



**Q-Q RESEARCH**  
consultants

# **Final Report\***

**Wildlife Neighbors (AISL 2153843 )**

**PI: NC Harris, Yale University**

**coPI: Detroit Zoological Society**

\*This material is based upon work supported by the National Science Foundation under Award No. AISL 2153843. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

## Evaluator

As the evaluator, Q-Q Research Consultants (QQRC) is contracted to conduct the evaluation of the Wildlife Neighbors pilot project. QQRC is a women-owned 8(a) small business with over 20 years of experience using data, technology, and innovation to develop solutions for private and public business sectors and partnerships domestically and internationally. The QQRC Core team includes 25+ expert consultants that possess a high degree of knowledge and skills in support of a wide range of business needs, including:

- Training
- Professional Services
- Research, Monitoring, and Evaluation
- Project Management
- Administrative and Human Resources

When conducting the evaluation, the QQRC team harnesses their advanced training in research and evaluation methodologies to take an approach that includes the use of methods that embody the principles set forth by the American Evaluation Association.

## Introduction

As part of its overall strategy to enhance learning in informal environments, the Advancing Informal STEM Learning (AISL) program funds innovative resources for use in a variety of settings. For example, the project allows for a participatory research experience for urban youth (6th-8th grade) through the use of trail camera surveys (cameras that allow researchers to unobtrusively collect information on the presence of wildlife) around the Urban Metropolitan parks of Detroit, Michigan. Urban ecologists studying wildlife reside at the nexus between human and natural ecosystems. It is this coupling that uniquely positions these researchers to facilitate a myriad of informal, experiential learning in STEM education. Through a strategic partnership between the Applied Wildlife Ecology Lab at Yale University and the Detroit Zoological Society, youth participants deployed trail cameras in parks near middle schools to capture their wildlife “neighbors” with whom they are sharing the neighborhood. Facilitation modes of the Wildlife Neighbors program varied in the amount (summer camp vs. afterschool club) and medium (in-person vs. remote) of facilitation to immerse the participants in ecological research, engaging them in the entire scientific process: observation, inquiry, data collection, fieldwork, data analysis and story telling. The project sought to examine the effects of experiential learning through wildlife monitoring on strengthening four aspects of environmental literacy: knowledge of ecology, competencies as researchers, empathy for wildlife, and sense of place. Pre- and post-surveys, reflection questions, and questionnaires to parents/caregivers were implemented to assess the impacts and experiences of the Wildlife Neighbors program on environmental literacy in youth participants.

## Program Overview

Through the Wildlife Neighbors program, middle school students from Detroit, Michigan participated in an inquiry-based science experience in which they used a network of trail cameras in Detroit parks to learn about the wild animals who share their neighborhoods with the goal of strengthening their environmental literacy.

