

CASE STUDY



Milkweeds & Monarchs: Summer Internship

Youth-focused Community and Citizen Science // A project of the UC Davis Center for Community and Citizen Science // education.ucdavis.edu/ccs

Youth Community and Citizen Science (YCCS) can take many forms. In the case study below, drawn from in-depth field research, we highlight important project features and describe how educators and youth have taken up three key practices that promote science learning and environmental science agency—the ability to use experiences in citizen science and environmental science to make positive changes in one’s life and community.

DESCRIPTION

The Monitoring Milkweed-Monarch Interactions for Learning and Conservation Project (MMMILC) is a long-term ecological monitoring research project run out of UC Davis. The goal of the project is to better understand the interactions between milkweed plants (*Asclepias spp.*) and monarch butterflies (*Danaus plexippus*) that rely on the plants through multiple life stages. In a changing climate, long-term monitoring of native pollinators is crucial for learning more about entire ecosystems. Each summer, a group of high school interns participate in MMMILC activities as part of a career-focused internship program run by the Center for Land-Based Learning (CLBL). Monitoring activities take place at a suburban green belt. Interns come from cities surrounding the greenbelt. After training and a certification exam, they visit the site weekly to assess the status of milkweed plants and take photographs for a group blog. UC Davis and project entomologist Dr. Louie Yang writes a weekly update with ongoing analysis of the data interns have collected.



SPECIES OR SYSTEM STUDIED

Milkweed and monarch interactions. Interns collect weekly data on milkweed size, development, and monarch interaction.

RESEARCH SITE

Suburban green belt. Interns study milkweed plants that were planted two years ago along a greenbelt that lies between agricultural fields and a suburban neighborhood.

PARTICIPANTS

High school students. In the summer, 6 – 18 racially and ethnically diverse high school students, ages 15 – 18, spend one day a week with MMMILC as part of a paid work development internship.

STRUCTURE

Summer internship. In the summer, interns collect data that contributes to a larger year-round project run by UC Davis entomologist, Dr. Louie Yang.

DURATION

4 months. Most interns participate over the summer, while some continue longer, monitoring during spring and fall, or returning to the program for a second or third summer.

INSTITUTION

University-Community Partnership. MMMILC is housed at the University of California, Davis, and works in partnership with the Center for Land-Based Learning.

OTHER ACTIVITIES

Each week, at least one youth intern creates a blog entry with pictures taken during data collection. As part of their broader internship, interns also work on a local organic farm and attend community college classes. For the MMMILC project, Dr. Yang and his undergraduate students partnered with the city and several other local organizations to plant several hundred native milkweed plants in the greenbelt.

CURRICULA RESOURCES

Several resources were created for this project, including a training session presentation, monitoring certification exam, monitoring protocol, and a monarch larvae identification sheet.

KEY PRACTICES

*There are many strategies to get youth involved in community and citizen science. Through in-depth case studies of diverse YCCS projects, we have documented three youth-centered practices that are effective in promoting learning and environmental science agency. These practices are **youth sharing findings with outside audiences, taking ownership of data quality and interacting with complex social ecological systems.***

SHARING FINDINGS WITH OUTSIDE AUDIENCES

A public blog challenges interns to identify what’s important and communicate clearly and effectively

Throughout the program, interns often shared pictures of caterpillars and other interesting insects with the project scientist and on social media. Additionally, each week a different MMMILC intern took on the role of “blogger” and shared a highlight or anecdote from that day’s monitoring experience. There was little structure

to the blog, giving interns the opportunity to write about whatever aspect of the data collection and field experience they wanted. For some youth, this offered a creative means by which to share their thoughts publicly, though in some cases other dismissed or ignored the responsibility.

One intern, Duncan, showed much enthusiasm for this role. While initially unsure about what to write in his first blog, in his second entry Duncan was excited to share the experience of finding an intriguing caterpillar. After speaking to Dr. Yang about his unusual discovery and learning



more about it, he used careful scientific language when describing the caterpillar stages through metamorphosis and encouraged other interns to read the blog entry. Later in the program, Duncan also volunteered to co-write a third blog with a friend, showing the friend how to add pictures and make the post live.

