

Redbud Educational Programs

Annual Report
July 2016 – June 2017



Presented by

Colorado River Alliance

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Redbud Educational Programs Annual Report July 2016 – June 2017

Introduction and Overview

The Redbud Educational Programs achieved several milestones during the 2016–2017 program year. In November 2016, Redbud Program Coordinator Daniela Pennycook led the program's first-ever fully bilingual field trip to a group from the Girl Scouts of Central Texas. In June 2017, the program taught its 25,000th student since its inception. Over the course of the school year, the program exceeded its goal of teaching 3,000 students by 281 students.

Throughout the 2016–2017 program year, one key area of focus was making these programs bilingual in English and Spanish. Demographic data from the schools who attend Redbud Field Trips show that almost 40% of the students are Hispanic; this initiative has helped to ensure that everyone takes part in conversations about our river's future. We translated all Redbud program materials, including models, handouts, tests, and visual props to be in both Spanish and English. There are English and Spanish materials for each of the four stations on the field trip, allowing students to choose the language they are most comfortable with. We have also recruited bilingual interns and volunteer docents who can teach in Spanish, English, or a combination as needed.

Of the schools who attended Redbud field trips during the 2016–2017 program year, 28% had Title I status, meaning that they include lower-income families and that their students qualify as "underserved." In the 2017–2018 program year, we are implementing a new system of bus scholarships for Title 1 schools, which will help us further target populations of students who would otherwise be less likely to attend our programs.

Most of the students who experienced Redbud field trips were 3rd through 5th graders (see data below), and we also conducted numerous afterschool programs and adult tours. For instance, we helped Boy Scout troops earn their Energy Use and Conservation merit badges, and we taught Girl Scouts as well. We also served a GeoFORCE Texas group, a college-preparatory program that introduces middle and high school students to geology.

This year, the Redbud Educational Programs' achievements include:

- We served a total of 3,281 students and other guests;
- We recruited and engaged 38 Volunteer Educators, many of them bilingual; and
- Students demonstrated statistically significant knowledge gains about their drinking water source, the Water Cycle, and watershed pollution.

Focus areas in the program year 2017–2018 include:

- Increase bilingual programming for Spanish-speakers, serving at least 300 students;
- Identify and execute a marketing outreach plan for educators serving ESL students in AISD and other Austin-area schools;
- Empower 18 fully bilingual volunteer environmental educators and interns; and
- Develop and evaluate new volunteer training procedures and teaching curricula for Spanish speakers.

Goals and Program Description

The Colorado River Alliance's Redbud Educational Programs are held at the Wilkerson Center for Colorado River Education at the LCRA Redbud Center. The Redbud Program's educational goals are:

- 1) Increase awareness and conservation of the Texas Colorado River by inspiring students to become river stewards through hands-on learning;
- 2) Reach all segments of Austin's population, including people from underserved and underrepresented backgrounds; and
- 3) Support formal learning inside classrooms by improving student knowledge of relevant topics covered by the Texas Essential Knowledge and Skills (TEKS) and State of Texas Assessment of Academic Readiness (STAAR) tests.

Redbud programming is comprised of three distinct field trips:

- 1) **Youth Experience Stewardship (YES):** Launched in 2009 as a collaboration between LCRA, the Alliance, and the Austin Independent School District (AISD), YES is a four-hour, outdoor experience (see Appendix, Table 2) targeted for children in grades 3–5. YES program curriculum covers four core topics during each field trip: the Texas Colorado River & Highland Lakes, watersheds and watershed pollution, water conservation, and the water cycle. Additional topics include water sources, healthy aquatic systems, rainwater harvesting, wildlife, water-resource protection, and river ecology. The YES program supports educator efforts in the classroom, aligns with grade level Texas Essential Knowledge and Skills (TEKS) (See Appendix, Table 1), and supports the missions of both the Alliance and LCRA.
- 2) **Afterschool and summer programming:** These programs are two hours long, delivering customized YES program content that is adapted towards various student age groups and visitor requests.
- 3) **Public group tours for adult audiences:** Tours educate the general public about the importance of the Texas Colorado River and eco-friendly building design. Visitors have the option of exploring our river's geography and its dams, the Redbud Center's eco-friendly features, and water quality.

