The Power of Data: Citizen Science and Otherwise

We know that a key factor in people’s decision to participate in the MLMP is to provide data that help us understand and preserve monarchs. Here are two ways that data from the MLMP and other sources help us understand how monarchs are doing and what factors influence their population size.

**2015 - 2017: Minnesota (left) and Wisconsin (middle) MLMP data. Note that the y-axes have different scales. Overwintering area (right)**

**Raw Data:** While detailed analyses of MLMP data for publication involve using site-level data, and the exclusion of data that don’t meet the requirements of a particular analysis, we can learn a lot from state summary graphs, such as those shown above. These graphs, showing data from Minnesota and Wisconsin allow us to compare monarch summer numbers over the past three years. We have more sites in these states than other states, making it less likely that summary graphs will be influenced a great deal by single sites.

We use the second peak in graphs from the Upper Midwest as a general indicator of the breeding population size in any given year. Depending on the analysis we’re doing, we either look at this peak for eggs only, or for eggs and larvae combined. Note that in both states, 2015 was the best of the last three years. The peaks in 2015 were similar in the two states: eggs and larvae combined were about 0.33 monarchs/milkweed in MN, and 0.25 in WI, on the weeks of July 26 and July 19, respectively. This consistency within a region is common.
The Power of Data: Citizen Science and Otherwise (Continued)

Densities were lowest in both states in 2016, reaching highs of about 0.074 and 0.027 in MN and WI, respectively. Numbers in 2017 fell between those in 2015 and 2016 in both states. 2015 had the largest winter population size in the past seven years (4.01 hectares: https://monarchconservation.org/), matching our high MLMP values. However, the breeding peak was higher in 2017 than 2016, unlike what we observed at the wintering sites. This discrepancy is likely to reflect varying contributions of monarchs from other regions, and perhaps varying migration survival.

The Big Picture:

Of course, monarch numbers are influenced by many factors. The MLMP data illustrated above don’t tell us what drives monarch numbers; they just tell us what the numbers are, and the discussion above only looked at three years. Nail et al. 2015 and Stenoien et al. 2015 used MLMP data to understand what drives monarch survival and density at the site level across years 1997-2014; see “MLMP Update November 2015”.

A recent analysis published by members of the Monarch Conservation Science Partnership (Thogmartin et al. 2017*) analyzed factors that affect the size of the entire monarch population, as represented by the area occupied by monarchs wintering in Mexico. This analysis looked at potential effects of climate, habitat availability, and other potential threats on winter population size.

The biggest driver, across all of the years for which we have data, was glyphosate (Round Up) use; monarch numbers are negatively associated with glyphosate use. Because glyphosate can be applied to fields in which genetically-modified, or “Round-Up Ready” corn and soybeans are planted, and because milkweed used to be abundant in these fields, we were not surprised at this finding. Interestingly, the next two most important drivers were related to climate. When the minimum August temperature in the North Central (NC) US was high, monarch numbers were low (i.e. years with hot Augusts had fewer monarchs). Similarly, when there were more warm days in the NC US in the late spring and early summer, monarch numbers were lower (i.e. years with hot springs had fewer monarchs).

The important role of glyphosate in diminishing monarch numbers illustrates the importance of habitat; we need to make up for the milkweed lost from agricultural fields and other areas. The importance of climate is concerning, since warmer temperatures are now the norm due to increased greenhouse gases in the atmosphere, and are predicted to get worse. In order to survive this changing climate, monarchs need to be able to find climatically-suitable habitats, and this is more likely if more habitat is available to them. Visit www.plantmilkweed.org for tips on creating monarch habitat, and encourage your community to get involved!

*Thogmartin, W.E., R. Wiederholt, K. Oberhauser, R. Drum, J.E. Diffendorfer, S. Altizer., O.R. Taylor, J. Pleasants, D. Semmens, B. Semmens, R. Erickson, K. Libby, L.Lopez-Hoffman 2017. Threats associated with the decline of the monarch butterfly. R. Soc. Open Sci. 4(9):170760. doi: 10.1098/rsos.170760 (note that this paper is open access; you don’t need to access it through a University or other paid database)

Artistic Contributors

Whether it’s writing, painting, or photography, monarchs often bring out the creative side of people. The latest submissions include black and white pen drawings and unique prints.

Art in Nature; PSU Altoona, Tracie Cobb
Irvin, Michelle Smithbauer, Hunter Corbin,
Lola Xia, Mike Lucas

“One of the swarm”; Kyle Faloon

Monarch Butterfly’s Transition Process; Lola Xia

To submit and view artwork visit https://monarchlab.org/mlmp/gallery/art
Volunteer Highlight: Krystin Dozier and Team

This spring we’re highlighting volunteer Krystin Dozier and her team in Northern California, at Effie Yeaw Nature Center. Krystin has been monitoring for MLMP for 3 years, and began it as part of her capstone project while training to become a California Master Naturalist. The next year, she recruited another Master Naturalist, and has since recruited 20 more volunteers to help monitor their milkweed patch at the nature center. This year, they began monitoring in April and will continue monitoring for the rest of the season, into October.

