Watershed Explorers Program

2021-2022 Program Summary

Solano RCD is grateful to our program funders:

Solano County Water Agency
Solano County and All City Jurisdictions
Beverage Container Recycling City/County Payment Program
CalRecycle Used Oil Recycling Program
Vallejo Water Conservation Program
Vallejo Flood and Wastewater District
Fairfield-Suisun Sewer District
Potrero Hills Landfill
Habitat Conservation Fund
Greater Vallejo Recreation District

SOLANO
Resource
Conservation
District

Written and Administered by
Solano Resource Conservation District

1170 N Lincoln Street, Suite 110, Dixon, CA 95620
Phone: (707) 678-1655 **Web:** solanorcd.org

PROGRAM OVERVIEW

Local partners contract the Solano Resource Conservation District (Solano RCD) to implement the Watershed Explorers Program, a third grade field trip program designed to help students develop an awareness and understanding of local watersheds and how to protect them.

The Watershed Explorers Program engages third grade students in exploring their local watershed through a water lesson facilitated by the Solano RCD through the School Water Education Program (SWEP) and a field trip to a local park or open space. The teaching objectives are directly linked to California's Next Generation Science and Common Core standards, and incorporate research-based instruction practices highlighted by The BEETLES Project, a program of the Lawrence Hall of Science at University of California, Berkeley. This year, our programming included live, virtual field trips; in-person field trips on school campuses; and in-person field trips to Lagoon Valley Park in Vacaville.

GOALS AND OBJECTIVES

The primary goal of the Watershed Explorers Program is to engage students in exploring their local watershed to help them develop stewardship practices and an awareness of the natural world. Participants leave the program able to:

- Understand what storm drains are and how stormwater moves through the watershed
- Identify solutions to protect stormwater from pollution
- Describe how to respond to drought or lack of rain
- Implement the "reduce, reuse, and recycle" messaging to address stormwater pollution issues
- Recognize ways nature changes when the seasons change

The guiding question for the Watershed Explorers Program is:

> What environmental solutions might help living things affected by drought and/or stormwater pollution?

From this guiding question, the program is structured around the following goal:

> All participating students will obtain, evaluate, and communicate information about how drought and runoff pollution impact living things in a watershed.

AUDIENCE

The 2021-2022 program engaged 2,513 students from 105 classes throughout Solano County.

In fall 2021, Solano RCD contacted all Solano County school districts to gather preliminary data on third grade registration. According to our research, we planned to reach 75% of all Solano County third grade students. In April 2022, the California Department of Education released that student registration for 3rd grade was higher than anticipated at 4,546 students. This increase in students coupled with a lack of teacher registration resulted in us reaching 55% of all third-grade classes.

Table 1. *Summary of Watershed Explorers Program Enrollment by City*

	School Name	Classes	Students	Field Trip Site	Field Trip Date
Dixon					
	Dixon Montessori	4	100	*Valley Glen Pond A	November 8th
	Tremont	3	81	*Valley Glen Pond A	January 28th
	Total Dixon Classes:	7		**Total Dixon Students:**	181
Fairfield					
	B Gale Wilson	2	54	*Rockville Hills Regional Park	November 30th
	Cordelia Hills	5	99	*Rockville Hills Regional Park	November 1st November 2nd
	David Weir	3	75	*Rockville Hills Regional Park	February 2nd
	Fairview	3	77	*Rockville Hills Regional Park	December 1st December 2nd December 3rd
	KI Jones	6	135	*Rockville Hills Regional Park	December 1st December 2nd December 3rd
	Laurel Creek	4	84	*Rockville Hills Regional Park	November 10th
	Nelda Mundy	5	124	Vintage Green Valley Park	January 19th January 26th January 27th
	Oakbrook Academy of Arts	3	69	Lagoon Valley Park	May 31st
	Sheldon Academy	3	57	Lagoon Valley Park	June 1st
	Virtual Academy of Fairfield-Suisun	4	136	*Rockville Hills Regional Park	January 21st
	Total Fairfield Classes:	38		**Total Fairfield Students:**	910
Suisun City					
	Crescent	2	64	*Rockville Hills Regional Park	March 15th
	Suisun Elementary	3	59	*Rockville Hills Regional Park	January 18th
	Total Suisun City Classes:	5		**Total Suisun City Students:**	123
Rio Vista					
	DH White	3	46	*Sandy Beach Park	November 18th
	Total Rio Vista Classes:	3		**Total Rio Vista Students:**	46
Vacaville					
	Cambridge	1	26	*Lagoon Valley Park	December 10th
	Cooper	5	123	Lagoon Valley Park	March 17th March 18th March 29th
	Edwin Markham	3	74	Lagoon Valley Park	March 24th March 25th
	Eugene Padan	4	91	Lagoon Valley Park	March 31st April 1st
	Fairmont	3	76	Lagoon Valley Park	February 15th March 1st
	Jean Callison	2	20	Lagoon Valley Park	February 17th
	Sierra Vista K-8	2	47	Lagoon Valley Park	March 22nd
	Total Vacaville Classes:	20		**Total Vacaville Students:**	457

