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Agriculture and Natural Resources | 4-H Youth Development Program

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4-H Water Wizards 2018-19 Final Report

Program Partners:
Elk Grove Unified School District
Sacramento County Department of Water Resources
American River Water Education Center

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Program 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.

The project includes:

- *Training for after school program providers*: Para-professionals that work in after school programs bring varied knowledge about water and the process of facilitating inquiry-based learning. To build competence and confidence, we provided three, three-hour training sessions for those who delivered the curriculum.

- *Hands-on learning experiences that encourage inquiry*: 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.

- *A service learning project*: Students take action on a water issue in their community. After developing an awareness of water issues, youth design, implement, and evaluate a project to address a need they identify in their family, school, or the greater community.

At the Bay Delta Model, students point to the Golden Gate where their local watershed empties into the Pacific Ocean.

Students explore dams and flood control at the American River Water Education Center.

- *Visit to the American River Water Education Center (ARWEC)*: Towards the end of the project, afterschool program sites travel to the American River Water Education Center where they tour the activity center, see Folsom dam, and explore Beal's Point, a collection point for our local watershed.

- *San Francisco Bay-Delta field* trip: Through the Watershed Stewardship and Education Grant, students from Florin, Kennedy, and Tsukamoto elementary schools in Elk Grove Unified School District culminated their project with field trips to the San Francisco Bay-Delta Model and the beach to deepen their understanding of watersheds and delta issues.

Youth Served

4-H Water Wizards typically reaches over 400 youth annually. The program is delivered at afterschool sites in the Elk Grove Unified School District (EGUSD), predominately at schools in lower-income neighborhoods where at least 50% of students are eligible for free or reduced price lunches. Our numbers this year were lower as we served 278 youth at 13 after schools sites. Three of the sites delivered the program to multiple groups of children. Six sites participated in fall 2018 and seven in spring 2019. Of the 278 youth participants, 72 attended the field trip to the Bay Delta Model. Total project participation is listed in Table 1 below.

Table 1: Participant demographics for 2018-19 4-H Water Wizards Project

Ethnicity	Elementary Students (n=278)	Adult Program Staff (n=17)	Total	Percent
Caucasian	25	7	32	11%
African American	72	1	73	25%
American Indian	2	0	2	<1%
Asian	78	1	79	27%
Pacific Islander	4	2	6	2%
Hispanic	81	6	87	29%
Other	16	0	16	5%
Total	**278**	**17**	**295**	**100%**
Gender				
Female	138	10	148	50%
Male	140	7	147	50%

