

# **Watershed Explorers Program**

## **2018-2019 *Program Summary***

### **Solano RCD is grateful to their funders:**

Solano County and All City Jurisdictions  
Solano County Water Agency  
Vallejo Water Conservation Program  
Fairfield-Suisun Sewer District  
Vallejo Flood and Wastewater District  
Potrero Hills Landfill

Fall field trip component funded by:  
Habitat Conservation Fund administered through Greater Vallejo Recreation District

**Written and Administered by  
Solano Resource Conservation District**



1170 N Lincoln Suite 110 Dixon, CA 95620  
Office 707.678.1655  
[solanorcd.org](http://solanorcd.org)

## The Watershed Explorers Program 2019 Program Summary

### Overview

The Watershed Explorers Program utilizes science and place-based learning to build awareness and understanding of local creeks and watersheds, their unique ecosystems, and ways in which we care for them. Students learn the importance of water quality in their watershed and discover the impact trash, oil, and animal waste creates within urban runoff. Concepts are directly linked to the *Next Generation Science Standards for California Schools* and the program offers local children - many of whom have little or no experience being in open space settings - a concrete, experiential introduction to their watershed and the life that inhabits it.

### Audience

School Name	Classes	Students	Field Trip Site	Spring Field Trip Date
<b>Dixon</b>				
Tremont Elementary	3	83	Valley Glen Pond A	Fri. Jan 25
Gretchen Higgins Elementary	2	52	Valley Glen Pond A	Fri. Mar. 8
Anderson Elementary	3	74	Valley Glen Pond A	Thurs. Jan. 24
<b>Fairfield/Suisun City</b>				
Suisun Elementary	4	96	Rockville Hills	Tues. Feb. 12
K.I. Jones Elementary	6	136	Rockville Hills	Thurs. Feb. 7 Fri. Feb. 8
Laurel Creek Elementary	3	76	Rockville Hills	Fri. Feb 15
Cleo Gordon	4	90	Rockville Hills	Tues. Feb 5
Tolenas Elementary	3	74	Rockville Hills	Mon. Feb 4
<b>Vacaville</b>				
Edwin Markham Elementary	5	134	Lagoon Valley	Thurs Apr. 4 Tues. Mar. 21
Orchard Elementary	3	53	Lagoon Valley	Mon. Mar. 4
Kairos Public School	2	50	Lagoon Valley	Tues. March 5
<b>Rio Vista</b>				
D.H. White Elementary	2	48	Sandy Beach	Tues. April 2
<b>Benicia</b>				
Robert Semple Elementary	3	76	Glen Cove/Benicia SRA	Thurs. Apr. 25
Mary Farmer Elementary	3	77	Glen Cove/Benicia SRA	Tues. April 30
<b>Vallejo</b>				
Loma Vista Elementary	2	54	Glen Cove/Benicia SRA	Thurs. Apr. 18
Patterson Elementary	3	81	Glen Cove/Benicia SRA	Tues. April 16
Highland Elementary	4	104	Glen Cove/Benicia SRA	Mon. Apr. 15
Cooper Elementary	3	69	Glen Cove/Benicia SRA	Fri. Apr. 19
<b>TOTAL CLASSES</b>	<b>58</b>		<b>TOTAL STUDENTS</b>	<b>1,427</b>

# The Watershed Explorers Program 2019 Program Summary

## 2019 Participants

- Benicia – 2 schools comprising 6 classes of 153 students and 25 adults
- Vallejo – 4 schools comprising 12 classes of 308 students and 30 adults
- Fairfield – 3 schools comprising 13 classes of 302 students and 61 adults
- Suisun – 1 school comprising 4 classes of 96 students and 22 adults
- Vacaville – 3 schools comprising 10 classes of 237 students and 53 adults
- Dixon – 3 schools comprising 8 classes of 209 students and 32 adults
- Rio Vista – 1 school comprising 2 classes of 48 students and 8 adults
- Unincorporated - 1 school comprising 3 classes of 74 students and 10 adults

There were 18 schools, 58 classes, 1,427 students and 241 adult chaperones who participated on 20 field trips. Approximately 31% of all Solano County 3rd grade classes were enrolled in the program.

