

Southwest Monarch Study

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Wild, Reared, and Farm Recoveries 2014 - 2019

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This summer we're scrubbing the Southwest Monarch Study tagging and recovery data while in the process of writing a new paper. Earlier we published a paper of our findings focusing on Arizona monarchs¹ but with the expansion of tagging into Utah, Nevada, New Mexico and the deserts of California, our focus now is the Fall migration and overwintering strategies of monarchs in the Southwestern States in our tagging range.



Yesterday several articles were posted featuring a recently published paper regarding farm and reared monarchs and their migration. "Monarch butterflies purchased from a commercial breeder did not fly in a southward direction, even in offspring raised outdoors, in a new study conducted by scientists at the University of Chicago. Wild-caught monarchs bred indoors under simulated outdoor conditions also did not orient south, suggesting that captive breeding disrupts the monarch's famous annual migratory behavior."

<https://www.sciencedaily.com/releases/2019/06/190624161141.htm>

The issue of reared and farm monarchs evokes strong emotions on both sides of the spectrum, so we turned to our recovery data.

First, our disclaimers. We are still vetting data and our final numbers submitted for publication may differ from the numbers we are sharing with you at this time. More data will likely still be turned in that could affect final counts. (For example, we require data to be submitted before we issue new tags.) We could receive more recovery data.

Recoveries in Mexico are often years after they are tagged or a deceased tagged monarch could be found in California or elsewhere. But we have enough confidence in the data to say the comparisons will remain closely proportional.

Sun Angle and Recovery Density

Sun angle is the peak angle in degrees of the sun above the horizon on the day of tagging. This occurs at solar noon. Sun angle depends on the date and latitude. Solar noon is near standard noon, but they can differ due to the location of the tagging within the standard time zone. Sun angles start at their maximum value in summer and decrease to their minimum value through fall and winter. They are also larger closer to the north and south poles, becoming smaller near the equator. Why is this important? It provides a ratio of all recovered monarchs by date for latitude. During the main migration across our region in the Southwest United States we can expect a recovery ratio of 1:91.

Recoveries by sun angle 2014 to 2019*						
Category	Sun angle	All Tags		Recoveries		Recovery Rate
Pre early migration	More than 65°	839	13.3%	1	2.5%	1:839
Early Migration	65° to 56°	1782	28.2%	7	17.5%	1:255
Main Migration	56° to 47°	1999	31.6%	22	55.0%	1:91
Post main migration	47° to 43°	720	11.4%	8	20.0%	1:90
	Less than 43°	988	15.6%	2	5.0%	1:494
	Total	6328	100.0%	40	100.0%	1:158

* The data and analysis presented here are preliminary and subject to change.

Migration dates for the Southwest: <https://swmonarchs.org/peakmigration.php>

Comparison of Wild, Reared and Farm Recoveries

Several years ago, we became aware of a small number of people rearing wild monarchs in containers, tagging and releasing them when they eclosed. We added a column to our tagging data sheet to record this status. We did not encourage this practice, but we did ask those who did so to keep reared monarchs outdoors to receive environmental and celestial cues. We also encouraged healthy rearing practices.

In the following chart we used the following key: **W** = monarchs captured, tagged, and released in the wild. **R** = reared monarchs, where the egg, larva or chrysalis was caged for protection from predators and weather. **F** = farmed monarchs, bred in captivity.

Recoveries by Wild/Reared/Farm 2014 - 2019					
Category	All tags		Recoveries		Recovery Rate
W	4918	77.7%	16	41.0%	1:307
R	1277	20.2%	23	59.0%	1:56
F	130	2.1%	0	0%	
Unknown	3	0%	0	0%	
Total	6328	100.0%	39	100.0%	1:162

* The data and analysis presented here are preliminary and subject to change.

Summary

Southwest Monarch Study data indicates the overall tagging/recovery ratio during the time of migration is 1:91. But the ratio of all reared monarchs that were recovered is 1:54. Tagged reared monarchs have a better recovery ratio than wild monarchs during this time-frame. The reared monarchs were tagged in Utah, Nevada, Arizona and New Mexico and recoveries occurred in both California and Mexico.

We do not encourage mass rearing of monarchs but realize raising small numbers of monarchs has been part of many families for generations. Instead we do encourage safe practices and education: <https://swmonarchs.org/massraising.php>

Link to a sample recovery map: <https://swmonarchs.org/az-recoveries.php>

Please feel free to contact us regarding any questions. We hope to have this and more data submitted soon for publication.

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ⁱ Morris, Gail M., Christopher Kline, and Scott M. Morris. "Status of *Danaus plexippus* population in Arizona." *The Journal of the Lepidopterists' Society* 69.2 (2015): 91-108.