All programs are provided free of charge and are supported by community volunteers. Alliance staff recruit, train, and reward volunteers and interns as part of program operations. We deliver consistent messaging across all three Redbud programs through intensive, detailed volunteer training, co-teaching, field-trip observation, and ongoing support.

Program Statistics

In Program Year (PY) 2016–2017 (July 2016 – June 2017), **3,281 people participated in 96 field trips** (see Table 1, below). During each field trip, the number of participants, grade levels, type of school or organization, and ethnicity were recorded. To assess the program's progress towards reaching all segments of Austin's population, we collected demographic data.

Table 1: Redbud Program Statistics 2016–2017

PY 2016-2017 Totals	Participants	Field Trips	
	3287	96	
By Type of Program	Number of Participants	Number of Trips	Percent of Participants
YES: Youth Experience Stewardship	2687	64	83%
Afterschool/Summer Program	488	27	14%
Adult Group Tours	112	5	3%
By Type of School/Group	Number of Participants	Number of Trips	Percent of Participants
Public school Total *	2,205	50	68%
Public school – AISD	1,048	23	32%
Public school – Non AISD**	1,157	27	35%
Private schools	482	14	15%
Afterschool/Summer Programs	488	27	14%
Afterschool Programs from Public Schools	90	3	3%
Nonprofits	324	16	10%
Girl & Boy Scouts	24	3	1%
City of Austin	42	4	0%
Homeschool	0	0	0%
Private tours	8	1	0%
Adult Group Tours	112	5	3%
Title I Status***			
Title I Public Schools	927	22	28%
Non-Title I Public Schools	1,368	31	42%

* Inclusive of public charter schools

** We served public schools from Austin ISD, Del Valle ISD, Dripping Springs ISD, Elgin ISD, Hays CISD, Manor ISD, Pflugerville ISD, and Round Rock ISD

*** Title I schools are designated by the State of Texas and serve a larger percentage of students from underrepresented and underserved backgrounds. This section's totals include Afterschool Programs from Public Schools.

Table 2: Redbud Student Participant Ethnicity for all Program participants, 2016-2017

Student Ethnicity	Title I Schools	Percent of Students	Non-Title I Schools	Percent of Students	Total	Percent of Students
White	143	16%	965	63%	1108	45%
Hispanic	573	63%	382	25%	955	39%
African American	143	16%	104	7%	247	10%
Asian	32	4%	52	3%	84	3%
Other	13	1%	36	2%	49	2%
Total	927	100%	1556	100%	2443	100%

Program Evaluation

Program staff collect feedback from participants in both qualitative and quantitative form to help evaluate our program's effectiveness. (See Appendix, Figure 1, for example.) Teachers and chaperones that accompany students on field trips rate the overall quality of the YES program, as well as docent instruction on the four topic stations (see Goals and Program Description, above). Adults completed 171 evaluations during YES field trips in PY 2016–2017. Feedback scores were favorable across all four evaluation dimensions, and were consistent with the YES program's average evaluation rating since program inception:

Overall Program Evaluation 2016–2017 **Average Rating ***

- | | |
|---|------|
| 1. The staff was knowledgeable, friendly and helpful. | 4.92 |
| 2. Today's program is what I expected. | 4.88 |
| 3. I plan to bring future classes to Redbud Programs. | 4.94 |

*** Scale: 1 (not at all) to 5 (very much)**

Ratings of all four topic-station questions were averaged to provide a measure of client satisfaction with our curriculum and educators, and they were assessed individually:

Redbud Core Topic Instruction Evaluations 2016–2017 **Average Rating**

- | | |
|---|------|
| Q1: The presenter was knowledgeable, friendly and helpful. | 4.89 |
| Q2: The information was presented in an appropriate manner. | 4.87 |
| Q3: The materials and activities were grade-level appropriate. | 4.92 |
| Q4: This station covered important TEKS and/or science content. | 4.93 |