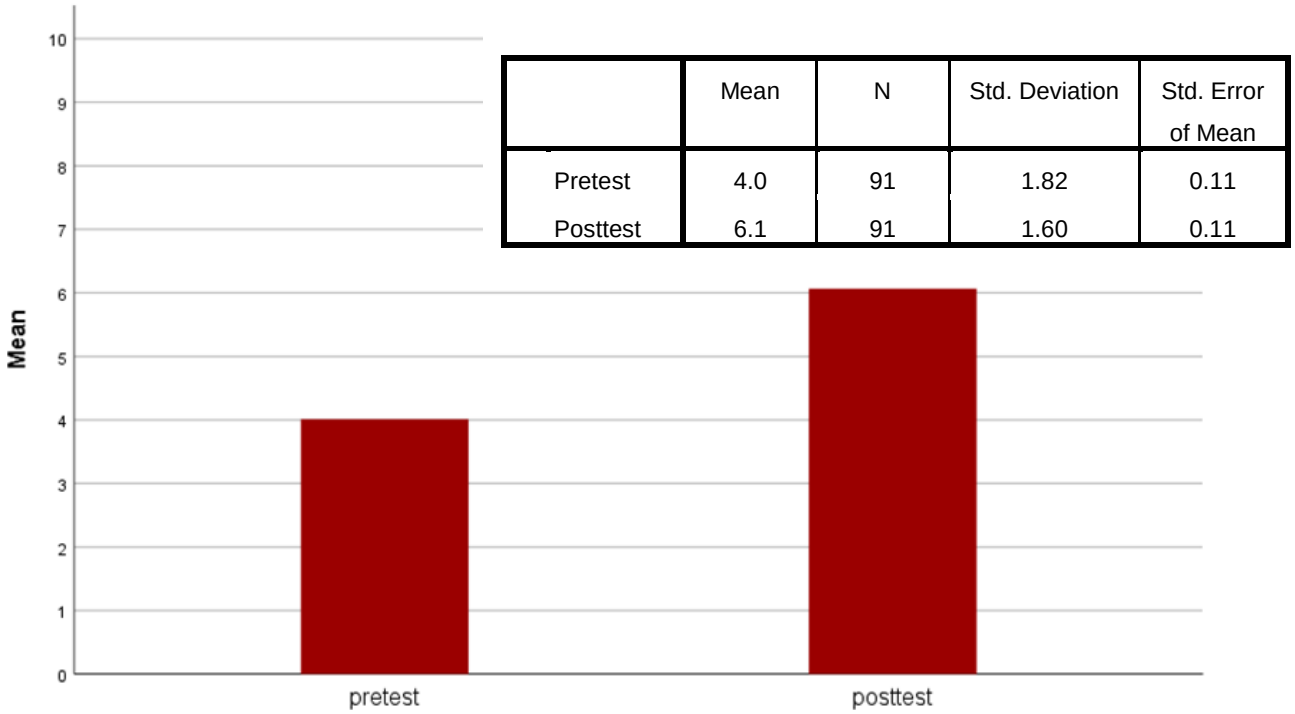
We have the capacity to serve more students, and a goal for next year is to better inform afterschool site directors (who elect to have their sites participate in the project) about the project outcomes and benefits. We will meet with site administrators this summer to share the findings from this year's assessment and encourage greater participation in 2019-20. We also made a concerted effort to recognize site directors who participated in the program this year.

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. Five sites elected to take part in the evaluation, providing a total of 91 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: Mean pre-test and post-test scores for total sample (n=91)



	Mean	N	Std. Deviation	Std. Error of Mean
Pretest	4.0	91	1.82	0.11
Posttest	6.1	91	1.60	0.11

We compared knowledge gain across grades (see Figure 2 and Table 2). Participants scored significantly higher in post-tests for grades 4 and 5. Students in grade 4 (n=52) showed greater knowledge increase than grade 5 participants (n=25). Water education is part of the 5th grade curriculum which may contribute to the difference. While grade 6 participants also show significant difference in scores, the sample size is too small to be taken into consideration (n=6).

