



Frequently Asked Questions: Monarch Butterfly Handling in California

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

Yes, a Scientific Collecting Permit (SCP) is required to handle wild monarchs in California. This permit requirement applies to handling activities wherever monarchs occur throughout the state as wildlife does not only occur on public lands; species also inhabit private property, including backyards.

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. See question 5 below for more information on in-situ propagation.

The commercial sale, trade, or barter of wildlife taken or possessed pursuant to the SCP regulations is prohibited. Monarchs that are "taken" accidentally through routine activities like driving are not covered by the regulations, but salvage of monarch carcasses requires a permit.

In conclusion, the SCP regulations enable the public to engage in research activities to help benefit and conserve the State's wildlife resources without compromising the health of wildlife and/or the sustainability of wildlife populations.

2. Who can obtain a Scientific Collecting 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).

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. Are SCPs only applicable to monarchs?

No, an SCP is required for all terrestrial invertebrates included on [CDFW's list of Terrestrial and Vernal Pool Invertebrates of Conservation Priority](#). Additionally, an SCP may be required for incidental capture of non-target taxa on the Conservation Priority list. Other terrestrial invertebrates are exempt from the SCP requirement. However, this exemption for terrestrial invertebrates only applies to scientific and education purposes outlined in the SCP regulations, but is not extended to activities outside the scope of those regulations (e.g., commercial activities). For more information on when a permit is required and what type of permit is needed, please visit our [please visit our Terrestrial Wildlife SCP website](#).

4. 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. This action is in line with protections we implement for other at-risk species that have undergone recent, extensive declines. The activities limited by the current 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. We anticipate that the current moratorium will remain in effect until the population has increased past its quasi-extinction threshold (it is currently under evaluation given the initial 2021-22 overwintering reports).

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

5. Is it okay for me to protect monarchs without touching them by putting a net or cage over them?

No, this practice would be considered in-situ propagation, which is not allowable by CDFW regulations without a Scientific Collecting Permit. The SCP regulations include the following definition under Propagation, "Captive breeding, captive rearing, and other actions that *may not involve captivity* to promote successful reproduction as part of a department-approved recovery

or conservation plan for a listed species or other species of conservation concern, or for scientific research purposes.” Any of these actions could lead to incidental injury or mortality of monarchs and therefore needs to be appropriately reviewed and conditioned in a permit.

6. Why is CDFW limiting captive rearing activities for permit holders?

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](#)). These studies occurred in the east, which may or may not be indicative of dynamics in the western population. Monarchs captively reared in the Pacific Northwest have been shown to successfully migrate to overwintering site in coastal California ([James et al. 2018](#); [James et al. 2021](#)), and in less frequent instances, breed during the winter period in California. Fewer than 1% of tagged monarchs were resighted (typical for mark-recapture studies, e.g., [Taylor Jr. et al. 2020 range: 0.29 – 3.36%](#)); thus, additional information on western monarch movements and migration success following captive rearing is needed to inform whether captive rearing is contributing to or detracting from conservation efforts.

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-sighted) 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 mortality 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.

7. 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 more 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 a few caterpillars could have disproportionate impacts on the remaining migratory population. Rather than collecting or purchasing commercially available caterpillars 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 allow natural processes to occur without excessive human intervention.

8. 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](#), portions of the [Monarch Larval Monitoring Project](#) (you may not participate in activity 3 in California), 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 and volunteers may be added to that entity's permit after taking a quiz indicating they understand the survey protocol and permit conditions.

9. Do commercially reared monarchs harm the migratory population?

Yes. Recent analysis has shown that some 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). Commercially produced monarchs have also been shown to spread disease, as discussed in more detail in this [Joint Statement from 10 Scientists Against Monarch Release](#). Releasing monarchs can also undermine efforts to survey local monarch populations, artificially inflating the numbers we use to assess their population viability. Thus, purchasing monarchs from breeders and releasing them is not considered an activity that contributes to the conservation of the western migratory population.

10. 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 into 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 (see [this blog post from Monarch Watch](#) for more information on the rising winter temperatures).

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](#).

11. 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](#)). A more recent study found approximately 70% of resident monarchs were infected with *Oe* ([James et al. 2021](#)). 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, when monarch eggs and caterpillars are not present. You could alternately cut it back in the winter, however, timing this can be tricky given that monarchs breed on it year-round. Instead select 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.