Table 3: Individual Station Ratings

Rating Dimension	Water Conservation	Colorado River & Lakes	Water Cycle	Watersheds & Pollution
Q1	4.90	4.86	4.92	4.88
Q2	4.91	4.81	4.88	4.90
Q3	4.95	4.91	4.93	4.91
Q4	4.93	4.93	4.92	4.94

Student Knowledge Gains

To ensure that the YES program is successfully achieving our second and third educational goals (see Goals and Program Description, above), we conduct pre- and post-visit knowledge tests to AISD students. The tests are identical and include three questions (see Appendix, Figures 2a and 2b, for examples), assessing student knowledge of important concepts covered during the field trip and recorded in their Field Journals (see Appendix, Figure 10).

During PY 2016–2017, 700 students completed the pre-visit knowledge test (pre-test) and 364 students completed the post-visit knowledge test (post-test). Across Program Years 4-9 (the years when knowledge tests were administered), 3,877 students (88 classes) completed the

pre-test, and 3,263 students (74 classes) completed the post-test, and all of these records were included in analyses presented in this report.

Pre-test and post-test scores were anonymously collected and analyzed using a Matched Subjects design. The matched subjects in the analysis were 3rd, 4th and 5th grade classes from Austin-area schools (AISD). In this design, only one test type (pre-test or post-test) was administered to students during a given field trip. The average class size was 45 students. Children from Title I schools (serving students from predominantly low-income households) and Non-Title I schools (serving students from predominantly middle-class and affluent households) were tested. An Analysis of Variance (ANOVA) was used to assess class mean percent of correct responses to each of three questions on the Test. Test type (pre-test, post-test), school Title I status (yes or no) were fixed factors in the ANOVA. The ANOVA was configured to account for minor differences in sample size (number of classes) per condition, so that they did not unduly influence the test results.

Classes from both Title I and Non-Title I schools scored significantly higher on post-tests than pre-tests ($p < .05$; See Table 4, below, and Figures 5a-5c in the Appendix). Classes from Title I schools scored lower than classes from Non-Title I schools on both pre-tests and post-tests for Questions One, Two and Three. Class performance on individual test questions is addressed in the Discussion section of this report.

Table 4: Mean Class Pre- and Post-Test Scores, Program Year 2016–2017

			Title I		Non-Title I		Total	
			Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
Overall Test Score (Class Mean):			64.3	75.4	74.1	84.9	72.1	82.5
	Question Type	Question	Mean % Correct Responses in each Class					
Q1	Multiple Choice	Where does your drinking water come from?	77.5	99.4	68.1	98.1	69.9	98.4
Q2	Multiple Choice	Do humans reuse the same water over time?	58.6	85.7	71.3	84.1	71.3	84.1
Q3	Open	What are 3 examples of pollution that impact our waterways?	56.7	90.5	77.9	89.2	73.7	89.6

In all cases, mean class post-test scores are significantly higher than pre-test scores ($p < .05$). Also, in all cases, class pre-test averages from Title 1 schools were significantly different from the pre-test averages from non-Title 1 schools ($p < .05$); note that Title I pre-test scores were higher than non-Title I pre-test scores for Question 1.

Water Conservation Pledges

Water conservation pledge cards were distributed to students in order to assess the impact YES programming may have on student water-use behavior. Students viewed a list of ways in which they could reduce water use at home and then selected water conservation actions they promised to undertake (see Appendix, Figure 3, for example).

Pledge cards were collected from 2,611 students during the field trips for PY 2016–2017. Data from the Pledge cards are summarized in Table 4 below, and addressed further in the Discussion section of this report.

Table 5: Student Conservation Pledge Responses, Program Year 2016–2017

Student Affiliation:	All students	
Mean Pledge Score	83%	
Conservation Habit	# Pledges	% of Students*
Turn tap off when brushing teeth	2036	18
Take 5 minute showers	1732	15
Only fill bath tub half full	1799	16
Use leftover water for plants	1723	15
Remind family to do full loads of laundry	1811	16
Remind family to water lawn when sun is down	1676	15
Other	479	4

*Students can pledge to adopt more than one Conservation Habit; they are not mutually exclusive.

