

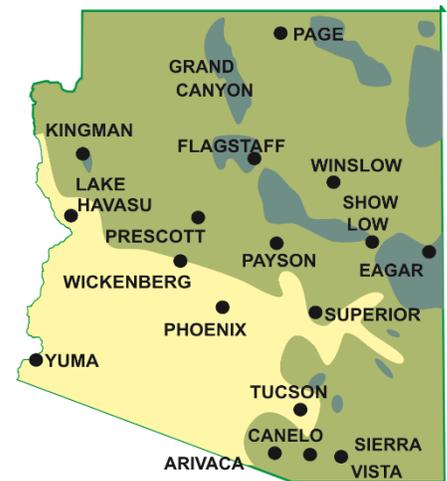


Status of *Danaus plexippus* in Arizona

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In June 2015, “Status of *Danaus plexippus* in Arizona”, peer-reviewed by Dr. Robert Pyle and Dr. Lincoln Brower, was published in the *Journal of the Lepidopterists' Society*. This publication is an overview of the findings of over 500 Citizen Scientists participating in the Southwest Monarch Study to learn about the distribution, breeding and migration of *Danaus plexippus*, the monarch butterfly, in the Southwestern United States.

Arizona is divided into three climate zones. Each zone contains similar habitats for monarchs and milkweed. Yellow includes the low and middle altitude deserts (Phoenix, Yuma, Tucson, Parker, Lake Havasu). Green encompasses the high desert terrains and cool plateau highlands (Payson, Sierra Vista, Prescott, Kingman, Winslow). Blue indicates the mountainous regions (Flagstaff, the Grand Canyon, Springerville/Eager).



Top Ten Findings

1. Monarch butterflies are present in Arizona throughout the year. Where they are found depends on the time of year and the elevation.

2. There are several varieties of *Asclepias* (milkweeds) that monarchs favor in Arizona to lay their eggs. While Arizona has the second largest number of milkweeds in the United States, we found monarch eggs or caterpillars on the following milkweeds by elevation.

Asclepias (milkweed) favored by monarch butterflies by climate zone.

H = Mountainous regions, M = High desert and cool plateau highlands, L = Low and mid altitude desert

H	M	L			
-	-	x	Whitestem milkweed	<i>A. albicans</i> **	
-	x	x	Arizona milkweed	<i>A. angustifolia</i> **	<input checked="" type="checkbox"/>
x	x	x	Antelope horns	<i>A. asperula</i>	<input checked="" type="checkbox"/>
x	x	x	Engelmann's milkweed	<i>A. engelmanniana</i>	
-	-	x	Desert milkweed	<i>A. erosa</i>	
-	x	x	Pineleaf milkweed	<i>A. linaria</i> **	<input checked="" type="checkbox"/>
x	x	x	Mohave milkweed	<i>A. nyctaginifolia</i>	
x	x	-	Showy milkweed	<i>A. speciosa</i>	<input checked="" type="checkbox"/>
-	-	x	Desert or Rush milkweed	<i>A. subulata</i> * **	<input checked="" type="checkbox"/>
x	x	-	Horsetail milkweed	<i>A. subverticillata</i> *	
x	x	-	Butterfly weed	<i>A. tuberosa</i>	<input checked="" type="checkbox"/>
-	-	x	Vining milkweed	<i>Funastrum cynanchoides</i> (<i>Sarcostemma cynanchoides</i>)	

* primary *Asclepias* for breeding

** evergreen

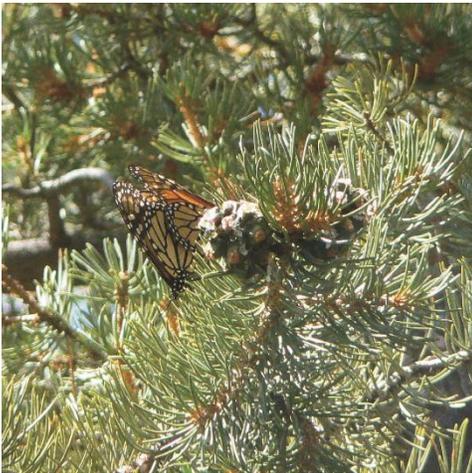
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Monarch caterpillar feeding on Desert Milkweed, *Asclepias subulata*

