projects that do involve captive rearing or handling, an SCP is required. Currently no monarch community science projects have an active SCP with CDFW. If you're considering volunteering for a project, we recommend checking with the organization to make sure they have an SCP that covers the activities they are promoting. Note that we do not issue permits directly to individuals participating in a community science project, the permit is issued to the entity overseeing the project.

### **5. Why is CDFW limiting captive rearing activities?**

While captive rearing is an important tool in the recovery of other at-risk butterfly populations (for example, the Quino checkerspot), some research indicates that it may negatively impact the migratory capacity of monarchs. Two recent studies have found that captive reared monarchs did not show proper migratory orientation, even when kept in incubators that mimicked outdoor conditions ([Tenger-Trolander et al. 2019](#); [Tenger-Trolander and Kronfrost 2020](#)). Although a follow-up study by [Wilcox et al. 2020](#) indicated that the impact may only be temporary, a closer look revealed that there was no control group for that study and captive reared monarchs still failed to orient in the correct direction when compared to data from wild-caught migrants ([Davis 2021](#)).

Other issues associated with captive rearing include decreased fitness. [Davis et al. 2020](#) found that monarchs that were captive reared exhibited less strength, paler color, and shorter forewings. These factors indicate that captive reared monarchs exhibit poorer overall condition and reduced migratory propensity compared to wild monarchs. Other studies suggest that reared monarchs have lower migration success rates (are not as frequently re-tagged) when compared to wild monarchs ([Morris et al. 2015](#); [Steffy 2015](#)).

Handling can also increase stress in monarch larvae and pupae, though handling appears to have a less pronounced impact in adult butterflies ([Davis 2020](#)). This is also part of the reason why we are currently not permitting captive rearing, which targets late instar larvae, but are authorizing netting and tagging/Oe sampling of adults (exempt from the moratorium described in Q3).

If not done with extreme care, captive rearing also has the potential to spread Oe. [Project Monarch Health](#), a community science program that enlists the public to sample Oe levels indicates that monarchs in people's backyards have incredibly high rates of Oe compared to those observed in more natural conditions.

Given the low numbers of migratory monarchs and the potential negative consequences from captive rearing, CDFW is following the precautionary principle (do no harm) and asking the public and researchers to cease captive rearing until we have more data or the monarch population recovers to a sufficient level for activities to resume in a safe fashion.

More research is needed to better understand the conditions under which a captive rearing program could benefit monarchs; however, were captive rearing to be adopted as a tool for monarch conservation, it would need to be carried out by trained, permitted professionals following a specific protocol under strict phytosanitary conditions, with oversight from the US Fish and Wildlife Service and CDFW.

## **6. Do I need a permit if I want to use live monarchs for educational purposes?**

Yes, an SCP is required to collect, remove from the wild and/or captively rear monarchs for educational purposes. Monarchs have provided an incredible tool to learn about long-distance migration and metamorphosis. They have inspired children and adults for generations. In the past, when monarchs were abundant, removing a few monarchs from the wild did not have a significant impact on their overall population. With the current numbers so low, however, removing just 10 caterpillars could impact 5% of the remaining migratory population. Rather than collecting or purchasing commercially available caterpillars (see Q7) for use in the classroom, we recommend creating a monarch garden that incorporates native milkweed or flowering plants as a way to provide an educational opportunity and contribute to monarch conservation. If a child happens to reach out and touch a caterpillar, it isn't the end of the world; it means they're curious. But it is also a good opportunity to remind them that monarchs are in danger and, as wildlife, we should look but not touch.

## **7. Do commercially reared monarchs harm the migratory population?**

Yes. Recent analysis has shown that commercially produced monarchs are genetically distinct from North American lineages ([Tenger-Trolander et al. 2019](#)). It is unknown to what extent the genes carried by these monarchs are maladapted for migration or could negatively impact the

wild population. Years of indoor rearing and going through unnatural selection may lead to traits that might not benefit migration (such as the phenotypes exhibited in the [Davis et al. 2020](#) study described in Q5). Thus, purchasing monarchs from breeders is not considered an activity that contributes to the conservation of the western migratory population.

## **8. Are there two populations of monarchs in California?**

In addition to the declining population of migratory western monarchs, scientists are seeing an increase in resident monarchs that breed year-round. Recently, resident monarchs have been reported in higher numbers in coastal areas from San Diego to the San Francisco Bay Area. Historically, the migratory monarch population overwintered in coastal groves from October to March. During the rest of the year, monarchs migrated and bred throughout states west of the Rocky Mountains. In the past, winter breeding may have occurred at a low level, however, it has expanded over the past few years concurrent with the decline of the migratory population. A 2021 paper ([Crone and Schultz](#)) estimated there were approximately 12,000 resident monarchs—more than six times the remaining migratory population.