Bilingual Programming

Demographic data for the Redbud Center Field Trip Programs show that 39% of attendees are Hispanic, and many of these students use Spanish as their primary language. In order to better serve Spanish-language students, the Colorado River Alliance is working towards providing bilingual programming for all education programs. Two pilot field trips serving more than 37 students highlighted two important challenges in developing bilingual programming. First, students have a range of language abilities across all communication methods (i.e. reading, writing, speaking, and understanding verbally). These abilities may be impossible for our staff to assess prior to the field trip. Second, it is a challenge to schedule our bilingual volunteers and interns to serve the bilingual students when we don't know in advance when the students are coming! The first challenge is being addressed by translating all visual aids and activity props and making them available in both English and Spanish for each of the field-trip stations. Students will either have access to bilingual materials or have the option to choose English or Spanish materials, depending on the activity. The second challenge is being addressed by recruiting only bilingual interns; as a result, bilingual interns will be able to provide Spanish support to students on any available field trip date.

Volunteers

Volunteers and interns are essential to the Redbud YES Program. During PY 2016–2017, 38 environmental education docents were involved in Redbud programs. Volunteer docents teach all four of the YES program stations, and administer pre-tests, post-tests and pledges. During YES program field trips for grades 3-5 schoolchildren, four instructors are needed to staff the stations each day. Alternative programs require one to three instructors depending on the size of the group. Adult public tours require one instructor. Volunteers and the Redbud Program Coordinator fill these needs.

The number of docents and cumulative hours they contribute to Redbud programming are summarized in Table 6 below. Hours contributed by paid staff are not included.

Table 6: Volunteer Participation by Program Year

School Year	# Volunteers	# Hours	Avg. Hours/Volunteer
Fall 2009	24	354.5	14.77
2009-2010	27	500	18.52
2010-2011	No data	No data	No data
2011-2012	17	355.5	20.91
2012-2013	33	911.5	27.62
2013-2014	33	897.5	23.61
2014-2015	35	1,175	33.57
2015-2016	48	1,493	31.10
2016-2017	38	1404.5	36.9

Discussion

Program Participation

The Alliance's Redbud program exceeded its attendance goal (3,000 students for PY 2016–2017) with a total attendance of 3,281 participants. 28% of these students were from Title I schools. 32% of field trips were attended by AISD schools this past year. We've long pursued the goal of engaging students from underrepresented and underserved populations, and the Austin Independent School District (AISD) has expressed the need for bilingual programming to engage students who are learning English as a second language (ESL). In order to drive progress in this outreach area, the Alliance recruited 3 bilingual interns for the 2016–2017 school year. These interns, in coordination with the bilingual Redbud Program Coordinator, have translated all of the Redbud curriculum, as well as piloted the first bilingual field trips at the Redbud Center. Although we did not meet the strategic goal of reaching 10% of our total students with bilingual programming, significant progress has been made that will allow us to achieve this goal in the coming year.

Strategic Action Items for PY 2017–2018 include:

1. Identify and execute a marketing outreach plan for:
 - o Educators serving ESL students in AISD and other Austin-area schools
 - o Recruit bilingual volunteer environmental educators and interns

2. Implement **full** bilingual Intern training procedures and support for teaching curriculum for Spanish-speakers on **any** day.
3. Implement X Student Repeated-Measures Test for Knowledge Gains, factoring for primary student language preference.

Student Knowledge Gains

Classes from both Title I and Non-Title I schools demonstrate significantly more environmental knowledge after Redbud field trips than before them (Table 4 above, and Figures 4, 5a-5c in the Appendix). The degree of difference between lower average pre-test and higher post-test class scores is similar for classes from Title I schools and those from Non-Title I schools, for most questions (Figures 4a-4c, Appendix). This score pattern suggests that **classes from underrepresented and underserved populations make similar amounts of knowledge gains as classes from more affluent backgrounds in our program.**

Substantial qualitative differences exist between the examples of pollution students name before field trips versus after them. We collated class responses across all four program years; their students provided 30 different response categories (see Appendix, Figure 9). Among these, the following patterns were notable:

1. Students name more “hard-to-see” pollution types after Redbud field trips than before them: Fertilizer, chemicals, and pet waste were well-represented in post-tests, but very little or not at all in pre-tests.
2. Students name more “easy-to-see” pollution types before Redbud field trips rather than after them.