Benicia					
	Joe Henderson	3	76	*Benicia State Recreation Area	November 3rd November 15th
	Mary Farmar	3	78	Lagoon Valley Park	May 23rd
	Matthew Turner	3	73	*Benicia State Recreation Area	October 27th October 28th
	Robert Semple	3	67	*Benicia State Recreation Area	February 3rd
	Total Benicia Classes:	12		**Total Benicia Students:**	294
Vallejo					
	Annie Pennycook	3	94	*Glen Cove Waterfront Park	February 1st
	Cave Language	2	45	*Glen Cove Waterfront Park	December 16th
	Dan Mini	3	63	*Glen Cove Waterfront Park	October 26th October 28th
	Federal Terrace	1	26	*Glen Cove Waterfront Park	June 2nd
	Grace Patterson	2	53	*Glen Cove Waterfront Park	January 20th
	Highland	3	91	*Glen Cove Waterfront Park	October 25th
	Johnston Cooper	3	60	Lagoon Valley Park	May 24th
	St. Vincent Ferrer	1	20	Lagoon Valley Park	April 29th
	Steffan Manor	2	50	*Glen Cove Waterfront Park	March 10th
	Total Vallejo Classes:	21		**Total Vallejo Students:**	530
	Total Classes:	**105**		**Total Students:**	**2513**

* Virtual Watershed Explorers Field Trip

FALL 2021 PHENOLOGY FIELD TRIPS

960 students from 38 classes of the Watershed Explorers Program participated in the virtual phenology field trip in September and October, which was funded by the California State Parks Habitat Conservation Fund. Participating students came from every city across Solano County except Rio Vista. Each class virtually visited a local park or open space in their respective city. These students had the opportunity to compare and contrast environmental variances within the parks from fall to spring, as well as document the different phenophases, or stages and behaviors, they observed. The student-collected data is submitted to the USA National Phenology Network (USANPN) where it is utilized to better understand how plants, animals, and ecosystems respond to changes in the climate locally, regionally, and nationally.

Table 2. *Summary of HCF Phenology Field Trip Enrollment by City*

	School Name	Classes	Students	Phenology Field Trip Site	Field Trip Date
Dixon					
	Tremont	3	81	Valley Glen Pond A	October 1st
	Total Dixon Classes:	3		**Total Dixon Students:**	81
Fairfield					
	David Weir	3	75	Rockville Hills Regional Park	September 24th
	Nelda Mundy	5	124	Rockville Hills Regional Park	September 16th September 24th September 29th
	Virtual Academy of Fairfield-Suisun	4	136	Rockville Hills Regional Park	September 28th
	Total Fairfield Classes:	12		**Total Fairfield Students:**	335

Suisun City					
	Crescent	4	64	Rockville Hills Regional Park	September 21st
	Suisun Elementary	3	59	Rockville Hills Regional Park	September 23rd
	Total Suisun City Classes:	7		**Total Suisun City Students:**	123
Vacaville					
	Edwin Markham	3	74	Lagoon Valley Park	October 5th
	Fairmont	3	76	Lagoon Valley Park	September 27th September 30th
	Total Vacaville Classes:	6		**Total Vacaville Students:**	150
Benicia					
	Robert Semple	3	67	Benicia State Recreation Area	October 7th
	Total Benicia Classes:	3		**Total Benicia Students:**	67
Vallejo					
	Annie Pennycook	3	94	Glen Cove Waterfront Park	October 8th
	Grace Patterson	2	53	Glen Cove Waterfront Park	September 14th
	Johnston Cooper	2	57	Glen Cove Waterfront Park	September 17th
	Total Vallejo Classes:	7		**Total Vallejo Students:**	204
	Total HCF Classes:	**38**		**Total HCF Students:**	**960**

METHODOLOGY

The Watershed Explorers program took place over 5 sessions from October 2021 – June 2022. The Solano RCD offered the Watershed Explorers program in a virtual format in the early part of the year. Beginning in January 2022, teachers were offered the option of in-person programming for the first time since early 2020. Approximately 36% of classes this year were able to participate in in-person Watershed Explorers field trips.

