

## GET INVOLVED TODAY!

Visit us online to find out how you can participate in Monarch Watch or help support this wonderful educational program. Thank you!

Monarch butterflies capture the imagination of people of all ages with their spectacular migration and striking beauty. Each fall, millions of monarchs migrate from Canada and the United States to their remote overwintering grounds in the Transvolcanic Mountains west of Mexico City. Deforestation in Mexico, habitat loss in the United States, changes in agricultural practices, and global warming threaten this phenomenon. Monarch population size estimates help conservation groups understand the impact of these threats. Monarch Watch provides these critical population size estimates through its tagging program, a long-term mark and recapture effort.

Monarch Watch is an educational outreach program based at the University of Kansas that engages citizen scientists in large-scale research projects. This program produces real data that relate to a serious conservation issue. Monarch Watch gets children of all ages, both at the primary and secondary level, involved in science. Our website provides a wealth of information on the biology and conservation of monarch butterflies and many children use it as a resource for science fair projects or reports. Additionally, we encourage children to showcase their research or school projects on our website and we involve them in real science with the tagging program.

Since its inception in 1992, Monarch Watch has evolved into an electronically-based program with an award-winning website and a growing community through e-mail discussion lists and online forums. The program involves more than 2,000 schools, nature centers, and other organizations in the United States and Canada, and we estimate 100,000+ students and adults participate in tagging activities each fall.

To help support this program, we have several promotional and educational items for sale - including our Monarch Tagging Kits, Monarch Rearing Kits and thousands of other nature-related items. Please visit our website and the Monarch Watch Shop for complete details:

[www.MonarchWatch.org](http://www.MonarchWatch.org)

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## Why We Still Tag Monarchs

Given the obvious success of the tag recovery program, one might ask: why do we continue with the tagging program? Don't we have enough recoveries to learn all there is to learn about the migration? The simple answer to the questions is that we learn something new each year. When we started this program in 1992, only 99 monarchs tagged by Fred and Nora Urquhart and their associates had been recovered in Mexico. The number of recoveries from Mexico now exceeds 10,000 with more than half of those coming from the winters of 2002 and 2004 when severe January storms killed an estimated 75% and 70% of the population respectively. Yes, in general terms, we know where the monarchs come from that overwinter in Mexico but there are many details that are still not clear. One of the puzzles is why the recoveries are not a linear function of distance. In other words, given that the distance from St. Paul, MN to El Rosario (1791 miles) why does Don Davis have to tag more than 2.5 times as many butterflies for each recovery when the distance from Toronto, Canada to El Rosario (2053 miles) is only 1.1 times greater?

We have learned a great deal about the migration to date from all of your tagging efforts. The tagging data have revealed that there is a pattern to the timing and pace of the migration. When we initiated this program there were no data on the time course of the migration. It appeared to be primarily driven by the weather. We now know that the migration is intrinsically driven by an interaction of the monarchs with the changing celestial conditions in the fall such that the pace of the migration across the latitudes is remarkably predictable. This pattern is so robust that it allows us to anticipate the arrival of the wave of southerly moving monarchs at each latitude. We are presently engaged in an extensive study of all the tagging data to date and anticipate that additional insights concerning the migration will result from this analysis.

One of our goals for the tagging program was to use this mark and recapture effort to derive estimates for the size of the fall migratory population, the amount of mortality during the migration and the size of the overwintering population. To be able to arrive at such estimates, traditional mark and recapture methods require that the number recaptured or viewed (in the case of dead butterflies on a forest floor) is known. In other words, we need specific measures of the number of untagged to tagged butterflies for each population

estimate. Because the ratio of untagged to tagged may be tens of thousands to one, establishing a true measure of the population using this method has eluded us. We've tried to estimate the number "viewed" in the winter population for each recovery and to use the total hectares occupied by overwintering monarchs, and the various estimates of the number of butterflies per hectare suggested by various studies, but none of these methods has yielded a satisfactory estimate of the total population. Estimates of the number of monarchs per hectare varies from 10 to over 50 million - too broad to be of much use particularly since the measurements of hectares varies (usually declining by 30% or more) from December to January at the same site. It remains that we are going to have to devise a way to establish the ratio of untagged to tagged monarchs to arrive at a reasonable estimate of the number of overwintering monarchs. This is doable but it will take some technological innovations to accomplish this objective. At present, we are limited to collecting thousands of dead monarchs from the overwintering sites and scanning them visually for tags. This is too time consuming as we discovered first hand when it took 4 of us many hours over 4 days to scan 40,000 dead monarchs for tags. We are confident that once we have developed and perfected the technique we have in mind, we will be able to arrive at consistent estimates of the number of untagged to tagged monarchs that can be used to arrive at more accurate population estimates.

