

QUESTIONS from the MBF WEBINAR held January 27, 2021

Answered by MBF's Board members.



1. Could you make a video of the webinar available on-line?
Yes!! It is available at: https://www.youtube.com/watch?v=nnddC_qulc8
2. Why aren't pollinator flowers planted in Mexico to feed the winter butterflies? Monarchs have evolved to feed during their southward migration, so it is more important to ensure that there is habitat with a lot of nectar along the way. Once they reach the winter colonies, most overwintering monarchs do not need to drink nectar. As long as they have found sufficient nectar along the migratory route, most have sufficient fat reserves to survive the winter and begin their return migration.
3. Is avocado farming a threat to monarchs? In terms of forest loss, the Reserve boundaries have been relatively efficient in containing the avocado expansion. Within the Buffer Zone there are 455 hectares of avocado orchards (less than 1% of the protected area), and only 18% (82 hectares) are due to deforestation. There is not a single hectare of avocado in the Core Zone. But if expansion continues it is a threat to changing the environment for overwintering monarchs. To grow, avocados require a lot of water, a limiting resource that is scarce during the winter when monarchs need it. Also, increased amounts of pesticides from farming can taint water supplies.
4. Is there a species of tree that the monarchs prefer? Do all the monarchs overwinter only on the Oyamel fir trees in Mexico? At the elevation where monarchs aggregate for the winter, the most abundant tree is the Oyamel fir, and that is the tree on which most monarchs are found. This is where the microclimate is ideal for surviving the winter. Some cedars and long-needled pines also grow at this elevation among the Oyamels, and some monarch clusters are found on these trees, but by far most monarchs are on Oyamels. The short needles of firs may provide an easier substrate for monarchs to hang on as compared to the long needles of the pines.
5. Do the monarchs go for the tree trunks first or to the boughs or random? Monarchs first encounter the branches and outer portions of the trees as they aggregate at the overwintering sites. As the branches become densely settled, incoming monarchs land on nearby branches and on tree trunks.
6. If a monarch takes a short flutter during a warm day, do they tend to return to the same roosting spot? Do they have a specific spot on the tree that they come back to after heading out for water? With thousands and tens of thousands of monarchs flying out at the same time, it is impossible to follow a single individual. We know that the aggregations change locations during the winter, and monarchs that fly out to drink water most likely return to different trees. No, they don't have reserved seats.
7. Is the density of monarchs on the trees consistent both from tree to tree and from year to year? No; density varies a great deal, but this variation is hard to quantify.
8. How specific is site fidelity year to year within the forests? Monarchs aggregate for the winter in the same general areas on the same mountain sides but rarely in the exact same trees from one year to the next. More often, a colony in one winter may be a hundred meters or more away from where they were the previous winter.
9. Do the overwintering monarchs in Mexico have to deal with severe storms as do the western monarchs? How important is occasional bad weather (storms) to winter survival? Severe storms are rare at the Mexican overwintering sites, but when they occur, they can have dramatic effects on the monarch colonies. Storms can knock monarchs from trees onto the forest floor and wet them from rain and snow, leaving them more likely to die from freezing when clouds recede and temperatures plummet. For example, nearly 80% of the monarchs at one colony died in a January 1992 storm; about 75% died in two colonies during a January 2002 storm; and at least 40% died in several colonies in a March 2016 storm.
10. Are there any predators in the colonies? Yes. Two bird species and a mouse species prey on monarchs during the winter, leaving detached wings on the forest floor. Black-backed orioles open the abdomens, which are rich in lipids, avoiding the deterrent cardenolide chemicals concentrated in the

exoskeleton, whereas black-headed grosbeaks seem less sensitive to these chemicals and consume primarily the thoraxes. Both take more monarchs when it is very cold and where the aggregations are less dense. Black-eared mice feed on both live and dead monarchs on the ground, also avoiding the toxic parts of the monarch bodies.