## New Program Component: fall field trip emphasizing phenology

812 students from 32 classes of the Watershed Explorers Program participated in a new fall field trip opportunity. Participating students came from across all seven cities in the County, each visiting their respective city's park or open space. 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 they observed.

Part of the draw for this additional field trip and this new program component is for young students to become phenologists, or scientists that observe and record information about changes in nature across the different seasons. The data they collect is submitted to the USA National Phenology Network where it is utilized to better understand how plants, animals, and ecosystems respond to changes in the climate locally, regionally, and nationally. National researchers are looking to see if phenological events, such as the timing of a particular plant's flower bloom, is occurring sooner or later than years past to track the impacts of climate change within the United States.

## Goals and Objectives

The primary program goal of the Watershed Explorers Program is to help students develop an awareness of the outdoor, natural world. Participants leave the program:

- Able to describe the path water takes through the watershed;
- Knowing how to protect and conserve drinking water from source to sink;
- Understanding the role of storm water in their watershed, particularly the impacts of oil and trash on storm water quality;
- Understanding how they can mitigate or eliminate the impacts of their own and their family's behaviors on watershed health by practicing the Three R's (reduce, reuse, and recycle).

## Method

Participants receive preparatory information in the classroom from their teachers who use the program's Teacher Guide to ready students for the field trip. Students are given their own journals and participate in various activities including:

- Making paper watershed models to observe what happens when oil or other contaminants are improperly disposed of in the watershed;
- Counting the number of gallons of water they use each day and discuss ways to reduce their water consumption;
- Drawing the life cycle of a plant, reading about pollinators and discussing phenology and its relevance to the interconnectedness of humans, animals, weather and our environment.

Additionally, with support from the Solano RCD's School Water Education Program, a Solano RCD educator provides a one-hour presentation for each enrolled class discussing where students' water

## The Watershed Explorers Program 2019 Program Summary

comes from, where their stormwater goes, and ways to conserve water. A hands-on, three-dimensional EnviroScape presentation allows students to model the movement of water in a watershed and experience a small-scale simulation of the impacts of pollution. After discussing and demonstrating how water moves oil and other pollutants, students review a list of Certified Collection Centers in their journals to help connect their parents with a concrete way to be part of the solution.

When students arrive at their local park for a field trip, they are outfitted with the equipment they'll need to investigate the landscape and divided into groups to visit a series of learning stations. Students look for traces of birds, insects, and mammals as they hike through the park. Guided by program staff, students use their journals and participate in these hands-on activities:

### Plant and Animal Phenology

**Description:** As a group, students make close observations about a special plant or animal to the park, helping them develop their observation skills and putting the physical characteristics they observe into context with the current season. Students make predictions about how the characteristics of the plant (e.g., number of flower buds) or animal (e.g., nesting behavior) will change over time. Students are encouraged to come back regularly with their families to check if their predictions are accurate. **Desired Outcome:** Students are better able to identify characteristics and behaviors of plants and animals as they are connected to each season and are more likely to revisit the site to check their prediction.

### Macroinvertebrates

**Description:** In this two-part activity, students are introduced to aquatic macroinvertebrates and how these creek-dwelling animals are indicators of creek health. One half of the group begins the activity by closely examining the organisms and discussing how storm water pollution (e.g., motor oil) can harm these animals. Simultaneously, the other half of the group models the movement of pollution (e.g., oil and litter) through a watershed, from the streets to the storm drains and out to creeks and the ocean. The students verbally explain their drawings before swapping activities with the other half of the group. **Desired Outcome:** Students will understand how pollution is carried by water into storm drains into creeks and directly affects wildlife locally and as far out as the ocean.

### Phenology Scavenger Hunt

**Description:** Students work in pairs to locate and identify seasonally driven phenomena (e.g., opening leaf buds, flowers, pollinators, dropping leaves, bird nests). Once the scavenger hunt is complete, the group discusses how understanding phenology is important to understanding how to respond to water availability, such as when to plant crops or how we should all conserve water to support plants and animals during times of drought. **Desired Outcome:** Students will directly connect water consumption to preservation of life across all ecosystems.