Students who have gone on Redbud field trips not only know several examples of watershed pollution, they often identify the less-visible ones that are considered to be the largest threats in our watershed.

Student Conservation Pledges

At the conclusion of field trips, students indicate they are willing to adopt water conservation behaviors at home (see “Water Conservation Pledges,” above). **If all participating students honor their Water Conservation Pledge elections for one year, they will have saved an estimated 18 million gallons of water** (see Appendix, Table 3).

Volunteer Recruitment

We must recruit more docents who are categorized into the following groups:

- “Seasonal”- Volunteers that stay for one-two semesters and attend field trips once per month. We aim to recruit and train **10** per year moving forward (**5** per season).
- “Intern”- Volunteers who contribute an average of 12-15 hours per week. Previous to fall 2016, we have recruited three interns per semester. Moving forward, we will aim to recruit **four** interns per semester (**all** of them bilingual) to support the Program’s strategic direction.
- “Long Term Occasional”- Docents have volunteered for more than one year, and attend field trips 2-3 times per semester, totaling 5-6 trips per year. We aim to have **two** active docents of this kind per year

- “Long Term Active”- Docents have volunteered for more than one year, and participate in field trips at least once per month. These volunteers are more difficult to recruit and we aim to have **two** active docents per year.

Partners and Supporters

The Redbud Educational Programs would not be possible without our partners and supporters. First and foremost, the Lower Colorado River Authority provides the space for this program at its dynamic and exciting Wilkerson Center for Colorado River Education, and LCRA was instrumental in this program's initial development and launch. Recent financial supporters include Atkins, the Austin Community Foundation (specifically, the Georgia B. Lucas Fund), the Jacob and Terese Hershey Foundation, the Junior League of Austin, the Reese Foundation, the Save Barton Creek Association, the Texas Pioneer Foundation, and Time Warner Cable.

Appendix

Table 1: Texas Essential Knowledge and Skills Alignment

	Science	Social Studies
3rd Grade	1B, 2A, 2F, 3C, 3D, 5B, 6A, 6C, 7B, 7C, 7D, 8B, 9A, 9C	1A, 2B, 4A, 4B, 4C, 4D, 5A, 11A, 11C, 12B, 12C
4th Grade	1B, 2D, 3C, 3D, 5A, 5B, 7B, 7C, 8B, 9B	2E, 5A, 6A, 8C, 7A, 7B, 7C, 9A, 9B, 9C, 20B, 20C
5th Grade	1B, 3A, 3D, 5A, 5D, 7B, 7C, 8B, 9A, 9C	6A, 7B, 8B, 9A, 9B, 9C

Table 2: YES Program Core Topic Stations

<u>Colorado River Station</u>	This station aims to provide students with a background on the importance of the Colorado River, the geology and geography of the river, and the purposes of the Highland Lakes and Dams system. Students view a detailed map of the dam and lake locations, then explore a stream table to discover firsthand the use of dams to manage flood waters. Then, students tour the Wilkerson Center's interactive water feature exhibit and replicas of the Highland Lakes and Dams. At each dam along the feature, there is a stopping point with a teachable moment.
<u>Watershed Station</u>	The Watershed Station allows students to identify attributes of a watershed and locate their school's watershed. Students learn that water is collected from both surface water and groundwater sources, and that Austin's drinking water is pumped from the Colorado River. Students then move to an interactive model town to see how nonpoint-source pollution affects the health of the Colorado River Watershed. Students then brainstorm ways in which their daily lives, whether at home or at school, impact the river's long-term vitality.
<u>Water Cycle Station</u>	Students discuss the amount of freshwater on Earth and how water is reused by humans over time. After a review on prior water-cycle knowledge, they play a game in which they become drops of water in the water cycle to ultimately realize that water moves in many ways through the cycle. The second part of the game introduces pollution to see how human pollution ends up impacting water sources. The stations end with a group discussion on how drought can change the water cycle, and that during drought some of the water cycle processes will change.
<u>Conservation Station</u>	The Conservation Station begins with students brainstorming ways we use water in and around the home and the amount used. The docent reveals that, on average, a family of four in Texas uses about 410 gallons a day which totals 150,000 gallons a year. Students participate in a game in which they estimate how much water can be wasted by using water carelessly during daily tasks. Students then brainstorm ways water consumption can be reduced during these