11. Do individual monarchs return to their same subcolonies each year or just to the general area? The monarchs that fly to Mexico each fall have never been there; it was their great or great great grandparents that left Mexico the previous spring. We have no evidence that monarchs go to the specific colonies where their own ancestors had been. We know that the same mountainsides are used year after year for overwintering colonies, but we don't know about different origins for the monarchs in each of the separate colonies.
12. Are the numbers of trees in that area increasing? Are more trees being planted to shelter monarchs? To reverse the damaging effects of past logging, several organizations are sponsoring reforestation of open areas in the Monarch Butterfly Biosphere Reserve. The Monarch Butterfly Fund is one of these organizations; we help fund the local Mexican group Alternare, which planted more than 21,000 trees in 2020.
13. Do you think that priority to forest protection inside the Monarch Biosphere Reserve should be given to the forest near the creeks, to protect the inside Reserve migration downhill December -> March? The priority of the Monarch Butterfly Biosphere Reserve is to protect the entire Oyamel forest ecosystem. Monarchs use the entire watershed as a cue to select locations to form their overwintering colonies. The water in the streams that monarchs visit comes from the entire forest ecosystem, not only from the trees near the creeks.
14. Why the dramatic color variation? Why do the wings look whitish when they're in the trees? The dorsal and ventral (top and bottom) sides of monarch wings have different colors. The top displays the orange and black-striped pattern that is so well known, but the underneath shows a dull, tan background. The difference stands out when comparing the same bough cluster from the cold of early morning, when butterfly wings are closed, to the sun of late morning, when their wings are open. This difference is shown in the attached photos of the same bough.



15. The sound of monarchs on trees must be amazing; have you made recordings? Most everyone thinks of butterflies are being quiet, but when tens of thousands are flying all at once overhead, one hears a gentle whooshing sound like the rustling of fallen leaves. This sound can be heard in the background of some YouTube videos of the Mexican overwintering colonies.
16. Do monarchs build up most of their lipid reserves in Canada or the northern U.S. before departing for Mexico or after they've crossed the Rio Grande? What can we do to increase the nectar in Texas as monarchs fly south for the winter? I heard that more important than planting milkweeds for reproduction is to plant late season flowering plants. What about Joe Pye weeds, pink thistle, asters, goldenrods. For migrating monarchs, are there certain nectar sources that are better/richer to build their reserves for overwintering? Monarchs feed through their entire southward migration down through Mexico, accumulating the lipids needed to keep them alive through the winter and to begin the northward migration the next spring. They fatten up during migration. Among the most important late season nectar sources are plants in the Aster family (Asteraceae), often known as composites. These include all thistles, asters, goldenrods, Joe Pye weed, and frostweed (*Verbesina virginica*), which is a common nectar source in Texas. Although their caterpillars are specialized for feeding on milkweed leaves, adult monarchs take nectar from whatever flowers are available; this difference between larval and adult feeding is typical of butterflies. It is important for them to have patches with flowering plants throughout their migratory route, and that means ensuring that native habitat is available. We also need to counter climate change because of nectar loss from the drought conditions it produces.
17. Should we plant only native milkweed? Tropical milkweed is so much easier to grow. The main problem with tropical milkweed is that it doesn't die back in the winter. As a result, local monarchs can continue breeding rather than enter reproductive diapause and migrate, and within a continuous breeding population of monarchs, the monarch parasite known as O.e. can build up in high numbers, leaving less healthy butterflies. As a general rule, native plants provide a "better" environment for all wildlife – healthier and with evolved community interactions.
18. Last year the monarchs were very active all season. Were there more dead monarchs that didn't have enough lipids to survive? There are always differences within the large numbers of migrating monarchs that fly to Mexico each year, and some are better provisioned with lipids than are others because of genetic differences and the conditions they encountered during migration. Every winter, monarchs with little lipid do not survive. When winters are warmer, as is happening in this era of climate change, monarchs may be more active during the winter, but we do not have evidence of a difference in the past winter season.
19. How does the remigration north progress? How long does it take before they make it to Canada? The monarchs that survived the winter in Mexico begin flying northward in late February and March and reach Texas and the southern tier of states, where they lay eggs. The monarchs that complete development from these eggs continue the northward migration to recolonize their summer breeding range, which includes the northeastern and northcentral U.S. and southern Canada (it is useful to look at a map to see how much of southern Canada is actually farther south than much of the northern U.S.). That's the end of directional migration, though the following generations spread out as the population grows and make use of available milkweed and additional habitat. There is some weather-based variation in migratory patterns, of course.
20. Do monarchs try to mate in Mexico or do they wait until they travel north? Mating begins in late February and March as the overwintering colonies become more active, move downslope, and start dispersing and migrating. On the way north they mate and lay eggs in northern Mexico and in the southern tier of states, especially in Texas. There is, however, some mating throughout the winter, and this usually involves males in poor condition that are unlikely to survive to the end of the winter.
21. How did you detect the inseparable link between people and environmental conservation? In short, conservation can't succeed without attention to the people who live near an area of conservation concern. To conserve the Mexican forest where monarchs overwinter, the Mexican government and

several NGOs (non-government organizations) are providing alternative sources of income. They are also promoting environmental education for local people about monarchs and the forest and helping them adapt ways of living that reduce harm to the surrounding environment (e.g., cisterns for water, fuel-efficient stoves), and attend to their economic well-being. Such actions are right to do and increase our ability to protect the forest.