Prior to the field trip, teachers were encouraged to participate in a lesson about our local water resources. The lesson is a component of the larger School Water Education Program (SWEP). The Watershed Explorers field trip activities were similar between virtual and in-person programs, with all students participating in a macroinvertebrate station, a storm drain/stormwater pollution station, and a phenology nature journaling station. Content was adjusted accordingly for virtual and in-person programs, but it maintained the core curriculum focus on drought and stormwater pollution. The program was facilitated as follows:

SCHOOL WATER EDUCATION PROGRAM – SOLANO COUNTY WATER RESOURCES LESSON

Funded by the School Water Education Program, the Solano County Water Resources lesson covers city drinking water sources, stormwater and stormwater pollution, and ways students can conserve water. Before the lesson, teachers receive a water conservation challenge worksheet to give to students so they can track their water usage. Teachers are also provided with an introductory “Solano County Watersheds” video so students can see all four of Solano County’s major watersheds and learn which watershed they live in.

During the Solano County Water lesson, students interact with a three-dimensional model called an EnviroScape to understand the watershed concept and identify how stormwater and stormwater pollution move in a watershed. The lesson also prompts students to think critically about the impacts of drought on their drinking water supply and helps them come up with ways to actively save water every day. This hour-long lesson was primarily offered virtually throughout the year, but in May and early June we offered in-class lessons as well. 86% of Watershed Explorers classes also participated in the Solano County Water Lesson.

WATERSHED EXPLORERS FIELD TRIPS

Virtual Field Trips

For virtual field trips, one to three classes joined Solano RCD staff live-streaming 75-minute field trips from a local park or open space in the school's city. Educators showed students different areas of the park and highlighted how drought and stormwater pollution affect living things in a watershed, in line with the program goal and guiding question. Students engaged with educators by taking turns answering questions, responding with hand signals, and by participating in dances and other movement activities.

In-Person Field Trips

The majority of in-person field trips were held at Lagoon Valley Park in Vacaville. Classes were split into groups of 10-15 students and were led by an educator. Groups visited the watershed science stations around the park. Solano RCD closely collaborated with the District Science Coordinator for Vacaville Unified School District to bring Vacaville's 3rd grade students to Lagoon Valley Park. In addition, schools from Fairfield, Benicia, and Vallejo also participated in our in-person field trips. Please see chart above for details.

Field Trip Structure & Curriculum Content

Each field trip began with an introduction and a land acknowledgement honoring the Patwin and/or Karkin Ohlone people and their ancestral lands. Students were set up to keep a scientific mindset during the activities focused on drought, stormwater and stormwater pollution, watershed stewardship, and phenology (the study of plants and animals and how they change over time in response to climate conditions). Curriculum focus areas are listed below:

Drought and Water Conservation

Description: The concept of drought was explored during the live, virtual field trip by observing a body of water and comparing current observations to past photo documentation. For in-person programs, educators related to students' previous knowledge of the park/school site to reflect on how water levels and plants change throughout the year. Students and educators also observed and discussed how plants and animals adapt during times with little rainfall and reflected on drought by discussing water conservation strategies.
Desired Outcome: Students understand the importance of water conservation and implement suggested practices at home.

Macroinvertebrates and Stormwater Pollution (Storm Drain Model)

Description: Educators introduced students to many living things found in their specific watershed, including aquatic macroinvertebrates, which require clean and healthy waterways and play a major role in food webs and ecosystem health. To understand impacts on these organisms, students observed a storm drain model to learn the path water takes from storm drains to nearby creeks or streams where the organisms live. Students discussed different pollutants that can end up in storm drains and solutions for preventing stormwater pollution, including how to properly dispose of used oil by recycling it.
Desired Outcome: Students connect stormwater pollution to the vitality of macroinvertebrates and all life that relies on them in their local waterways. Students share with their parents where they can discard used motor oil.

Plant Phenology

Description: Students observed a native plant (virtually at their local park or in person near their school or at Lagoon Valley Park) to help them practice their observation skills and put what they observe into context with the current season. Students made predictions about how the characteristics of the plant (e.g., number of flower buds) will change over time, and how drought may affect the plant and their watershed. Students were encouraged to come back with their families to check if their predictions are accurate.
Desired Outcome: Students identify phenological characteristics of plants and predict how drought may affect their watershed.