There are two other reasons for continuing the tagging program. The involvement of thousands of taggers has created a veritable army of observers in the field. The reports from this large cohort of collaborators provide us with insights on the dynamics of the migration and the size and quality of the population each season. Perhaps of even greater importance is the fact that this program brings at least 100,000 people into intimate contact with one of the worlds most remarkable natural events each fall. Once people become familiar with monarchs, the value of preserving the monarch migration in eastern North America becomes apparent. Saving the monarch migration is possible but the threats to the migration posed by a variety of human activities, e.g., illegal logging at the overwintering sites in Mexico, are such that the public in Canada, the United States and Mexico will have to lobby their politicians to enact and fund measures that assure the preservation of the migration.

# 2016 MONARCH WATCH MINI TAGGING DATASHEET

TAGS PURCHASED/RECEIVED FROM: \_\_\_\_\_

.....  
 : PHOTOCOPY THIS SHEET IF NECESSARY; YOU MAY ALSO DOWNLOAD IT FROM OUR WEBSITE - WWW.MONARCHWATCH.ORG :  
 .....

TAGGER NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY, STATE, ZIP \_\_\_\_\_  
 PHONE AND/OR EMAIL \_\_\_\_\_

PLEASE RETURN ALL COMPLETED DATASHEETS AND  
 UNUSED TAGS BY **DECEMBER 1, 2016** TO:  
**MONARCH WATCH • UNIVERSITY OF KANSAS**  
**1200 SUNNYSIDE AVENUE • LAWRENCE, KS 66045**

Tag Code (6 symbols)	Date (mm/dd/yy)	(M)ale/(F)emale	(R)eared/(W)ild	Tagging Location (City, State, Zip)
Example: ABC123	09/15/16	F	W	Lawrence, KS, 66045

## IMPORTANT NOTES

- Before using this datasheet, fill out the top portion (name, address, etc.)
- It is **very important** that you record the complete six-symbol tag code - partial codes make tracking your monarch virtually impossible.
- Record tags in sequential order.
- Use black ink to record your data and make sure everything is readable.
- Keep originals and return a copy of your datasheets to us. In the event that your datasheet is lost or destroyed, we will contact you for another copy.
- Please let us know of lost, redistributed, or damaged tags and return any unused tags with your completed datasheets as soon as possible and preferably before December 1st.

## INSTRUCTIONS

### Tag Code & Date

Record the complete tag code in the format of 3 letters followed by 3 numbers. Record the complete release date, including month, day and year.

### (M)ale / (F)emale

If possible, indicate the sex of the butterflies you tag. See the Pre-Migration Newsletter for guidance.

### (R)eared / (W)ild

Indicate whether the tagged monarch was (R)eared from the egg, larva, or

pupa stage or captured as a (W)ild adult butterfly.

### Tagging Location

Give the nearest town or city, state (province) and zip (postal) code - for example: Lawrence, KS, 66045

**You might find it easier to work with a partner, taking turns tagging and recording data.**

**1.** Carefully hold a monarch between your thumb and index finger along the leading edge of the butterfly's forewings and locate the discal cell (large mitten-shaped cell on hindwings). See figure A at right.

**2.** Record all data before removing a tag from the sheet.

**3.** Remove a tag by its edge from the sheet (a toothpick might be helpful), place it over the discal cell (of either hindwing) and carefully apply pressure to the tag from both sides of the butterfly (Figure B), press firmly for several seconds and release the butterfly - again, making sure all of the information is recorded first!

**Try not to allow the tag to stick to any other surface, such as your finger, before applying it to the butterfly** - to be most effective, the adhesive surface of the tag must be clean when it is applied to the wing.

**HAPPY TAGGING!**

