What Has Four Eyes, Six Legs and is Red All Over?
Building a Citizen Science Program With *Tetraopes*

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Abstract
This short paper will chronicle the development of Milkweed Watch, a citizen science program based out of the University of Nebraska-Lincoln, which seeks to raise awareness about and appreciation of the invertebrate fauna associated with milkweeds. This program has special interest in updating the distribution of the charismatic, red and black longhorn beetles of genus Tetraopes.

Milkweed Watch is a citizen science program based out of the University of Nebraska-Lincoln's Department of Entomology. Established in 2014, the program had a slow start, but following a revamped approach, has started picking up speed! The program originally spawned from the lacking appeal of milkweed plants (*Asclepias* spp.) on the part of some members of the public. For various reasons, milkweeds are disappearing. Despite the famous and close association of these plants with the beloved and iconic monarch butterfly (*Danaus plexippus*), these host plants are often demoted to the status of "weed" and removed from properties. The undervaluing of these important plants is worrisome for the conservation of not only the monarch butterfly, but also all those species that exclusively or partially rely on them. Milkweed Watch was established to begin a homegrown, Nebraska approach to the conservation of milkweed and associated wildlife conservation. This past year, the program got more organized and has joined forces with the Nebraska Master Naturalists, Master Gardeners and others, to achieve its goals.

Milkweed Watch has four primary goals. The first is to determine what animal species use milkweed plants. This involves a simple photographic inventory of animal sightings (invertebrate and otherwise) found on milkweeds. The ulterior motive of this goal is to expose people to the sheer diversity of animals utilizing these plants in numerous ways. Citizen scientists are asked to join the Milkweed Watch project page on iNaturalist.org. This platform allows them the ability to interact with their data while giving the Milkweed Watch program leaders access to their records. An iNaturalist app (available through Google Play and the App Store) can be used in the field, making observations and recordkeeping simple and fast! Further, all iNaturalist members, whether Milkweed Watch members or not, can work together to properly identify specimens in photographs. It should be noted that the burden of identification does not fall on the citizen scientists of Milkweed Watch. However, they are provided with guides, tools and training to give them this knowledge and skill should they choose to develop it.

The second goal of Milkweed Watch is to determine the diversity and distribution of milkweed plants in Nebraska. There are approximately sixteen *Asclepias* species recorded throughout the state. Additionally, honeyvine milkweed (*Ampelamus albidus*), is recorded as well, since it too holds "weed" status yet supports milkweed dependent species, including the monarch. The state of Nebraska has diverse ecoregions, ranging from the tallgrass prairies and wetlands in the east

to the semi-arid conditions of the Sandhills and shortgrass prairies in the west. Each ecoregion has its own collage of milkweed species. Citizen scientists are asked to make photographic observations of milkweed presence. These might include plants already found on their property, plants found casually while out on a walk or excursion, new milkweeds planted by the citizen scientist, or any combination of these. Photos are uploaded to the iNaturalist page for identification and recordkeeping. A dichotomous key to the milkweeds of Nebraska was developed for use and testing by Milkweed Watch citizen scientists.

The third goal of Milkweed Watch is to update the diversity and distribution records of Red Milkweed Beetles (*Tetraopes* spp.) in Nebraska. This showy and charismatic beetle is an easy entry into the world of milkweeds. The last formal *Tetraopes* survey in Nebraska was a Master's thesis by J. R. Baker (1971). This past year, distribution of this genus was revisited through personal collections of entomologists in the state (Spomer, 2014). Six species have been recorded in Nebraska, including *Tetraopes tetrophthalmus, T. femoratus, T. quinquemaculatus, T. melanurus, T. annulatus* and *T. pilosus*. Again, citizen scientists are asked to record photographic observations in their iNaturalist account. A simple guide to the milkweed beetles of Nebraska was developed for our volunteers, however definitive species identification will likely require samples. Sampling will likely occur in cases where a potentially new county record is reported. Indeed, it is possible that new state records will be recorded through this project. Just a few years ago, a new species, *Tetraopes huetheri* Skillman was reported in South Dakota (Skillman, 2007). It is hoped that one of the Milkweed Watch citizen scientists will record a new county or state record!

The final goal of milkweed watch is to promote awareness about and appreciation of milkweeds and other wild plants. Researchers know citizen science for its value of increasing the geographic, temporal and spatial reach of a research program. However, citizen scientists also extend outreach and awareness – another integral aspect of a research program. It is through Milkweed Watch's citizen scientists that this fourth goal truly comes to life and has it's best chances at success. The state of Nebraska is overwhelmingly a privately-owned land grid. This ownership thus requires a door-to-door approach to milkweed conservation and observation. When Milkweed Watch first began, it was a two-person show. This severely limited the impact we could have on Nebraskan citizenry and attitudes towards milkweeds. Through the actions of Milkweed Watch volunteers, they are reaching out to their neighbors, their family members, their communities, and offering encouragement to grow or preserve milkweeds, teaching classes about milkweeds, recruiting new Milkweed Watch volunteers and spreading an interest in the diversity of life that abounds on these plants.

Several private and government efforts have been put forth to draw attention to the issue of declining milkweed and monarch populations. To be successful, such efforts will require many approaches and many people. Milkweed Watch is just one of these efforts, tailored to the Nebraska terrain. Each observation and each report provides a clearer picture of milkweed distribution and significance. As a team of milkweed watchers, we hope to not only support monarch conservation efforts, but also the stewardship and appreciation of all creatures that rely on these critical plants.

References

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