Watershed Stewardship Principles

Description: Students reflected on what they learned during the field trip and came up with tangible ways to protect their watershed. Using program journals, students demonstrated what they learned by drawing the path a piece of trash can take from a storm drain to creeks and rivers, and eventually the ocean. Educators and students brainstormed a variety of stewardship practices that include not littering, recycling cans and bottles, participating in cleanup events, conserving water, and recycling used oil.
Desired Outcome: Students engage in watershed stewardship practices.

PROGRAM EFFICACY

Solano RCD measured student improvement in knowledge about storm drains, phenology, and water conservation with a two-part quiz. Students completed the first quiz prior to participating in the program, providing a baseline assessment of their topic knowledge. Participants took the same quiz after completing program curriculum, and the two data sets were compared. The identical 4-question pre- and post-assessment instruments asked students to identify a picture of a storm drain and tell us its purpose, list seasonal phenology phenomena, and tell us best drought and water conservation individual practices. Students were also asked an open-ended question on the post-assessment to get a sense of what topics resonated with students enough that they would want to share what they learned with others.

1. **(Shows picture of a storm drain) What is being shown in this picture? What does it do?**
   Desired Response: This is a storm drain. It brings water from the street to a local creek/watershed (so that the street doesn't flood when it rains).

2. **List ways nature changes as the seasons change.**
   Desired Response: Leaves change color and/or drop from the trees in the fall; flowers turn into fruit; acorns ripen and fall; it gets colder and/or there is rain; grasses change color; etc.

3. **List ways you can protect water.**
   Desired Response: Keep storm drains/stormwater clear of pollution; don't litter/pick up trash; pick up after your pet; remind parents to recycle used oil; save water; teach your friends and family about stormwater pollution; etc.

4. **What should we do if we do not get much rain?**
   Desired Response: Conserve or save water.

5. **POST ONLY:** What did you learn on the field trip that you want to share with someone else?

Assessment Results

1,413 students completed the pre-assessment quiz. In the aggregate, 50% of students provided correct or partially correct answers to the 4 pre-assessment questions. Specifically, 54% of students were able to correctly or partially correctly identify a storm drain and explain its purpose. 62% of respondents were able to name seasonal phenological phenomena. 68% of students correctly or partially correctly listed ways they could protect water, but only 32% were able to list personal water conservation strategies.

The number of students who completed the post-assessment dropped by 52%. The students who did complete the assessment quiz improved their ability to correctly or partially correctly answer the questions by 29%. Specifically, 90% of respondents were able to correctly or partially correctly identify a storm drain and explain its purpose. 71% of respondents were able to name at least one seasonal phenological phenomena. 87% of students correctly or partially correctly listed ways they could protect water, and 71% were able to list at least one personal water conservation strategy. For the final question, 79% of students demonstrated enough engagement with the program and assessment to consider what struck them as the most interesting – or at least conversation-worthy – topic they learned about on their field trip. Answers included thoughts on storm drains, wildlife, and other water protective strategies.

APPENDIX A – TEACHER/STUDENT FEEDBACK

Anonymous Teacher Feedback

"It was wonderful! You kept students engaged the whole time and gave them opportunities to move! Bravo! Loved it and they're excited to see the next one."

"Great program - I love that you have managed to make an effective program in a virtual atmosphere."

"This is the best so far I have seen a presenter use visuals and engage them online. Overall I think everyone did a great job. Thank you for this experience!"

"My students enjoyed seeing the videos, pictures, and live shots of animals. They also liked doing the animal stretches. I could tell they were engaged because lots of hands were up, there was happy chatter, and everyone was participating."

"The students enjoyed making observations and drawing the plant in the field journal. They all wanted to share their observations and really took their time drawing."

Student Feedback

"I learned that we are on a drought. That means we don't get that much rain and we have to save are water"."

3rd grader from FSUSD Virtual Academy, Fairfield

"I learned that we live in a watershed. In a watershed, water flows from the high points to the low points."

