



Sacramento County 4-H Youth Development Program

4-H Water Wizards Education Project

Project Description

4-H Water Wizards is a 12-week project that teaches 4th-6th grade students about water and its importance to the planet. Developed by the University of California Cooperative Extension's 4-H Youth Development Program and delivered in settings after school, the project is designed to encourage students to explore and discover about water as they become scientists themselves.

Students learn about the water cycle, watersheds, water usage, pollution, and water properties through building models, conducting experiments, and making observations. They construct a watershed; conduct a home water use survey; and explore salinity, density, taste, and hardness through experimentation. The project concludes with a student-planned service learning project that empowers youth to take action on a water issue they have identified in their community.

Students from one lucky site, Mary Tsukamoto Elementary, were rewarded for their fine work in the project with a day-long field trip to the Bay-Delta Model in Sausalito and a chance to visit the Pacific Ocean, the terminus of the watershed.

Project Participation

The table below shows the number of elementary school students and afterschool program staff who participated in 4-H Water Wizards in the 2021-22 school year. Because of the COVID-19 pandemic, we were not able to begin programming until spring 2022. 4-H trained six program staff to deliver the project and served a total of 154 students. Schools were all located in south Sacramento in lower-income communities, and were part of the Elk Grove Unified School District.



Pictured above is Josh, a staff member at Mary Tsukamoto Elementary afterschool program. Here he facilitates a lesson on water density. He asks students why, if two balls have similar size and shape, one floats and the other sinks. Students then "layer" colored water in a clear straw to figure out the salinity of different water samples.

Josh delivered 4-H Water Wizards in both the 2022 Spring and Fall semesters. His good work and enthusiasm for the project led to Tsukamoto participation in the Bay-Delta field trip.

Ethnicity	Elementary Students (n=154)	Adult Program Staff (n=6)	Total	Percent
Caucasian	7	1	8	5%
African American	36	1	37	24%
Indigenous	0	0	0	0%
Asian	35	0	35	22%
Pacific Islander	7	2	9	5%
Hispanic	51	2	53	33%
Other	18	0	0	11%
Total	154	6	160	100%

Table 1: Demographics of students and staff participating in the 2021-22 4-H Water Wizards project.

Project Outcomes

We conducted an evaluation to assess student learning about water. The assessment included a student pre- and post-survey to measure their knowledge about material covered in the 4-H Water Wizards project, to assess their understanding about water issues in their community, and to learn if the project had made a difference in their water conservation practices. 4-H staff administered the pre- and post-surveys at the beginning and towards the end of the project. Four sites elected to take part in the evaluation, providing a total of 50 matched surveys. All program leaders who deliver the program also filled out a pre- and post-survey that assessed their knowledge about water topics and comfort level teaching science, as well as a project evaluation form at the end of the program.

Students gain knowledge about water. Students responded to nine survey questions pertaining to the water cycle, watersheds, salinity, water density, water issues, and conducting experiments. We tallied the total pre- and post-test scores for all sites and then compared them using a paired samples t-test. As Figure 1 shows, post-test scores were significantly higher ($p=.000$).

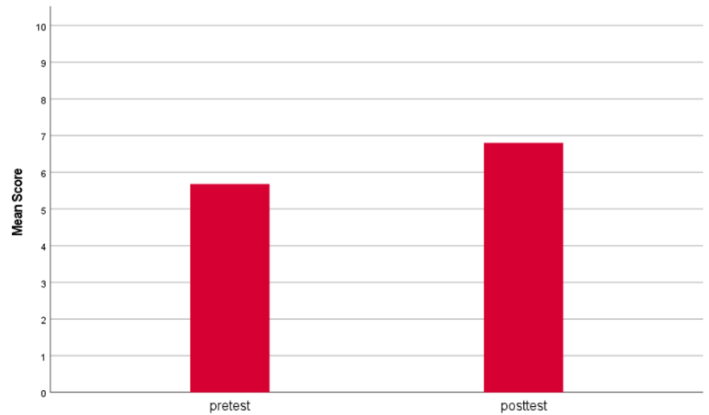


Figure 1: Pre- and post-survey scores for students participating in 4-H Water Wizards. Post-test scores were significantly higher ($p=.000$).

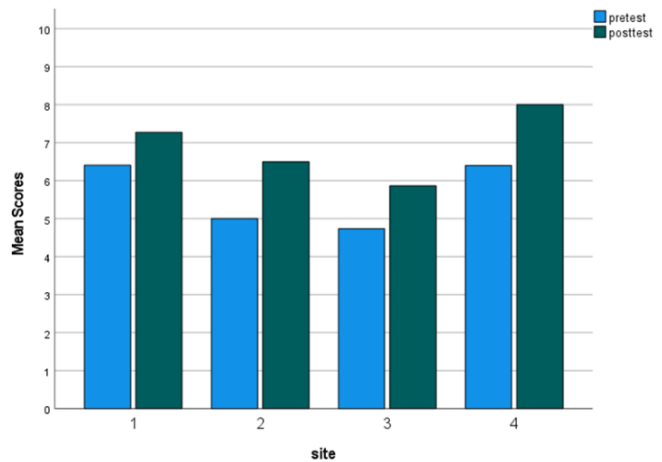


Figure 2: Pre- and post-survey scores for students participating in 4-H Water Wizards by site. All site demonstrated knowledge growth.