Figure 2: Pre-test and post-test scores by grade

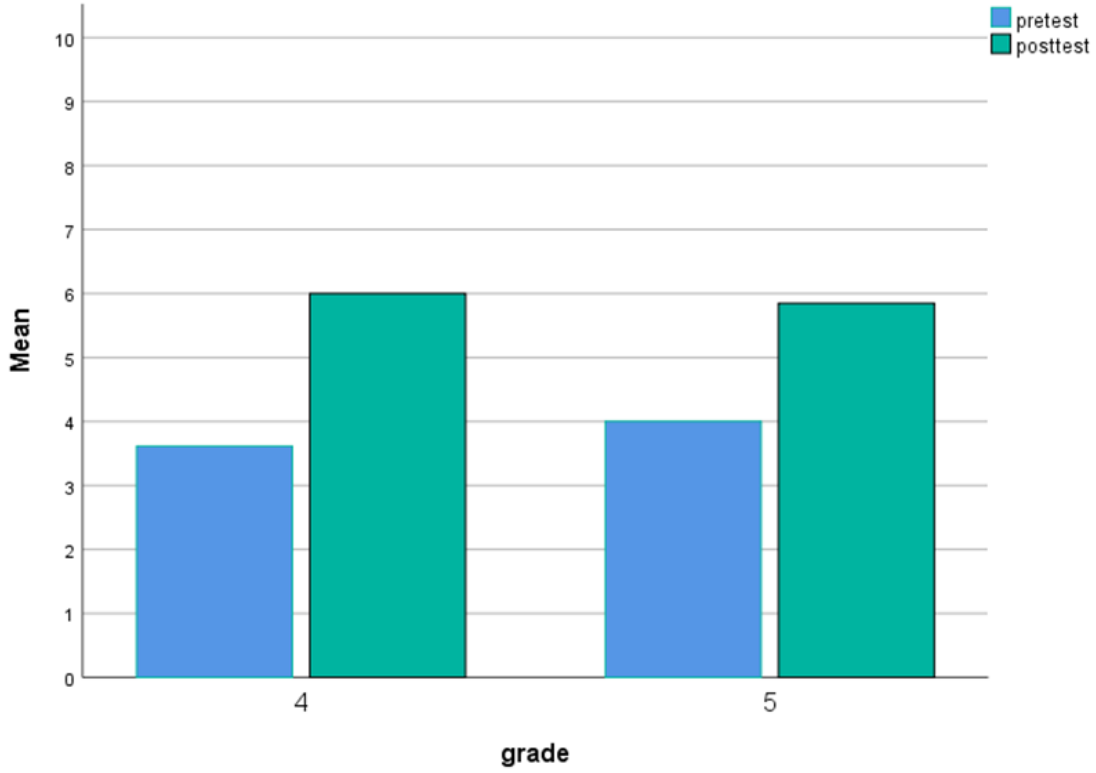


Table 2: Pre-test and post-test scores for grades 4 and 5

Grade		Mean	N	Std. Deviation	Std. Error of mean
4	Pretest	3.6	52	1.8	0.21
	Posttest	6.0	52	1.4	0.20
5	Pretest	4.0	26	1.7	1.7
	Posttest	5.8	26	1.4	1.6

We also examined the data across the five afterschool program sites participating in the evaluation. All sites showed increases in student knowledge. The grades of the students varied between sites, and Site 3 and Site 5 only had 4th graders in the project. Figure 3 and Table 4 illustrate the differences between sites.