Krystin’s favorite things about participating in MLMP include learning more about monarchs, watching them grow and change into butterflies, and having an opportunity to teach others about monarchs. She developed a community program for families to attend and learn more about how they can help monarchs. This program focuses on the importance of planting milkweed. It is hard to find native milkweeds in their area, and Krystin hopes her program will lead to action and change in their community.

“The milkweed may be hard to get going, but once it does, it really takes off!” says Krystin.

Looking forward, Krystin and her team will be raising some monarchs for Activity 3 (Estimating Monarch Survival), as well as continuing their weekly monarch density monitoring (Activity 1).

MLMP Launches an Upgraded Data Entry System!

We’re excited to share news of an upgrade to MLMP’s data entry system! Supported by the Monarch Joint Venture, this upgrade improves and streamlines your data entry process. We will record a quick tutorial that orients you to the new platform now that it is live. While we anticipate that there will be a bit of a learning curve, the changes were based on user feedback over the years and extensive testing in our lab.

Notable changes:

- If you collect per-plant monarch density data (Activity 1C), you no longer need to enter summary data first. You can enter your 1C data from the start.
- The new portal has a different look and navigation, but the elements of the old (current) system are still there.
- The results section will include more summary information at the site and state level.

All past data have been carried over to the new platform. Volunteers should have a better user-experience; the updated system is intuitive and easy to use on almost any device. You will be prompted to change your password if your current password does not meet our new password strength requirements.

MLMP wouldn’t be what it is without our amazing volunteers. Thank you for all of your hard work collecting data to help us learn more about monarch butterflies!

We welcome feedback on this change. Please email us at info@mlmp.org with any questions, comments or concerns once you log in to the new portal.
Is it True there is a NEW Monarch Citizen Science Program?

Yes! The Integrated Monarch Monitoring Program (IMMP) is a new effort engaging citizen scientists to track monarch distribution and abundance. It uses the Monarch Larva Monitoring Project (MLMP) egg and larvae monitoring protocols and provides additional activities to conduct at each monitoring location.

Background about the MLMP

Since 1997, the MLMP has involved volunteers from across North America in gathering data about monarch eggs, larvae, and their milkweed host plants. Information about monitoring sites allows us to correlate site features with monarch abundance. MLMP volunteers continue to provide data that help in our understanding of the distribution and abundance of breeding monarchs in North America, and to inform and inspire monarch conservation.

The primary activity in which MLMP volunteers participate is measuring monarch density, by visiting a site of their choosing one time each week to observe the milkweeds and record the number of plants, eggs, and caterpillars they find. MLMP locations are all areas of known monarch habitat (containing milkweed), such as backyard gardens, public parks, or nature centers. The information collected in this activity is used to study habitat characteristics, larval survival, and the distribution and abundance of breeding monarchs across their geographic range. Many volunteers also rear monarchs that they collect as eggs or larvae, providing additional information on natural enemies and survival rates, which can then be used to model population dynamics.

What is the IMMP?

The Integrated Monarch Monitoring Program (IMMP) is a national initiative to monitor monarch populations and habitat throughout the breeding range. It differs from the MLMP in two key ways. First, the IMMP uses geographically-representative, randomly-selected locations for monitoring activities (find out more about the random site selection process). This allows us to fill geographic and biological data gaps by prioritizing a set of predetermined locations from different land-use sectors for monitoring. Although particular sites have been prioritized for monitoring, participants can still monitor on sites of their choosing and contribute to the national dataset. Second, additional activities measure aspects of habitat quality (including nectar plant frequency), and monarch use of habitat (including more detailed assessments of adult monarch abundance).

The information collected by the IMMP will contribute to existing population and habitat models that inform broad-scale monarch conservation and provide long-term status and trend information for the species.

How do MLMP and IMMP work together?

The activities of the IMMP provide a comprehensive understanding of monarchs and their habitats throughout their breeding range. MLMP’s emphasis on measuring monarch egg and larval density at known milkweed locations complements the IMMP. In fact, MLMP’s methods for egg and larval monitoring (Activity 1) were adopted by the IMMP so that the data about monarch eggs and larvae from both efforts can be combined for analyses.

The additional IMMP activities (conducting adult monarch surveys and assessing nectar plant resources) can be conducted at existing MLMP sites as well.

What does this mean for me as an MLMP volunteer?

If you are an MLMP volunteer and you do not wish to take on any additional monitoring activities, keep doing what you are doing! Your monitoring efforts will continue to provide valuable data that inform monarch conservation.

If you would like your current MLMP site to contribute additional data to the IMMP, or you wish to take on an additional, random monitoring location, please contact mjvmmonitoring@umn.edu for next steps.