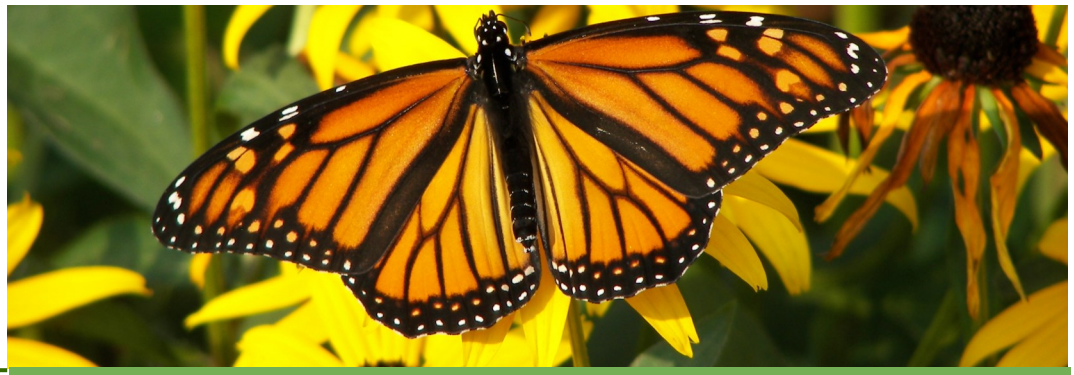
February, 2015

Issue 7

MONARCH JOINT VENTURE



MonarchNet News
A Citizen Science Newsletter

Upcoming Events

- Iowa Butterfly Survey Network Train the Trainer event in Reiman, Iowa, March 18
- Midwest-Great Lakes Society for Ecological Restoration Meeting in Chicago, Illinois, March 27-29

Eastern tailed-blue butterfly. Photo courtesy of USFWS.

The Monarch Joint Venture
2003 Upper Buford Circle
135 Skok Hall
St. Paul, MN 55108

Phone: (612) 625-8304
Fax: (612) 625-5299
monarchs@monarchjointventure.org
www.monarchjointventure.org/

Citizen Science Updates

Citizen Science 2015

- The first conference of the Citizen Science Association was held in San Jose on February 11 and 12. More than 600 citizen science volunteers, project leaders, and researchers from across the globe were present to share their perspectives on the growing field of citizen science. Key themes included reaching out to a more diverse group of volunteers, the importance of collecting null or absence data (see article on p. 2-3), and the research, education, and conservation outcomes of citizen science. Monarchs featured heavily in talks, posters, and discussions! Many of the posters presented at the conference can be viewed online.

Milkweed Citizen Scientists Needed

- Scientists at the College of William and Mary are in need of assistance from citizen scientists. They are analyzing the genetic structure of milkweed across the country in order to understand how monarchs and other insects will be affected as milkweed populations change. Volunteers are needed to collect milkweed and milkweed bug samples. Read more about the project here.

Citizen Science Twitter Chats

- Dr. Caren Cooper, of the North Carolina Museum of Natural Sciences, and SciStarter are hosting monthly twitter chats using the hashtag #CitSciChat. The chats are open to anyone interested in citizen science. You can learn more here.

Connect with the Monarch Joint Venture on social media!

Are you looking for up-to-date information on monarch conservation and citizen science?

- **Follow us on Twitter @MonarchsJV**
- **Like us on Facebook**

Mourning cloak caterpillars. Photo courtesy of Carl Stenoien.

Monarch Citizen Science and Data Accuracy

By Karen Oberhauser, Director of the Monarch Larva Monitoring Project and University of Minnesota Professor of Fisheries, Wildlife and Conservation Biology

As readers know, several citizen science projects depend on data collected by volunteers throughout the breeding, migratory, and to a lesser extent, overwintering ranges of monarchs. It's likely that you're one of these volunteers who contribute so much. If so, thanks!

As a volunteer, it's important to you that your time is well-spent, and, while you probably have fun and learn a lot as you collect monarch data, it's my guess that it is also important to you that your data are used to help understand and conserve monarchs. An important step of the scientific process is making sure that the data (whether or not they're collected by citizen scientists) used to answer questions are as accurate as possible. To help ensure that your time is well-spent, we've pulled together some thoughts on data accuracy from the leaders of the three largest-scale monarch citizen science projects: Journey North, Monarch Watch, and the Monarch Larva Monitoring Project (MLMP). Journey North volunteers report, among other things, sightings of monarch adults during their fall and spring migration. MLMP volunteers survey milkweed plants, ideally every week, and report the number of plants surveyed and the numbers of monarch eggs and larvae, identified to instar, on these plants. Monarch Watch volunteers catch and tag migrating monarchs, some of which are caught later during the migration or at the winter sites in Mexico. These projects thus represent a spectrum of time commitment and required expertise. We asked each leader about causes and prevention of the most common errors that their volunteers make, and what happens when inaccurate data are submitted.

All program leaders are first and foremost grateful for the time and effort represented by the data submitted to their program, and impressed with the high quality of these data. Elizabeth Howard, Journey North director, said "we've found people to be extremely careful about the observations they submit. People understand the importance of the data, they want to be helpful, and they hesitate to contribute unless they are quite sure of themselves. This self-screening is a valuable first step to data accuracy."

