

## FIELD GUIDE

# The many mysteries of the monarch

By **Don Lyman** Globe Correspondent , Updated September 8, 2021, 5:25 p.m.



A monarch butterfly on a purple coneflower KRISTIN FORESTO/MASS AUDUBON

Is it me, or were there a lot of monarch butterflies around this summer? It seems like I saw them everywhere. Floating across busy roadways, flying around supermarket parking lots, flitting from flower to flower in fields — the orange and black butterflies with a 4-inch wingspan seemed to be everywhere.

“Anecdotally, there do seem to have been a lot!” said Martha Gach, president of the Massachusetts Butterfly Club and Mass Audubon’s education manager and conservation coordinator at Broad Meadow Brook in Worcester.

But the monarchs we see at the beginning of summer aren’t the same ones we see at the end of summer, Gach explained. We see two generations in Massachusetts: The butterflies that come up from the southern United States that mate and lay eggs here in June and July, then the ones that hatch from those eggs and fly to Mexico in the fall.

“The Mexico butterflies came from New England,” said Gach. “They winter in Mexico and head north in March to Texas, where they mate, lay eggs, and die. Their offspring grow to adults, then migrate north to the general region of Virginia where they mate, lay eggs, and die. The generation born in Virginia are the ones that make it to New England in June. And it’s their offspring that fly back to Mexico.”



Two monarch caterpillars - one full-grown and the other newly eclosed next to its eggshell. Eclose is the entomological term for the larva hatching out of the egg. MADELINE CHAMPAGNE

Monarchs migrate south in late August and September, and travel several thousand miles, arriving in Mexico beginning in mid-November, Gach explained. Along the way, the butterflies need stopover habitat where they can rest and feed on nectar from flowers. Once in Mexico, the monarchs head to oyamel fir forests at high elevations in the Sierra Madre mountains.

Some monarchs overwinter in Florida, said Gach, and the monarchs that live west of the Rocky Mountains migrate to the California coast.

Madeline Champagne, an amateur lepidopterist — someone who studies moths and butterflies — said monarchs have a short life cycle, going from egg to caterpillar to chrysalis to butterfly in about four weeks. Once they metamorphose from the chrysalis as butterflies, monarchs only live about two to three weeks.

But the late summer generation of monarchs that migrate to Mexico live about nine months, said Champagne. Seasonal changes, such as shortened day length, trigger delayed reproduction, which allows them to live longer.

Many butterfly and moth caterpillars have a highly specialized diet, limited to a single kind of plant, Gach explained.

“For monarchs, that’s milkweed,” said Gach. “Monarchs will only lay eggs on milkweed.”

There are 73 kinds of milkweed native to the US, and monarchs use about 30 of them, Gach explained. Common milkweed, swamp milkweed, and butterfly weed are the most common milkweed species in New England. Monarch caterpillars feed on milkweed leaves.



A monarch caterpillar on a milkweed leaf. RYAN DORSEY/MASS AUDUBON

“Monarch caterpillars accumulate toxic cardiac glycosides that are in the milkweed leaves, and the adult butterflies carry these chemicals as a result and taste bitter,” said Gach. “Birds need to learn to avoid eating monarchs. A classic experiment by [entomologist] Lincoln Brower offered monarchs to young blue jays, who gobbled them up, but then vomited about 10 minutes later, and wouldn’t touch them again.”

But there’s a range of toxicity level in monarchs, depending on which milkweed species they’ve eaten, explained Gach, and some birds appear able to eat monarchs.

“There’s a recent blog post about young Mississippi kites chowing down on migrating monarchs,” said Gach. “It’s kind of like herd immunity — it takes a certain number of bad-tasting butterflies — researchers believe 25-40 percent — to confer protection on the species as a whole.”

It used to be thought a monarch mimic — the viceroy butterfly — lacked the bad tasting toxins monarchs have, and benefited from merely looking like monarchs, which deterred predators. But it turns out viceroys are toxic too — a phenomenon called Mullerian mimicry, where two or more unrelated noxious or dangerous species have evolved a similar appearance.

Monarch butterfly numbers have declined by about 90 percent since the 1990s. Gach said there are a number of reasons why, including habitat loss. In the US, industrial-scale agricultural practices have impacted the amount of milkweed available; widespread use of herbicides and pesticide-resistant crops also have reduced milkweed abundance. Insecticides impact monarchs and other insects. In Mexico, the monarch’s overwintering habitat has been shrinking due to illegal logging.

“And climate change is a biggie,” said Gach. “Drought, storms, and excessive heat play havoc with monarch migration and availability of food. Imagine a butterfly encountering a hurricane, and you get the picture.”

Natural threats to monarchs include predators and parasites — on butterflies, eggs, and larvae, Gach explained.

Champagne, who raises and releases monarchs and puts on educational programs, said survival rate from egg to butterfly is thought to be about 2 to 8 percent.

Despite the big decrease in the number of monarchs, they are not listed as an endangered species at either the state or federal level.

“At the federal level, the US Fish & Wildlife Service declared last December that monarchs were eligible for listing, but weren’t a priority,” said Gach. “So, they are being watched for possible listing as an endangered/threatened species, which would afford some protection.”



A monarch caterpillar on milkweed flower buds. KRISTIN FORESTO/MASS AUDUBON

Asked what people can do to help protect monarchs, Gach and Champagne had a number of suggestions, including:

- When purchasing plants, ask for pesticide-free.
- Support organic farmers.
- Don’t use chemicals on your lawn or garden.
- Plant milkweed.

- If you have a lawn, convert some of it into meadow. If you have a balcony, add some flowering plants. Monarch butterflies feed on the nectar of a variety of flowers including asters, goldenrod, sweet pepper bush, and Joe Pye weed.
- Advocate for open space protection and climate resiliency.
- Support local and national environmental organizations that protect habitat, pollinators, and monarchs, such as Mass Audubon, The Trustees of Reservations, the Xerces Society, Journey North, and The Nature Conservancy.

“Monarchs are important as pollinators, as part of the broader food chain that supports birds and other creatures, and as a symbol of the human spirit,” said Gach. “Their unique migration journey links distant places — Massachusetts and Mexico. That to me is so fascinating — that such a tiny, ephemeral creature knows where it needs to go and how to get there. That is the magic of migration that we need to protect and steward.”

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A "Monarch Waystation" provides milkweed, which monarchs lay their eggs on, and wildflowers that monarchs use for nectar. This station is maintained by the Massachusetts Department of Conservation and Recreation at its North Region Headquarters in Stoneham. Monarch waystations are a conservation effort affiliated with an organization called Monarch Watch. (See <https://monarchwatch.org/waystations/>)DON LYMAN