### Storm Drain Model

**Description:** Students observe a storm drain model demonstration by creating an "oil spill" and then following the path of the contaminated water. Students discuss the significance of properly disposing used oil. **Desired Outcome:** Students bring their student journal home and share with their parents where they can discard used motor oil.

### Reduce, Reuse & Recycle (RRR)

**Description:** Educators talk to students about RRR concepts, using student lunches as tangible examples of reusable items and the importance of recycling. Each student is provided with a color-it-yourself CRV page comic featuring Petrolia the Used Oil Avenger - *Petrolia and the Case of the CRV Refund* to reiterate that many cans and bottles can be exchanged for cash. Classes are invited to participate in our WE! Recycle Challenge where they collect recyclables in their class for a month period and turn them in at one of their cities CRV collection sites.

## The Watershed Explorers Program 2019 Program Summary

**Desired Outcome:** Students understand the significance of the RRR message and begin disposing of trash responsibly while also engaging in the California Beverage Container recycling program.



Students from Anderson Elementary in Dixon won the WE! Recycle Challenge and were awarded reusable water canteens.

### 2019 Watershed Explorers Student Assessment Performance Outcomes

We assess gains in student knowledge about concepts taught in the Watershed Explorers Program with a two-part assessment quiz. Students take the first quiz prior to participating in the program to establish a knowledge baseline. Participants take the second quiz after participating in the in-class curriculum and the field trip to capture information about student knowledge gains following their participation. The 7-question pre and post-assessments are designed to measure understanding about storm water runoff, individual watershed stewardship practices, phenology, and water conservation. Questions include:

1. In your city, where is the first place rain water goes after it hits the street?  
*Desired Response: Storm drain*
2. Where does the water go after that? *Desired Response: Creek, students' watershed (Sac River, Suisun Marsh, Carquinez Strait, San Pablo Bay) and out to the Ocean*
3. What should your family do with used oil from their cars? *Desired Response: Recycle it*
4. What are two ways you can use the "Three Rs" at home or school? *Desired Response: Use less plastic, reuse your glass jars, reduce the amount of water bottles by reusing a bottle*
5. Why is important to save water inside and outside the home? *Desired Response: This allows us to save it for a later time in case we are in a drought. It's like saving money in the bank. Water is a limited resource in CA. We need to remember that, even if it's raining a lot.*
6. Phenology is the study of changes in nature through winter, spring, summer, and fall. What are two changes that happen every year? *Desired Response: Leaves fall from trees, leaves grow on trees, flowers bloom, pollen spreads, the grass on the hills turns green, birds come back from their winter feeding grounds, etc., etc.*
7. Rain effects everything. What happens if we don't get enough rain? *Desired Response: Drought, fire, flood reduction*

### Fall Field Trips

In the pre-assessment, 13% of students were able to provide correct or partially correct answers to the seven assessment questions, with students performing best (29% correct or partially correct answers) to the question about storm water distribution. Surprisingly, 21% of respondents were able to correctly or partially correctly explain two yearly phenological changes. Students had the most difficulty in telling us where storm water goes after it enters the storm drains, with no one providing a correct or partially correct answer. By the post- assessment, student grasp of concepts improved on all questions, by an average of 39%. Correct responses rose with all questions, and specifically the question on recycling and drought impacts increased to 37%. As we piloted the new fall material, the

## **The Watershed Explorers Program 2019 Program Summary**

emphasis was on the phenology component. We are now more intricately working to incorporate a modified version of the fall activities into our existing Watershed Explorers Program curriculum.

### Spring Field Trips

In the pre-assessment 19% of respondents were able to provide correct or partially correct answers to the seven assessment questions. By the post-assessment, this number improved to 57%, an improvement of 39%. In the pre-assessment, students were most challenged by the question of where rainfall goes after it hits the street (9% providing correct or partially correct answers), followed by what to do with used oil (12% provided correct or partially correct answers). Grasp of these concepts improved markedly by the post-assessment, increasing 66% and 60%, respectively. Students demonstrated the best grasp on the drought question on the pre-assessment (47% provided correct or partially correct answers), but demonstrated the best grasp of the rainfall question discussing where water goes after it hits the ground (76% providing correct or partially correct answers) by the post-assessment.