As a long-term field biologist, I often hire undergraduate student workers during the summer, and have worked on collaborative projects with faculty members from other institutions who do the same. People who ask about the quality of citizen science data often don't realize that many data published in traditional scientific papers are actually collected by these student workers. Don't get me wrong, I like undergraduates, but there is no reason that we should be inherently more trustful of data collected by student workers making $8-$10 per hour than those collected by committed adult volunteers. In fact, in one more "traditional" study of monarch numbers, we needed to discard lots of data from collaborators from another institution (luckily not the U of Minnesota) because it was clear that they weren't accurate.

For all three projects, many problems would be relatively easy to solve if people were a little more careful. For Monarch Watch, the biggest issues involve not returning data sheets, recording only part of the code for each monarch, and failing to record the location or date of tagging. This means that about 10% of all of the monarch tags that are recovered result in no data because project organizers don't know when and where the monarchs were tagged. The cost of this to the program is significant; Monarch Watch pays 50 pesos per recovered tag, and the unusable data represent a loss of $7000 to $10,000 over the years. Here are some examples of these problems, according to Chip Taylor, Monarch Watch director: "Transposition of codes and dates is more common than I thought it would be. We've identified a number of cases in which a butterfly was recovered before it was tagged. We tracked down a NJ recovery to find that the person who reported the recovery had transposed the tag code and that the butterfly had actually been tagged in Ohio."

For Journey North and the MLMP, accurate observation and identification is a big concern. Howard, of Journey North, says, "It's easy for us to catch smaller things (errors in data, location), but accurate identification remains our biggest concern. With the monarch's higher profile now, we have more new participants along with more reports of 'yellow monarchs' and 'baby monarchs,'" which are clearly other butterfly species. A similar kind of error occurs when some MLMP volunteers report seeing many monarch larvae, but no or few monarch eggs. Clearly, these data cannot be accurate, and volunteers are just not locating eggs. We also see cases in which volunteers report many more late-instar larvae than first instars, and are either mis-identifying or missing completely the first instars.

Monarch egg. Photo courtesy of Joyce Pearsall

Monarch Citizen Science and Data Accuracy, continued

Journey North has a full-time person dedicated to screening data during the migration seasons, reviewing sightings, contacting observers with questions, and editing or removing data, usually within 24 hours of the report. Thus, the 'real-time' maps that appear on the Journey North website represent a large up-front investment in data cleaning. MLMP has a different approach to cases of mis-identification or missing data. We leave clearly-inaccurate graphs on the MLMP website, since these records do provide information about monarch presence, and also represent a record for the volunteers. However, when we use the data for publications, we use specific "cleaning" criteria, and do not use records that are almost certainly inaccurate, such as those in which few eggs but many larvae are observed. While other people could download the data and use inaccurate records, we have a notice on the website that tells people that the data have not been cleaned, and that they should contact us before using them.

One of our biggest concerns about MLMP data, especially now that we are using them to help assess the status of the monarch population, is that people often do not monitor at all, or monitor less carefully or less often when monarch numbers are very low. One of the most distressing sentences I've heard in the last few years from volunteers sounds something like this; "I didn't monitor this year because there just weren't any monarchs around." This is upsetting because without accurate data, we cannot understand how monarch egg and larval densities in the samples that are represented by MLMP sites reflect the overall population. If people tend to not report low numbers, MLMP data overestimate population size.

Technology could help to address some identification problems. After years of experience, Journey North staff know when and where look-alike species are present that could provide identification challenges. Now that photo validation is so simple, they can often obtain photo records that allow them to be much more confident about questionable sightings. Journey North and MLMP personnel are also working with an expert to develop a smart-phone application that will help people better identify monarchs at all life stages.

All project leaders agreed that it's important for people to read directions carefully, ask questions when anything is unclear, and be consistent in their monitoring efforts. The three projects we've focused on here range a great deal in the effort required, and can provide venues for individuals with varying amounts of time and expertise. Journey North, with its very simple protocol and strong support to volunteers, addresses the important goals of collecting scientifically accurate data and developing scientifically literate volunteers. Journey North provides a comfort level that welcomes new people into the fold and prepares them for projects that require more knowledge and expertise, such as the MLMP.

An important outcome of these projects, and many other large-scale citizen science projects, is that they are providing lots of data. Massive data sets are less vulnerable to missed errors than smaller data sets. For example, over 1.2 million monarchs tagged through the Monarch Watch program, and over 16,000 have been recovered. If project staff clean up as many of the errors as they can, those that are missed will have no impact on the outcome of any analysis. But, whatever the size of the data set, it's important to vet the records for accuracy, and, if you're careful, your data won't be the ones that are cleaned out before analyses.

Monarch caterpillar on milkweed. Photo courtesy of Hadassah Zoharah.

We want to hear from you!

Are you are a butterfly citizen scientist with a story or a photo to share? Would you like to nominate a volunteer or program for recognition in the newsletter? Write to us at *monarchs@monarchjointventure.org* with what you would like to see in the newsletter.

Help us spread the word. Send this newsletter to friends who may be interested, and encourage them to "Get Updates" under News & Events on the MJV website at monarchjointventure.org/news-events/get-updates.