Figure 3: Pre-test and post-test scores by afterschool site

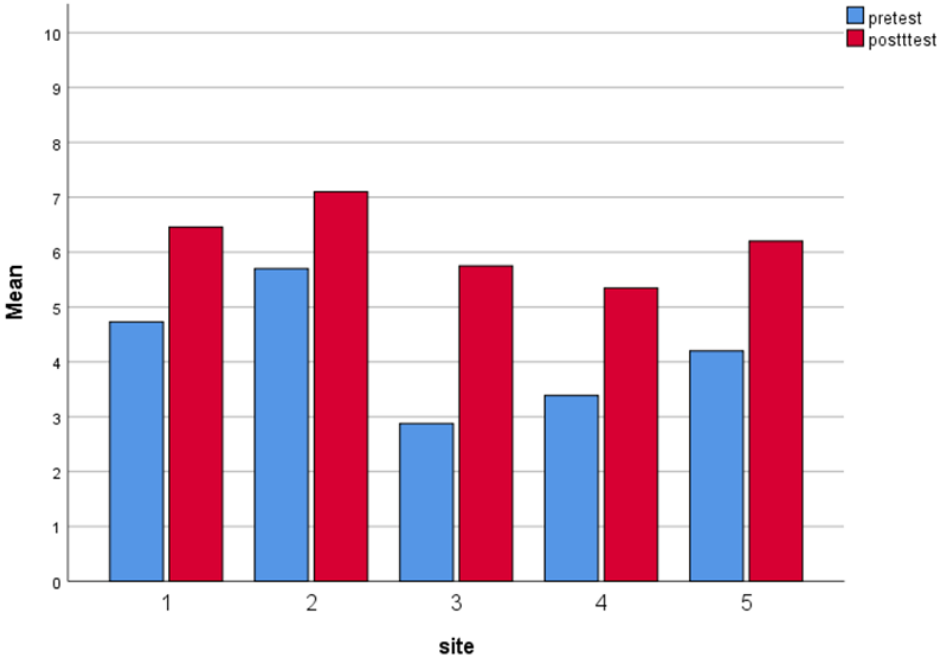


Table 3: Mean pre-test and post-test scores by site

Site		Mean	N	Std. Deviation
1 (fall)	Pretest	4.7	11	1.27
	Posttest	6.5	11	1.51
2 (spring)	Pretest	5.7	20	.32
	Posttest	7.1	20	.35
3 (fall)	Pretest	3.4	26	1.3
	Posttest	5.3	26	1.5
4 (fall)	Pretest	2.87	24	.34
	Posttest	5.85	24	.32
5 (spring)	Pretest	4.20	10	1.68
	Posttest	6.20	10	1.68

Increased awareness of water issues and conservation: Students were asked to identify two water issues in their community. In the pre-test, 45% of the students named one issue and 34% named two issues. In the post-test, 33% names one issue but 53% were able to name two issues, suggesting an increase in awareness in this area.

As far as water usage (asked only on the post-test), 65% of participants said they were using less water as a result of participating in 4-H Water Wizards. As examples of how they had practiced conservation, they mentioned things like "turning of the water when I brush my teeth."

Students enjoy the project: The vast majority of students (81%) reported they enjoyed the 4-H Water Wizards project.

Project Learnings and Insights

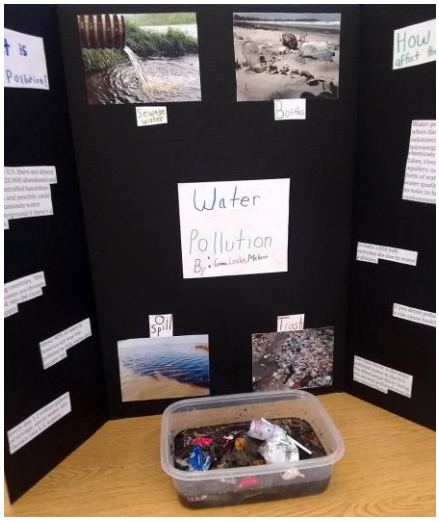
We continue to refine the 4-H Water Wizards project. This past year we have learned:

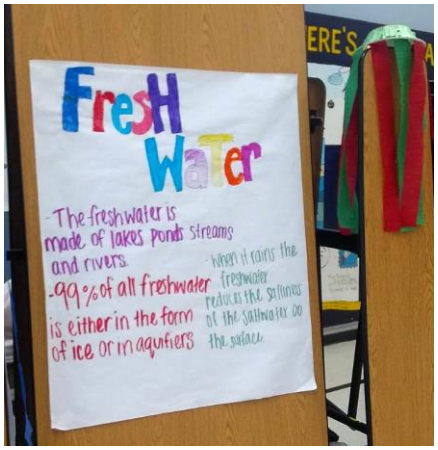
The trips to the Bay-Delta Model are a highlight. This was the second year we received a Watershed Stewardship and Education Grant from Sacramento County Department of Water Resources that allowed three sites—Florin, Kennedy, and Mary Tsukamoto Elementary Schools—to visit the Bay-Delta Model and the Pacific Ocean in Sausalito. Through models, a film, and exceptional guides, 72 students learned about water history and issues from a statewide perspective. After the tour and lunch, youth traveled to the other side of the Sausalito peninsula to experience the ocean, a first for many. They fully immersed themselves in all the beach had to offer: dodging waves, feeling the sand and the sticky residue of salt water, finding stones and shells, wondering why sand closer to the water looked different than sand farther away. The two, day-long trips fully met our expectations, and provided exceptional summative experiences for the sites that were able to participate.

A visit to the vast Bay- Delta Model in Sausalito allowed students to understand a more complex picture of their watershed.

Groundwater is but one topic covered on the ARWEC fieldtrip.