Interestingly, students improved by the same amount in the fall and spring, though they started the spring with slightly more demonstrated knowledge about the subjects. They ended with nearly identical correct responses to the phenology question (46% in fall and 49% in spring), but fall students started at 14% correct or partially correct and spring students started at 19%.

We do not have enough information to fully understand all the factors that impacted student understanding of the curriculum, or the impact of the pilot fall field trip on overall understanding of the curriculum. We continue to work to find ways to improve our assessment instrument and its administration, and to more closely tailor it to subject capability and comfort.

### Teacher Assessment

Teachers participated in the program assessment for the first time and for both the fall and spring field trips. Teachers took the same 7 question quiz they administered to their students. Respondents in both the pre and post-assessments in the Fall and Spring scored 75% and 88% respectively, the equivalent of a "C or B" or average grade.

These assessments do demonstrate where adult understanding about the curriculum is not complete. The areas where information is lacking pertains most to where storm water goes after it hits the street and where it flows after that. Teachers are unfamiliar with what a watershed is and how water flows through it. This will be an area we will work on further to educate teachers so they can successfully teach their students.

### Verbal Assessment

As part of our second State Parks Habitat Conservation Fund grant, we implemented an oral evaluation to check participant understanding of field trip safety and participation rules. The evaluation was done in a group setting with program educators verbally asking the questions. Students responded either with called out answers or by closing their eyes and raising their hands. The questions we asked were as follows: 1) What are the safety rules for being in a park/open space? 2) Do you like being outside in nature? 3) Do you want to visit this park or open space again? 4) Who would you like to come with you on your next visit?

Approximately 800 students participated in this evaluation exercise. Students' were successful at naming the trip safety rules and expressed positive feelings about nature in general and the field trip site. They were also enthusiastic about identifying who they wanted to bring back to the park for another experience. We chose an oral evaluation strategy for these questions to switch things up from the written pre and post-assessment quizzes administered to all participants used to assess understanding of major concepts taught in the program. This methodology provided a mostly

## The Watershed Explorers Program 2019 Program Summary

enthusiastic participation, but was somewhat challenging to administer largely because some of the questions were too complex for the format. Next year, we will rework the formatting of these questions to gauge participant understanding of these four evaluation objectives.

### Evaluation Conclusion

Evaluating very young students can be challenging. As our program grows to include more students throughout Solano County, in all their diversity of language, literacy and social skills, the challenge becomes more complicated. We are constantly refining our methodology and working to develop tools that provide children with unthreatening and manageable ways to provide honest feedback about our program and what they've learned. Methods under consideration include administering all program evaluation orally, in large and small groups and verbally administered multiple choice quizzes, where students are provided the question orally and answer on a piece of paper, and in drawing format so students can depict on paper how a watershed works.

The Solano RCD Education Director and Program Manager will be attending the August 2019 BEETLES (Better Environmental Education, Teaching, Learning & Expertise Sharing) Leadership Institute through the Lawrence Hall of Science where program evaluation methodology will be addressed in the training.

### Teacher Feedback

"The instructors are excellent! Students loved the actual hiking aspect. Not many get outdoors on a regular basis. This was excellent as always!" - Kaitlin Alden, Laurel Creek Elementary, Fairfield

"I think this field trip makes a real impact on the students. With the fall field trip, spring field trip, class presentation and workbook they learn throughout the year, not just once." - Bessie Bazos, Robert Semple Elementary, Benicia

"This is an incredible program! It definitely sparked an interest in my daughter that I didn't know existed." – Parent Chaperone Regina Lobo, Robert Semple Elementary, Benicia

"I think it's wonderful to have children explore nature, learn about pollution and the importance of protecting our environment." - Kenzie Sanders, Tremont Elementary, Dixon

### Photographs



Students at Valley Glen Pond investigating life in the storm water pond.



Students preparing to participate in the phenology scavenger hunt at Glen Cove Park.

## The Watershed Explorers Program 2019 Program Summary



An excited student from Rio Vista is ready to use microscopes at Sandy Beach Park.



Vacaville students hike to Lagoon Lake to observe how much water has entered since their last visit.



Students at Benicia State Recreation Area discussing how storm water moves through their watershed.



Fairfield-Suisun students begin their descent down Rockville Hills Park to carefully study the CA Buckeye.