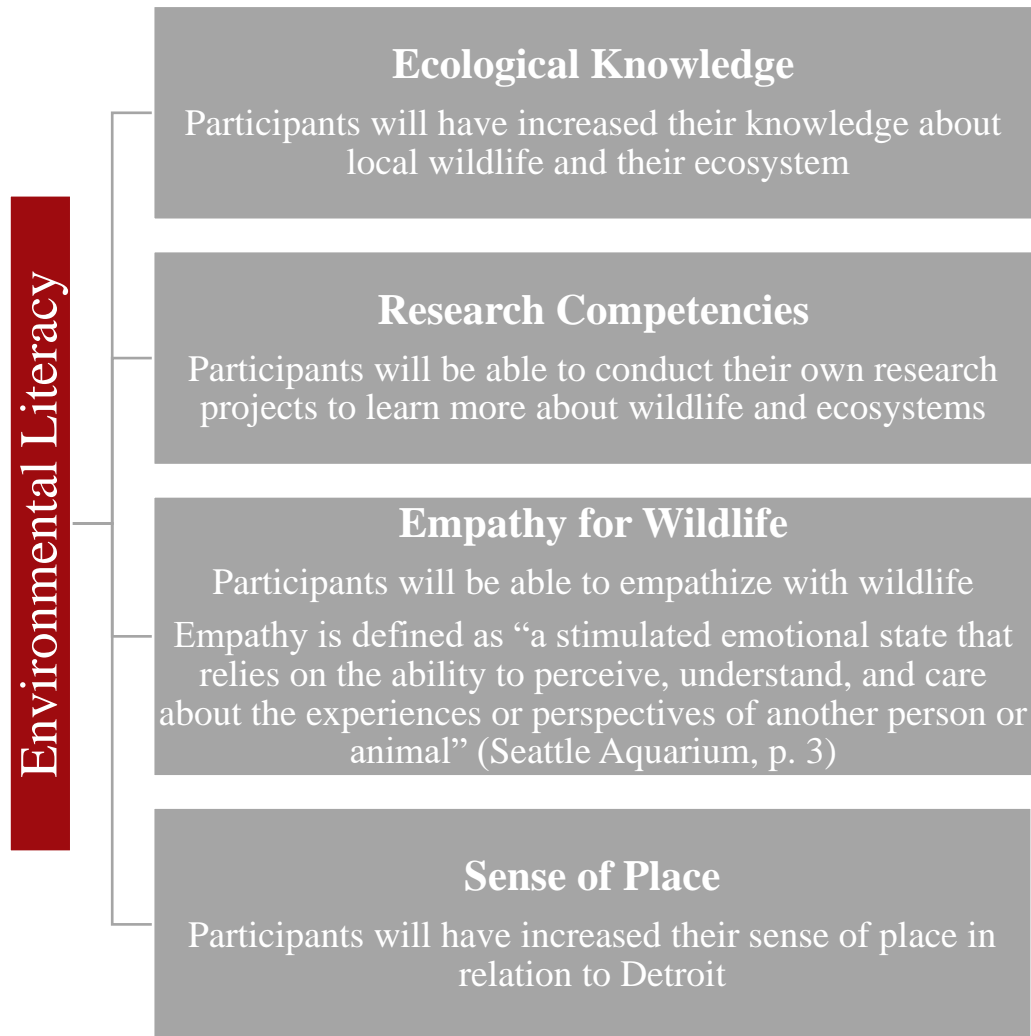
### Environmental Literacy

An environmentally literate person is “someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life” (Hollweg et al., 2011, p. 2-3). Environmental literacy consists of four components:

1. **Knowledge:** Such as knowledge of natural systems, social systems, environmental issues, and civic participation
2. **Competencies:** Such as the ability to identify, analyze, investigate, and address environmental issues
3. **Dispositions:** Such as pro-environmental attitudes and self-efficacy
4. **Environmentally responsible behaviors:** Such as non-activist and activist behaviors

The Wildlife Neighbors program operationalizes environmental literacy as: **youths’ knowledge of ecology, competencies as researchers, empathy for wildlife, and sense of place.**

Figure 1. Environmental Literacy



## Curriculum

The Wildlife Neighbors program was composed of eight curriculum modules that were aligned with the stages of the research process:

- **Module 1:** Making observations and identifying research topics
- **Module 2:** Choosing a data collection method and conducting background research
- **Module 3:** Asking research questions and collecting data
- **Module 4:** Refining research questions and making hypotheses
- **Module 5:** Extracting and processing data
- **Module 6:** Analyzing and interpreting data
- **Module 7:** Reflecting on results
- **Module 8:** Communicating results

## Recommendations and Conclusions

The Wildlife Neighbors pilot project sought to immerse Detroit middle schoolers in ecological research through the scientific process and strengthen four domains of environmental literacy: Ecological Knowledge, Research Competencies, Empathy Towards Animals, and Sense of Place (Place Identity and Place Dependence).

In general, quantitative data demonstrates that the program appeared to improve only one aspect of environmental literacy over time, as other domains remained unchanged. The overall group of participants demonstrated significant gains in their Research Competencies after the program concluded. However, there were no overall improvements in Ecological Knowledge, Empathy Towards Animals, Place Identity, and Place Dependence.

Subgroup analyses on each mode of facilitation found that only participants in the Summer Camp (Heavy) mode significantly improved their environmental literacy. Participants in this mode showed significant increases in Research Competencies, Place Identity, and Place Dependence. The Online (Light) and After School (Low) facilitation modes did not demonstrate significant change in any environmental literacy domain. Surprisingly, participants in the Saturday (Moderate) facilitation mode appeared to decrease their attitudes toward Empathy Towards Animals and Place Dependence. These findings are slightly different from the results of the qualitative analysis, which suggest Summer Camp (Heavy) and After School (Low) participants showed equally improved environmental literacy.

Parents with participants in the Online (Light) facilitation mode also completed surveys before and after the program. However, these parents were not the same, and change over time could not be tested. In general, post-survey parents reported more Ecological Behaviors in the Home and higher levels of their Child's Empathy Towards Animals. There was a slight difference in Home Science Interactions between the two parent groups. Qualitative data also indicated increased interest in nature noticed by parents since their child started the Wildlife Neighbors program in the Online (Light) facilitation subset. There were no qualitative data available or any other facilitation subsets.