3rd grader from Matthew Turner Elementary, Benicia

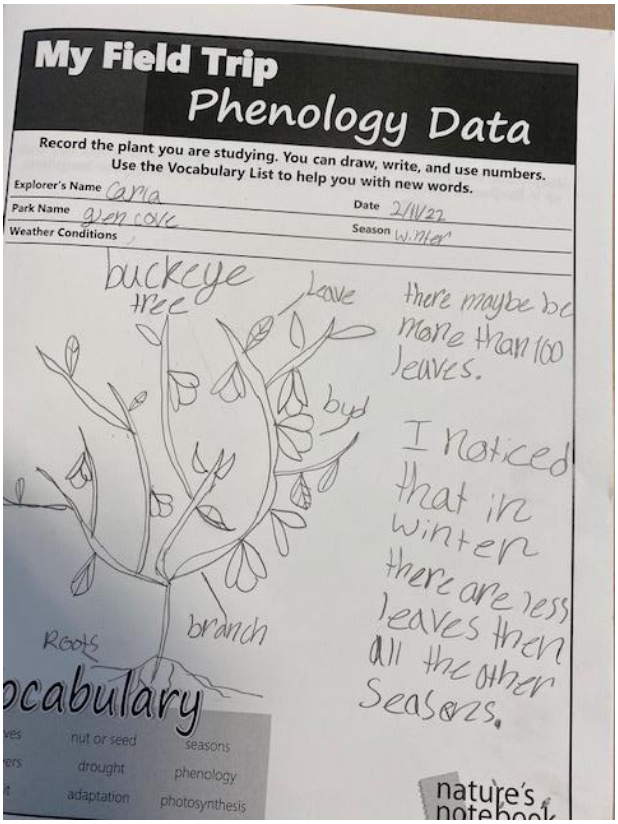
"I learned what a drought is and I learned how to not waste water and how nature changes in the seasons."

3rd grader from KI Jones Elementary, Fairfield

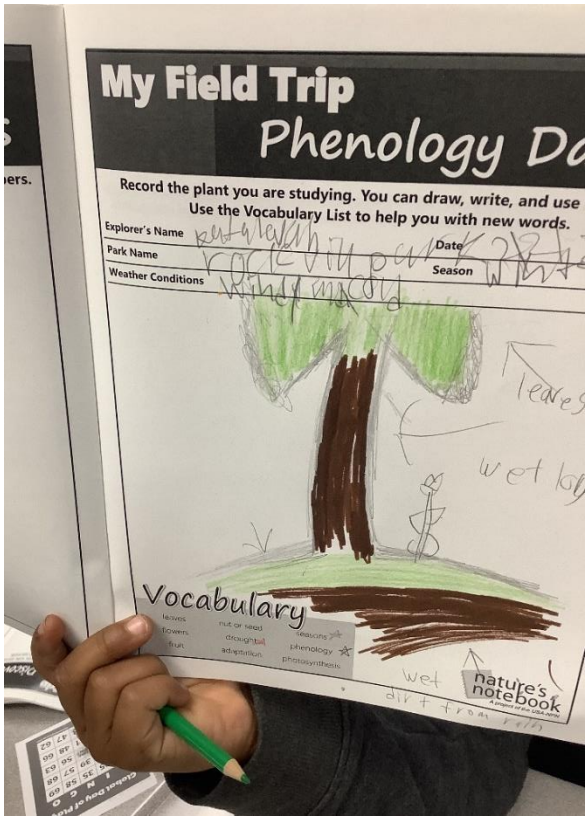
"I learned on the field trip not to let the water get dirty. If there is trash in the water, pick it up. If stuff gets in the water it can become really dirty and the sea can get dirty too."

3rd grader from Crescent Elementary, Suisun City

APPENDIX B – STUDENT JOURNALS



Johnston Cooper Elementary, Vallejo - A phenology nature journal entry of a California buckeye that a student made during a virtual field trip at Glen Cove Waterfront Park.



David Weir Elementary, Fairfield - A student shares his nature journal with observations of a California buckeye tree during a virtual field trip at Rockville Hills Regional Park.

Annie Pennycook Elementary, Vallejo – Students' drawings showing the path water takes through their watershed.

APPENDIX C – PHOTO DOCUMENTAT

Nelda Mundy Elementary, Fairfield – Education Assistant Manager, Lidia Tropeano, helps students identify animal tracks during a field trip at their school's campus.

Rockville Hills Regional Park, Fairfield - Program educator Wendy Low displays two native amphibians for students to see during a virtual field trip.

Lagoon Valley Park, Vacaville - A group of students from Johnston Cooper Elementary make observations of aquatic macroinvertebrates.

Lagoon Valley Park, Vacaville - Students from Fairmont Elementary observe a flowering tree while working on their nature journals.

Rockville Hills Regional Park, Fairfield - Program educators teach students from Cordelia Hills Elementary the definition of a watershed by leading them through the watershed stretch during a virtual field trip.