3. Monarchs usually feed on milkweed in bloom, but they also favor the nectar of other flowers when they are breeding.

In home gardens adult monarchs frequently visit zinnias, cosmos, sunflowers, tithonia, coreopsis and asters. Wild monarchs are frequently observed on the following flowers that vary by elevation as well as other others: Dogbane (Indian Hemp), Alfalfa, Thistles, Seep Willow, Sunflowers, Threadleaf Groundsel, Cow Clover, New Mexico Vervain, and Chaste Tree.



*Mating monarchs at the Grand Canyon.
Photo by Bob Morris*

4. The monarch breeding season in Arizona is complicated.

When and where you will see breeding monarchs will depend on where you live. Unlike many parts of the United States, the lower deserts of Arizona see more breeding monarchs in the fall, especially during September, than in spring. During the time of the spring migration in late March through June, there are small numbers of breeding monarchs migrating through the lower deserts. They leave the lower deserts by mid-May to mid-June, as temperatures soar over 100°F. Monarchs are reported in the middle elevations in small numbers sometimes as early as late March and early April and they continue to breed in these areas with the population expanding and becoming more abundant and noticeable in late July and August.

Monarchs begin to move into the higher elevations in May and June and breed until late August. In late August and early September breeding

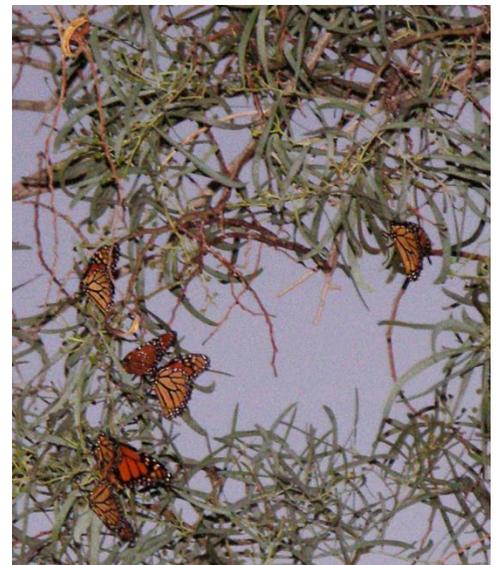
monarchs move into the lower deserts laying eggs. Their offspring then join the main migration in late September and early October.

5. During the fall migration, monarchs in Arizona have favorite flowers for nectar to refuel for their long journey.

When monarchs are migrating, they are not breeding, so milkweeds are not as critical. In home gardens, fall blooming zinnias, cosmos, sunflowers, tithonia, coreopsis, ageratum and asters are favored. In the wild, monarchs favor the following nectar plants during their fall migration: Sunflowers, Rabbitbrush, Desert Broom, Sweetbush, Thistles, Golden Crownbeard, Smooth Beggartick (Marsh Sunflower), Seep Willow, Milkweeds in bloom and others.

6. Peak fall monarch migration in Arizona ranges from September through mid-October, depending on elevation.

The monarch migration window in Arizona is longer than anticipated. You may see both breeding and migrating monarchs at the same time in the fall. We learned that some monarchs migrate beginning about one month before the peak migration through the state. The latest migrating monarch to date was tagged on November 19 in Chandler, Arizona and later seen in Kino Bay, Sonora, Mexico on December 14. Small, loose clusters of monarchs are found throughout Arizona during the peak migration, usually on the southeast side of trees.