Next, the post-program outcomes of participants in the Online (Light), After School (Low), and Saturday (Moderate) facilitation modes were compared to those in the Summer Camp (Heavy) mode, who received the most intensive programming. Participants in the Summer Camp (Heavy) mode reported significantly higher levels of Place Identity compared to those in the After School (Low) mode. Likewise, participants in the Summer Camp (Heavy) mode reported significantly higher levels of Place Dependence compared to those in the After School (Low) and Saturday (Moderate). Qualitative evidence indicates that all participants across the facilitation modes had a positive connection to the city of Detroit. Only three participants indicated a positive change in connection to Detroit after participating in the program. Results may indicate that the program may have the ability to contribute to existing positive connections to the city of Detroit, and there may be an opportunity to strategize on ways to further link participants' positive connections to wildlife in Detroit.

Based on the quantitative evidence, it appears the Summer Camp (Heavy) facilitation mode was the most effective in strengthening participants' environmental literacy (in some domains). The Summer Camp (Heavy) mode of the program took place at the Detroit Zoo and involved tours of the zoo, 45-minute lessons, and hands-on activities. For participants, the in-person experience in a high-quality ecological setting, in combination with long lessons and activities, likely strengthened their Research Competencies, Place Identity, and Place Dependence. In particular, the in-person setting may have been the catalyst for participants' improved connections to the city of Detroit (i.e., Sense of Place). Participants in the less-intense modes, who did not demonstrate as strong of outcomes, had shorter lessons and activities or worked through self-paced modules. The engagement of participants in the virtual, Online (Light) mode remains an open question. As evidenced in the qualitative data analysis, the Summer Camp (Heavy) facilitation mode had the highest amount of survey responses, but they did not excel in effectiveness against the other facilitation modes for each domain beyond the Empathy Towards Animals domain, which results suggest increased empathy among all participants.

However, there appeared to be a positive descriptive change in each facilitation mode, regardless of whether that change was significant. For example, quantitative data indicate that participants in all facilitation modes increased their Research Competencies over time. Even if students' attitudes decreased over time, participants in all facilitation modes reported higher than moderate Empathy Towards Animals and Place Dependence after the program concluded. This may be an opportunity for the facilitators of each mode to meet and discuss the strengths and limitations they experienced over the course of the program. These shared learnings may result in a new program mode that builds on the assets of the four existing facilitation modes. Based on qualitative evidence, it appears that only half of the participants indicated an increase in research competencies, indicating an opportunity to improve the components of the program that target this domain.

There were several challenges with data collection for the Wildlife Neighbors pilot program that should be addressed in the future. Piloting four modes of facilitation for a new program is ambitious but answers an important question regarding the tradeoff between invested resources and participant learning. However, this led to small sample sizes in each of the modes. For instance, only one participant from the Online (Light) mode and five participants from the After School (Moderate) mode completed both the pre- and post-surveys. This resulted in issues of power (i.e., the ability to detect statistical differences) and generalizability (e.g., case study of one) for the analyses on the pilot program. This was also a challenge for parent survey completion. Parents should be surveyed across all facilitation modes and tracked to ensure the same group completes both surveys. In the future, the program should consider ways to increase data collection efforts. It is important to note that the program did provide a \$300 research kit. Participants may have seen this kit as valuable to complete the program but not necessarily an incentive to increase their participation in the data collection activities (i.e., surveys, reflection questions). To encourage student participation in these activities, small incentives could be offered throughout the program, such as prizes and gift cards.

Another challenge may be the instruments used, particularly around Ecological Knowledge. Interestingly, participants in all facilitation modes appeared to decrease their knowledge over time. Based on the curriculum provided before the program began, QQRC created a multiple-choice test on the behaviors of black bears in Michigan. It is recommended that these items be reviewed and potentially revised to more general topics (e.g., Detroit) in collaboration with the program staff. Program staff should identify the main components or takeaways of Ecological Knowledge that facilitators will be teaching in the curriculum and create survey items that assess participants' skills and knowledge in these areas.

Lastly, surveying youth, some of whom were as young as eight years old, may pose some issues. Participants may rush through the survey or not understand the questions. Program staff should walk through the survey with participants and convey its importance in helping make program improvements for future participants.