Scientists are currently looking to which factors are influencing the transition to year-round breeding. One hypothesis is that the expansion of nonnative tropical milkweed (*Asclepias curassavica*) in home gardens may induce winter breeding (see Q9 below for more information about tropical milkweed). Climate change could also play a role as warmer winter weather exposes monarchs to temperatures that can cause them to break reproductive diapause early.

It is unclear whether resident monarchs represent a separate population from the migratory population or if there is intermixing. If they are distinct, questions remain over whether the resident and migratory populations can persist side by side, as they do in their introduced range in Australia. The resident population harbors higher rates of Oe ([Satterfield et al. 2016](#)), therefore it could pose a risk to the migratory population by exposing them to increased rates of disease when migrants move through coastal areas. Finally, scientists are still trying to determine if the transition to year-round breeding represents a persistent trend or is a short-term adaptation to local conditions.

Can conserving the resident population help rescue the migratory population? Unfortunately, an initial estimate indicates that the resident population's growth rate is not high enough to facilitate recolonization of western states (Crone and Shultz 2021) without significant incursion of monarchs from the eastern population. Thus, while monarchs may be able to persist as a resident population in a sliver of their historic range, we risk losing the migratory phenomenon. However, the resident population might not be out of the woods— Because it occupies a reduced range, the remaining individuals more vulnerable to stochastic events that may extirpate them from local areas and hasten the extinction of the entire western monarch population.

This is a complex and evolving situation that CDFW is closely monitoring. For more information, see [this blog post from the Xerces Society](#).

## **9. What risks are associated with planting tropical milkweed?**

Tropical milkweed (*A. curassavica*) is not native to California; its range extends from Mexico through South America. Tropical milkweed does not die back in the winter, which means that it

can provide a refuge for *Ophyrocystis elektroscirra* (Oe) and may influence winter breeding (see Q8 above).

As an evergreen milkweed species, tropical milkweed can continue to infect resident monarchs with Oe during the winter as well as reinfect the migratory population (e.g., [Satterfield et al. 2015](#)). Oe is a protozoan parasite that can have lethal (resulting in death) or sublethal effects on monarchs, such as reduced vitality or reproduction. In resident populations in California the level of Oe has been found to be approximately nine times that found in migratory populations ([Satterfield et al. 2016](#)). Under future climate conditions, researchers have also shown that tropical milkweed could become an ecological trap, leading to lower rates of survival and impacting monarch wing morphology in ways that do not support migration ([Faldyn et al. 2018](#)).

We recommend removing tropical milkweed wherever it is found and instead selecting native milkweed species that can provide breeding sites or native flowering plants that help support the monarch's migration. For additional information on tropical milkweed, check out the [Monarch Joint Venture's factsheet](#) or the [Xerces blog post](#) on tropical milkweed.

#### **10. What actions can the public take to conserve monarchs without a permit?**

Public involvement in monarch conservation is key to supporting the western population's recovery. Monarchs occur throughout California in urban and rural areas, thus everyone can play a part. We need an "all hands-on deck" approach to create high quality habitat that supports monarch breeding, migration, and overwintering. We recommend the following actions:

- Include native flowering plants in your home garden or restoration project, focusing on early- and late-blooming species that support the early spring and fall migrations.
- Plant native milkweed, where appropriate.
- Ensure plants you purchase from nurseries are pesticide-free.
- Limit pesticide use, particularly during periods when monarchs are present in your area.
- Become a community scientist by volunteering to collect data on monarchs and milkweed that help us make informed decisions that support the monarch recovery.

We collaborated with state and federal agencies and non-profit partners to develop the map below that can help guide activities the public can take depending on geographic location. If you live outside a Priority 1 area, do not be discouraged because the actions you take are still important to supporting monarchs.

# Priority Action Zones in California for Recovering Western Monarchs



- Priority #1**
- Early breeding zone:** Protect and plant pesticide-free early season native milkweed and nectar plants.
  - Central coast areas where monarchs overwinter:** Protect and restore overwintering habitat and plant pesticide-free native nectar plants. Avoid planting milkweed within 5 miles of the coast.
- Priority #2**
- South coast areas where monarchs overwinter:** Protect and restore overwintering habitat and plant pesticide-free native nectar plants. Avoid planting milkweed within 1 mile of the coast.
  - North coast areas where monarchs do not overwinter:** Plant pesticide-free native nectar plants.
  - Summer breeding zone:** Identify and protect existing native milkweed and nectar plants. Plant pesticide-free native milkweed and nectar plants.
- County boundaries.