12. Monarch numbers appeared to have rebounded in 2021- have they recovered?

Early unofficial counts from volunteers participating in the Xerces Thanksgiving Count— the annual census of the monarch population— indicate that there are more monarchs in overwintering sites this year than last year, possibly around 100,000 versus just 2,000 in 2020-21. While this increase offers hope for the struggling population, it is still only a quarter of the numbers typically seen during the first part of this century ([Schultz et al. 2017](#)). If this count had occurred in 2018, it would be seen as a significant cause of concern.

If you look at the graph below (Figure 1), you can see that the monarch population has historically fluctuated dramatically year-to-year, although this year's increase is on the upper edge of natural variation during the past thirty years— meaning it is slightly higher than what has typically been recorded. Their short life cycles and sensitivity to environmental factors ([Fox et al. 2019](#)) mean that insect populations tend to display high inter-annual variability ([Didham et al. 2020](#)). In addition, small populations are more vulnerable to demographic (variation in birth and death rates) or environmental (unpredictable responses to changing environmental conditions) stochasticity which can cause these population fluctuations (e.g., [Lande et al. 2003](#)). However, when you smooth out these “bounces” in western overwintering monarch numbers, it is easier to see that the long-term trend remains a pronounced decline (blue line in Figure 1 below).

In addition, it remains unclear as to which conditions allowed the monarch population to recover this year. Factors could include reduced drought conditions in western breeding grounds (e.g., Utah) that prolonged the availability of nectar resource during the fall migration. Cooler fall temperatures may also be limiting the incidence of winter breeding, which appeared to increase in 2020-21 ([James et al. 2021](#)). Other hypotheses include rescue from the resident population or the eastern monarchs that overwinter in Mexico.

What would recovery look like for western monarchs? If they are listed by the USFWS, the Service will issue a recovery plan that presents population targets. The Western Association of Fish and Wildlife Agencies set 500,000 as a short-term recovery target (WAFWA 2019). This

was before the more recent declines. Therefore, we guess that between 150,000 – 300,000 butterflies could be an appropriate near-term recovery goal given that the population hovered around this size for approximately 20 years. A fully recovered population would likely be more than a million migratory butterflies gathering at overwintering sites. This number would be closer to the predicted historic averages and provide more of a buffer against adverse environmental conditions.

In sum, while this year’s increase buoys our belief that we can still save this majestic species and its incredible long-distance migratory behavior, the reality is that western monarchs are still at risk of extinction. Thus, continued action is necessary to help save the western monarch (see Q13).

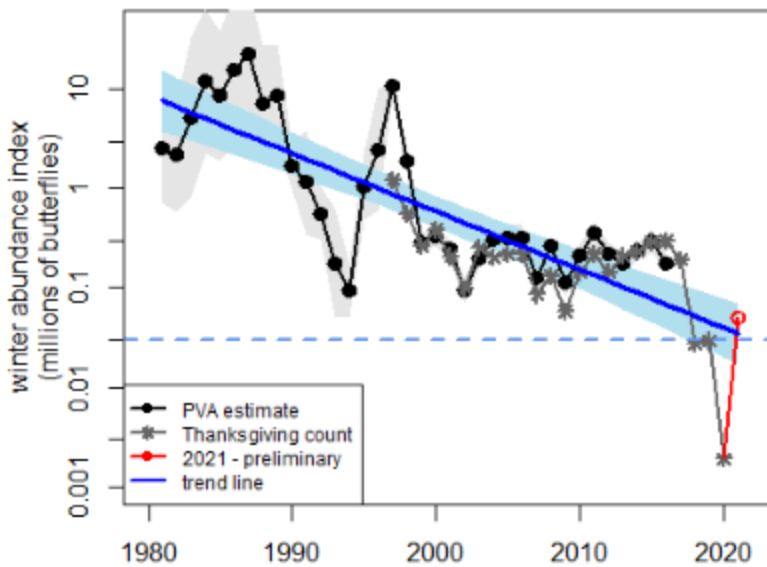


Figure 1. Western monarch overwintering counts over time show a downward trend despite annual population fluctuation over the past 30 years (reproduced with permission from E. Crone). The red point is the preliminary 2021 overwintering population estimate, an increase from the 2020-21 low of less than 2,000 butterflies.