22. The year's western monarch population count has been decimated by disasters influenced by climate change. Have you begun to see signs of climate change in the eastern population? Yes; climate change is having effects everywhere. In 2019, eastern monarchs were late in migrating southward because of the warm fall; more intense storms have led to higher mortality in the overwintering colonies; and migrating monarchs have encountered drought in Texas and other southwestern areas, drought that has reduced the abundance of nectar sources and channeled flight paths more to riparian zones. Climate change will produce additional effects in the coming years, including changing the elevational zones in which Oyamel fir trees grow.
23. How did monarchs get to Kauai? They seem to be thriving there. Are there monarch butterflies in Australia? Monarchs were introduced to different islands in the Pacific during the mid and late 1800s and, once introduced to an island, they dispersed to nearby locations. Their appearance in Hawaii dates from the 1840s, while their presence in Australia reflects a single introduction in the 1860-70s. Monarchs are now found on other Pacific islands, too. Their survival after each introduction required that milkweeds (*Asclepias* species) or milkweed relatives (e.g., *Gomphocarpus* species) already be present for reproduction, of course.
24. Which is the primary cause of falling population? Habitat loss/ chemical use in the US or deforestation in Mexico? Monarchs are under multiple threats throughout their life cycle. Studies have confirmed that the loss of milkweed in regions with industrialized agriculture has reduced habitat and lowered the rate of reproduction. Logging and the expansion of agriculture around the Monarch Butterfly Biosphere Reserve has degraded the Oyamel forest where monarchs overwinter. Climate change has increased the frequency and intensity of damaging wintertime storms as well as expanded regions of drought along the migratory route and altered the timing of migration. All these factors affect monarch abundance.
25. How can we contribute to your work and the effort of the communities to conserve the Reserve? Are there volunteer opportunities with your organization? What can we do to help our forest in Mexico? The donations we receive support our work in and around the overwintering colonies. Our efforts include forest conservation, reforestation, scientific research and monitoring, outreach and education, and sustainable development of the local communities. The contributions you provide are used for these goals. The more funds we receive, the more actions we can support in Mexico.
26. Other than overwintering sites found in Mexico, do monarchs overwinter in other locations? Are monarchs found in Michoacan? Overwintering sites in Mexico have been limited to about 12 mountains in the transvolcanic range in the states of Michoacan and Mexico in central Mexico. These sites are pretty well known, though it would be possible for additional small overwintering colonies to appear on nearby mountains. Western North American monarchs have historically overwintered at a range of sites along the California coast from San Diego to north of San Francisco. A non-migratory population is found around Miami in south Florida, and a few monarchs cluster during the winter along the southeastern U.S. gulf coast. These are the sites in North America. Some non-migratory monarchs occur in Guatemala and other central American countries.
27. Is there data for monarchs migrating north from Mexico to the west coast of the US? When the monarch population was larger, there were small overwintering sites each year along the Baja coast in Mexico. Earlier reports indicated seasonal movement northward along the coast. Northern monarch movement has been documented along the Colorado River on the California-Arizona border in early March as well. To date there is no documentation of a tagged monarch reported in the states of Michoacan and Mexico in central Mexico and then sighted later along the California coast. MBF is

funding research in NW Mexico, and in the future there may be more information about western migratory paths.