*South Mountain monarch cluster.
Photo by Tatsuyo Schultz.*

7. Monarch butterflies in Arizona migrate to both Mexico and California. Wind direction is significant.

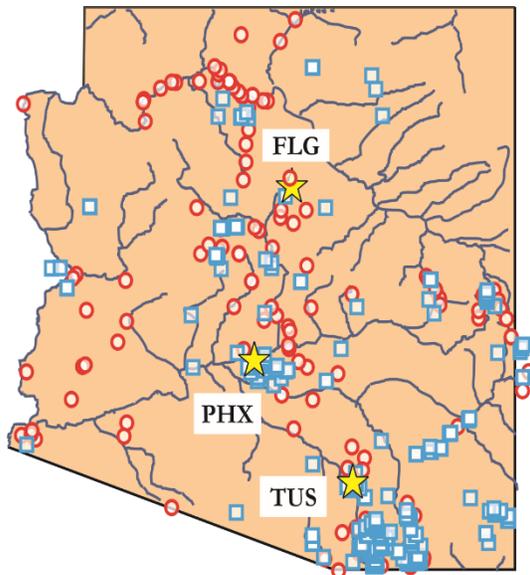
A total of 12,088 monarchs were tagged between 2003 and 2014 by 384 individuals in 276 locations. In addition, there were 134 unique locations where monarchs were reported around the state. Monarchs tagged or monitored at a site where it was unclear whether property owner permission had been obtained or later denied were omitted. During their fall migration, monarchs in Arizona fly both to Mexico and California. In early September our monsoon winds can affect the migration destination. Monarchs prefer to ride



thermals to save energy while migrating. We found a statistically significant correlation between wind direction at 1,000 feet and whether a monarch would be recovered (seen in Mexico or California.) There were also several cases where monarchs tagged on the same day flew to the same destination, another statistically significant finding.

8. Not all monarchs migrate in Arizona; small numbers of monarchs spend the winter in the lower deserts.

Small aggregations of monarch butterflies spend the winter in the greater Phoenix area especially along the Salt River, Tucson, Yuma and along the Colorado River in Parker and Lake Havasu. From weekly monitoring, some of the monarchs are breeding, others appear to be non-breeding populations. One monarch tagged at Rotary Park in Lake Havasu in November was spotted in the town of Lake Havasu in February. When a hard-freeze occurs during winter, the monarch sightings drop dramatically.



Blue squares indicate tagging locations; Red circles represent sightings of monarch butterflies.

9. Monarch butterflies in Arizona have low levels of *Ophryocystis elektroscirrha* (OE), a protozoan parasite. We submitted 463 samples over five years to Monarch Health at the University of Georgia for testing. Eastern monarchs typically have a 10 to 15% infection rate; Western monarchs, 25 to 30%; year round monarch populations, 85%. Arizona had an average rate of only 4% despite evergreen native

milkweeds, limited irrigated Tropical Milkweed, *Asclepias curassavica*, and small overwintering monarch populations. While OE levels should continue to be monitored to detect a changing trend, current levels indication this is not a serious threat to the monarch population in Arizona at this time.

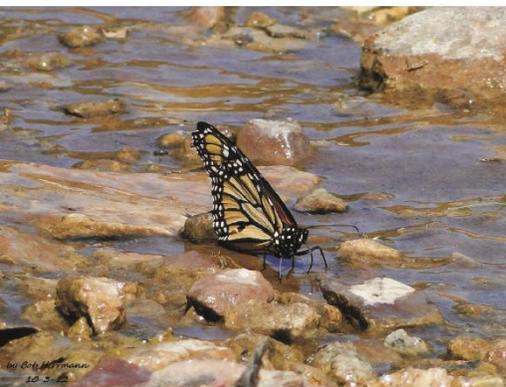


Photo by Bob Herrmann

10. Monarchs seek water in Arizona during high temperatures and low humidity. Monarch butterflies are not known for puddling with only limited reports in the Eastern population. In Arizona during periods of drought, low humidity and high temperatures, monarchs are frequently found in creeks and streams seeking water.

For the complete copy of "Status of *Danaus plexippus* in Arizona" see:
<http://images.peabody.yale.edu/lepsoc/jls/2010s/2015/2015-69-2-091.pdf>