13. 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.

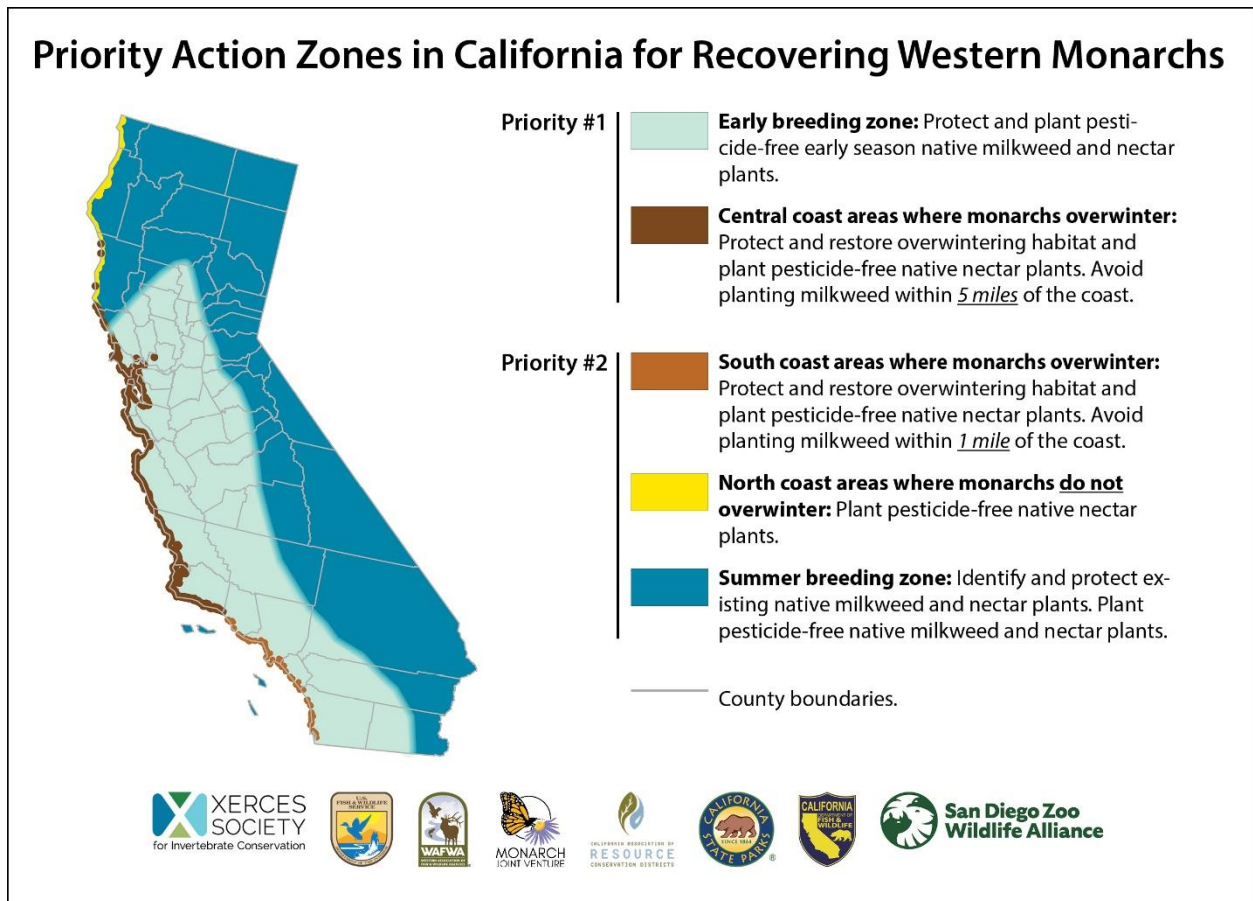


Figure 2. Map of priority actions for monarch conservation in different zones within California. This map was developed in collaboration with state and federal agencies and non-profit partners. It is intended for use as a guide depending on geographic location, but activities do not need to be limited to those described above. Similarly, actions take in Priority area 2 remain critically important to monarch recovery and should not be discounted.