- Increased awareness of water issues and conservation:** Students were asked to identify two water issues in their community. In the pre-test, 82% of the students named one issue and 60% named two issues. In the post-test, 90% named one issue and 56% were able to name two issues, suggesting little change in this area.
- As far as water usage (asked only on the post-test), 35% of participants said they were using less water as a result of participating in 4-H Water Wizards.
- Afterschool staff report growth in knowledge and confidence teaching science.** In pre- and post-surveys, staff facilitating the 4-H Water Wizards curriculum indicated that they increased their understanding of science and had greater ability to teach hands-on science as a result of the project. They also reported greater comfort in teaching about water and the environment. Figure 3 shows the survey results.

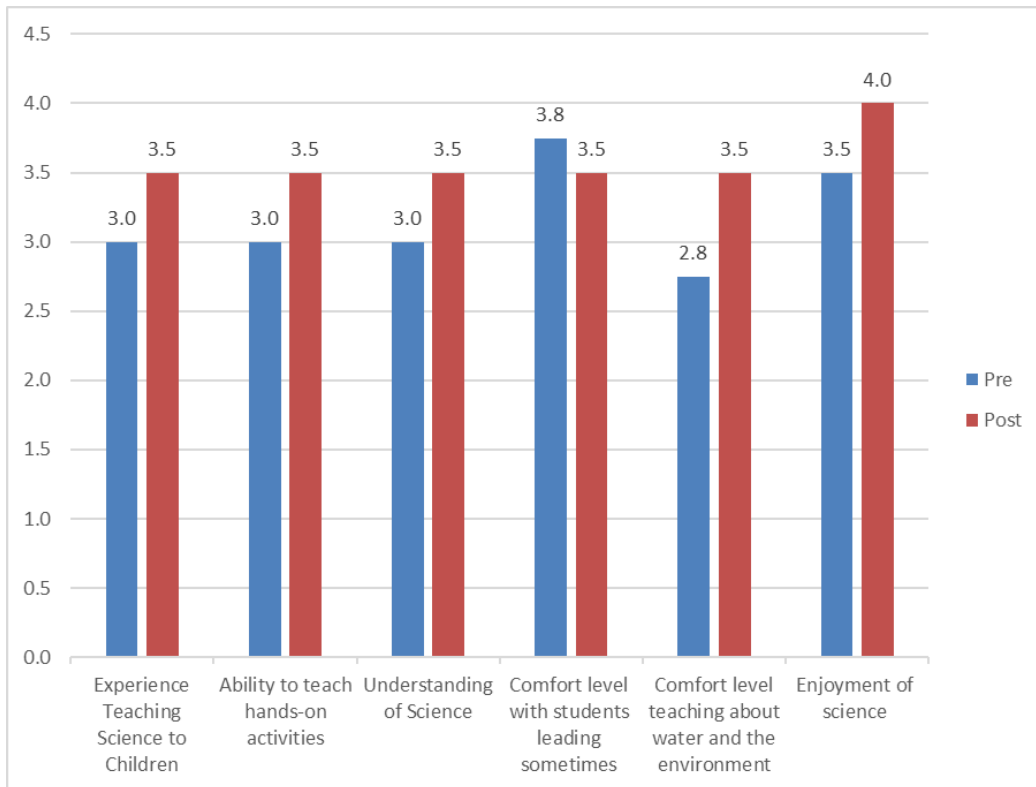


Figure 3: Afterschool program staff pre-program and post-program scores from the questionnaires rating themselves (1= poor to 4=very good) about various skills and attitudes in teaching science (n=4).

Learnings and Insights

We continue to learn how best to implement 4-H Water Wizards, especially in terms of supporting afterschool staff who deliver the project. To assure consistent and quality program delivery, we have learned:

- Having staff attend the three, three-hour training sessions allows those unfamiliar with water education content and/or teaching science to absorb material over time. We try to establish a safe environment where participants are encouraged to take risks while learning and peers become an avenue for shared information and support.
- Materials for the sites should be provided at the time of the training sessions so educators can leave with all they need to implement the project. This is especially critical in the afterschool setting.
- Field trips are an important component of the project. We've learned it is an incentive for staff (including professional educators), and more so, that these trips are a celebratory way to help students gain a deeper, different perspective on what they have learned about water in the classroom. We miss the fact that the American River Water Education Center has not re-initiated field trips since the pandemic, and we are grateful to provide a trip to the Bay-Delta model and Pacific Ocean.



Though our focus in Sacramento 4-H is always to serve our afterschool sites in our local community, the project is expanding to new audiences. For example, the elementary school science teachers in Hayward Unified School District are delivering the program to their 5th grade students. Now that the curriculum is available through the National 4-H Mall, the project is positioned for growth statewide and nationally.

Many thanks to our 2022-23 program partners:

- Michelle Wallner, Elk Grove Unified School District
- Jeanette Huddleston, Sacramento County Department of Water Resources
- California Agriculture and Natural Resources



Mary Tsukamoto students who completed 4-H Water Wizards pose for a group photo outside the Bay Delta Model.



Students kicked off their shoes and socks to dodge waves at the beach. Many hadn't been to the ocean—the terminus of their watershed—before.