The on-going process of making observations in the field and describing these findings in the blog allowed students to freely share what they were learning and experiencing each week. Blog entries ranged from noting caterpillar discoveries, sharing reflections on teamwork, and describing the challenges of field work on hot days. These examples not only illustrate incremental steps towards science learning and identity development, as in Duncan's case—but also demonstrate that youth want to share their socio-emotional experiences with outside audiences as well.

YOUTH OWNERSHIP OF DATA QUALITY

Lessons learned from early mistakes: forming diligence and identity in QA/QC

Over the course of the program, interns became increasingly confident with the data collection protocol and settled into a familiar monitoring routine. They knew exactly what had to be done and could begin work with little to no instruction. Likewise, the youth became aware of the need to help peers monitor more labor intensive sections—those with bigger plants and/or more caterpillars.

Charged with monitoring several hundred individual milkweed plants, interns learned it was necessary to consistently check that they were keeping accurate track of plants. This included paying attention to numbered tags attached to the plants themselves and the corresponding number recorded on the data sheet. After a particular incident where interns had to go back and remeasure plants a second time after they were recorded incorrectly, they discussed the importance of reliable data and became diligent about paying close attention to plant numbers throughout the rest of the

program. During another monitoring event, three of the participants took on the role of teaching the monitoring protocol to two visiting undergraduates. The youth answered questions and demonstrated techniques they had both learned and refined.

A major component of this project included online data entry. Interns worked in pairs or individually to enter the week's data into an online spreadsheet. This experience offered an opportunity for these youth to take a second look at their field recordings and sometimes led individuals to comment on or question individual and peer data accuracy and quality. For example, when Dr. Yang shared statistics on the interns' average monitoring time per plant, it led to a discussion about data quality versus quantity. One youth pointed out her slower monitoring speed was due to thorough measurement - throughout the project this became a particular identity she took on and justified for herself.

Opportunities like these—for discussion to focus around specific situations and include youth voices—gave interns a chance to more deeply understand how data quality could vary, how it affected research, and how their actions played a role in it.

INTERACTING WITH COMPLEX SOCIAL ECOLOGICAL SYSTEMS

Weaving together new hands-on experiences in science, place, and community

Youth interacted with the natural, built, and social environments where they were monitoring. The site was located along a public trail and passersby occasionally asked what interns were investigating. Some people were familiar with milkweeds and monarchs and shared positive reinforcement and encouragement for what the group was doing. Several youth took the time to share information about the project with interested individuals, while others avoided conversation with strangers or talked about unrelated things instead. Collectively, this wide range of interaction and overall positive response from the public offered interns choice in how they engaged with members of the public and how to share the information about their work.

Many of the interns were unfamiliar with this type of restored urban green space before participating in the project. Through weekly monitoring, familiarity with the place developed and allowed these youth to experience many different aspects of the greenbelt over several months—from picnicking in the shade, to picking in season figs, to witnessing significant phenological changes in the milkweed plants and monarchs—and to understand how restoration, community use, and environmental science research interacted.

YCCS PRODUCTS

In YCCS, the work youth do has a purpose—a “product” that has an audience and impact beyond the classroom walls. These products can vary widely by case.

DATA

Interns record weekly milkweed size and development, and monarch presence, size, and life stage measurements.

Audience: UC Davis MMMILC Project researchers

GROUP BLOG

1 – 3 interns take pictures and write a weekly blog about milkweed/monarch observations and reflections from the field and overall project experience.

Audience: General public

OUTCOMES & EVALUATION

The goals of the MMMILC Project are to provide interns with experience contributing to “real-world research” and a first-hand understanding of how science works. However, these outcomes are not currently being evaluated by MMMILC or CLBL.

DATA COLLECTION

Goals for learning included how to follow the study protocol utilizing datasheets, a folding ruler and calipers, identify milkweed plants and their relevant structures, and identify monarchs in all their life stages: egg, larva, chrysalis, adult. Educators used pictures, as well as living and preserved examples of each plant structure and monarch life stage to help interns identify them. To demonstrate proficiency interns practiced going through the protocol and measuring and recording data using potted plants with monarchs on them. To assess proficiency, MMMILC gave students a paper-and-pencil monitoring exam that interns were required to pass before doing fieldwork.

DATA ENTRY

Interns learned to carefully enter their data using online spreadsheets. Proficiency was evaluated and supported through observation by the lead educator.