The American River Water Education Center is an important program component. Though only three afterschool sites attend the Bay-Delta Model field trip, every 4-H Water Wizard site has the opportunity for an afternoon at ARWEC. During their visit, students play games about water conservation strategies and interact with ground water, flooding, and watershed models. After exploring the indoor exhibits, a short ride to Folsom Lake allows students to observe what they've seen depicted on the watershed posters in their classrooms: the dam, lake, and the Sierra Nevada Mountains (often snow-capped). ARWEC field trips have been part of 4-H Water Wizards since the program began over a decade ago, and exceptional docents reinforce and the many topics and lessons students learn in the project.





A science fair atmosphere prevailed at Tsukamoto's "Life of the Sea" event where participants viewed posters and spoke with student presenters.

The service-learning capstone has great potential. As their service learning project, students at Mary Tsukamoto Elementary School presented "Life of the Sea." Students worked in teams to create various displays explaining salt water and fresh water, sea life and environmental concerns that threaten the ocean ecosystem including pollution and global warming. Invited guests and younger students from the afterschool program learned from the young presenters.

Staff report increasing their skills and confidence teaching science. 4-H Water Wizards also strives to build the capacity and confidence of staff in the area of water and science education. Some quotes from staff about their experience with 4-H Water Wizards and what they learned:

"That my own science education/vocabulary is rusty! I loved being taught and teaching the water curricula."

"I learned how our water is cleaned and put back into our pipes."

"Be excited, group discussions, love science, enjoy the unknown, no wrong answers in science-just more to explore, leave questions unanswered, love to be wrong in science so you can do it again, be prepared, doing activity yourself before demonstrating to students."

"I have learned a lot about our environment and also how to teach students about it."

When asked how we could better support them in program delivery, comments included:

"More hands-on trainings." and, "Longer training than a 'brief' 3 hour run through, ability to explain all material needs in box."

"Shortened explanation of the curriculum."

"I can't think of anything at this time, you did a great job preparing us, supporting us throughout the past few months."

"Everything was perfect!"

Students play in the sand and the surf.

***Staff attendance at training is sometimes low*.** To better accommodate the afterschool programs, trainings have shifted from the evening (when program staff would be done with their work day) and now take place in the afternoon at an EGUSD site during regular program hours. Attendance at some 4-H Water Wizards training sessions was low primarily due to the inability to release staff from their sites in order to maintain appropriate supervision ratios. We delivered make-up trainings to assure staff had the information and confidence they needed to deliver the project. We will problem solve the attendance issue with our afterschool partners this summer.

Administrative hic-ups happen. This was our second full year of partnership with EGUSD. Orchestrating the many components of the program—trainings, field trips, supplies—went smoothly, for the most part. There were still glitches, including two missed field trips to ARWEC (one visit in the fall, one in the spring) as a result of scheduling conflicts or transportation issues. Communication and staff changes were at the root of the problem, and all parties know the importance of working early to set dates with ARWEC and schedule the sites.

Future Plans

We plan to continue 4-H Water Wizards next year, and EGUSD will be a primary partner. We see students increase their knowledge about water and begin to understand how important it is to people, farmers, and the well-being of the environment. To strengthen the project, we will:

- Meet with afterschool program administrators this summer to review this past year, identify areas for improvement, and create a plan for 2019-20.
- Improve communications and build relationships with site staff who are delivering the program to assure they know about trainings and receive support they need.
- Attract more afterschool sites to participate.

Key Participants

4-H Water Wizards is made possible through key partnerships which include:

- Members of the Elk Grove Unified School District Learning Support Services including Erin Sipes, Amanda Madrigal, Carina Bell and the 18 afterschool site staff who attended trainings and led the weekly projects.
- The Bay-Delta Model, especially Ranger Linda with the Army Corp of Engineers.
- The American River Water Education Center, especially Kathy Marlow and her docents.
- Sacramento County Department of Water Resources who provide funding for transportation to the San Francisco Bay-Delta Model field trip.

Images from the 2018-19
4-H Water Wizards
field trips