28. Monarch migration focus seems to be via Texas. What impact is there through AZ or CA? Each March and early April, small numbers of monarchs are seen flying north in southern Arizona near the border, especially in the eastern region. Their worn wing status indicate that they may be remigrants from central Mexico. The numbers vary from year to year but are many fewer than those seen remigrating through Texas.
29. What is the best thing one can do to help monarch butterflies up north? The top thing one can do is provide habitat—for breeding and migrating. Even if you don't have much land, monarchs use small areas, and you can support local or regional organizations that do have land on which habitat can be improved. For more information, see the Monarch Joint Venture's suggestions for getting involved in monarch conservation: <https://monarchjointventure.org/get-involved>.
30. Is there any good news about larval habitat for monarchs in North America? The good news is that so many people care and are doing what they can to protect and restore habitat.
31. Will the monarch be classified as an endangered species? and will that designation help the butterflies? The monarch is now officially classified as warranting the protection that would be guaranteed it by the Endangered Species Act but precluded from listing because other species are even more at risk. You can read more about this at <https://monarchjointventure.org/blog/faqs-endangered-species-act-listing-decision-for-monarch-butterflies>.
32. Are the population counts peer reviewed to ensure accuracy? Is measurement in acres or hectares? When the counts are published in the scientific literature, they are peer-reviewed. The measurements are in hectares but are easily converted to acres.
33. How are the monarch numbers this year? Are there new overwintering sites in Mexico? The numbers for this year have just been released (February 25, 2021): 2.1 hectares (5.2 acres), which is down from 2.83 hectares the previous winter. There are no new sites. You can read about this recent report at <https://monarchconservation.org/>
34. Why is the counting done by only one organization? WWF-Mexico and the National Commission of Protected Areas of Mexico (CONANP), which manages the Monarch Butterfly Biosphere Reserve, collaborate on the counts.
35. What happened in 1997-98 to cause the big decline? Why were there so many monarchs in 1996-97? There are many reasons why monarch numbers fluctuate so much from year to year, including yearly differences in the weather. Some years are really good for the growth of milkweeds, monarch caterpillars' source of food, and with warmth and humidity, large numbers of adult monarchs can develop. A bad year for milkweed growth and poor weather conditions (high heat and lack of rain) can produce a low number of adults.
36. Is satellite imagery used to determine the area with monarchs? Have you considered using drones and Lydar to estimate color? What about using radio telemetry as used on murder hornets? Is there a het signature you could use to get a count? Experts in Deep Learning AI could use many photos of hand counted butterflies to develop a way to estimate numbers. Ongoing research is trying Lydar to estimate monarch numbers.
37. What are the main challenges you encounter? The challenges are these: pressure to convert the forests into productive lands for avocado production, etc.; resistance from local communities (owners of the land in the Reserve) to use their natural resources sustainably; and the violence that is happening in the región. Sometimes the campesinos themselves ask us not to go to their community because of dangerous conditions. However, Alternare's team has never had any problems and has not encountered violent situations.
38. How are you dealing with CONANP budget cuts? CONANP is doing its best to continue with their mission, regardless of budget cuts.

39. Can you speak about the recent assassination of environmentalists in that area of Mexico? What has happened to the murder of the rangers? The deaths of a community leader and a guide in the communities were tragic, but there is no evidence that their deaths were related to their work with monarchs.
40. Do you have cooperation from the local governing officials? We collaborate closely with the Director of the Monarch Butterfly Biosphere Reserve.
41. Is it true that speed on the Mexican highways is reduced during the few weeks when monarchs are crossing them? We know that for some high-density monarch crossings, local government agencies place signs for drivers to reduce their speed. In the State of Mexico, monarchs at an overwintering colony need to cross a highway to reach water; in addition to signs there, the state police manage the cars to reduce their speed.
42. How do you address the illegal logging? Do you ever feel in danger from loggers or people against your work? Illegal logging is a big issue for the management of the forest. One approach is to incentivize the actual owners of the forest to protect it from loggers. In return, in addition to maintaining their forest, they receive financial compensation from an organization named Fondo Monarca. In Alternare's case it is the local people who protect and take care of us, warning us when there are threats so we can avoid them.
43. Can you make an environmental conservation program focused on monarchs? There are many conservation programs focused on monarchs. MBF is one of those, and the Monarch Joint Venture and Monarch Watch are others. We recommend exploring all of the organizations listed as MJV partners: <https://monarchjointventure.org/about-us/partners>. In Mexico a similar venture exists called the Red Monarca (Monarch Network – <https://redmonarca.org>), which is a network of non-profit and academic organizations (including MBF) that collaborate to increase participation, communication, and cooperation in support of sustainable community development and conservation in the Monarch Butterfly Biosphere Reserve. Red Monarca is comprised of the National Phenology Network, the National Community Water Monitoring Network, and a socioenvironmental chapter with a documentation center and Geographic Information System with data, research, documents, and maps of the monarch area. One of Red Monarca's main efforts is to disseminate the work that communities and ejidos (local communities) carry out to conserve the forest. All of these can be found on their website.
44. Is it possible to shop online for items produced by people of the local communities? More work is needed to train the communities so they can produce arts and crafts that are in demand and can be marketed. It is quite difficult to organize production, and transportation is expensive.
45. How important is tourism to the local economy? Has it been badly affected by the pandemic? Is there an initiative to implement ecotourism? How do you develop income during the whole year? Without a doubt, the pandemic affected the communities on whose land the monarch butterfly colonies occur (about eight). The rest of the 26 communities that live nearby or are part of the Reserve do not benefit from tourism. However, the local organization Alternare asked communities how they were affected by the pandemic. One of the most significant findings was that people replied that the knowledge they acquired to cultivate organic vegetables and take care of barnyard animals enabled them to produce and sell food.