daily tasks. After discussing the significant amount of water used for lawns, the Wilkerson Center's native plant gardens become a teaching tool. The scavenger hunt shows how families can drastically reduce the amount of water used in landscaping by having drought tolerant and native plants and grasses. Finally, students are issued 'Pledge Cards' so that they can commit to conserving water at home.

Table 3: Potential Annual Water Savings from Student Pledges, Program Year 9

Conservation Habit	Students	Gallons Saved	Times per year	Cumulative Water Savings (gals.)
Turn tap off when brushing teeth	2036	3.5	365	2,600,990
Take 5 minute showers	1732	25	313	13,552,900
Only fill bath tub half full	1799	10	5	233,870
Remind family to do only full loads of laundry	1723	20.5	52	1,836,718
Remind family to water lawn only when sun is down	1676	Unknown		
Total				18,224,478

Figure 1: Teacher Evaluation

YES Program Evaluation Form

Name (optional) _____
 Group Name _____
 Date _____ What is your zip code? _____

On a scale from 1 to 5, please rate the following:

5-----4-----3-----2-----1
 Very much Somewhat Not at all

Colorado River Station

1. The presenter was knowledgeable in his/her field. 5 4 3 2 1

2. The information was presented in an appropriate manner. 5 4 3 2 1

3. This material and activities were grade level appropriate. 5 4 3 2 1

4. The presenter was useful and helpful. 5 4 3 2 1

Comments about this station: _____

Conservation Station

1. The presenter was knowledgeable in his/her field. 5 4 3 2 1

2. The information was presented in an appropriate manner. 5 4 3 2 1

3. This material and activities were grade level appropriate. 5 4 3 2 1

4. The presenter was useful and helpful. 5 4 3 2 1

Comments about this station: _____

Please continue on the other side

Water Sources and Watersheds Station

5. The presenter was knowledgeable in his/her field. 5 4 3 2 1

6. The information was presented in an appropriate manner. 5 4 3 2 1

7. This material and activities were grade level appropriate. 5 4 3 2 1

8. The presenter was useful and helpful. 5 4 3 2 1

Comments about this station: _____

Water Cycle Station

1. The presenter was knowledgeable in his/her field. 5 4 3 2 1

2. The information was presented in an appropriate manner. 5 4 3 2 1

3. This material and activities were grade level appropriate. 5 4 3 2 1

4. The presenter was useful and helpful. 5 4 3 2 1

Comments about this station: _____

Overall Program Evaluation

1. The staff was knowledgeable friendly and helpful. 5 4 3 2 1

2. Today's program was what I expected. 5 4 3 2 1

3. I plan to bring future classes to Redbud programs. 5 4 3 2 1

Comments about this program: _____

Figure 2a: Pre-Test

What do YOU know?

- Where does your drinking water come from?
 - Edwards Aquifer
 - b** Colorado River
 - Brazos River
 - I don't know
- Do humans reuse the same water over time?
 - Yes
 - No
 - c** I don't know
- What are 3 examples of pollution that impact our waterways?

cans in water
bottles in water
Not good water

 PRE **334**

Figure 2b: Post-Test

What do YOU know?

- Where does your drinking water come from?
 - Edwards Aquifer
 - b** Colorado River
 - Brazos River
 - I don't know
- Do humans reuse the same water over time?
 - a** Yes
 - No
 - I don't know
- What are 3 examples of pollution that impact our waterways?

oil
trash
chemicals

 POST **517**

Figure 3: Pledge Card

Colorado River Pledge

I pledge to reduce water use at home by:

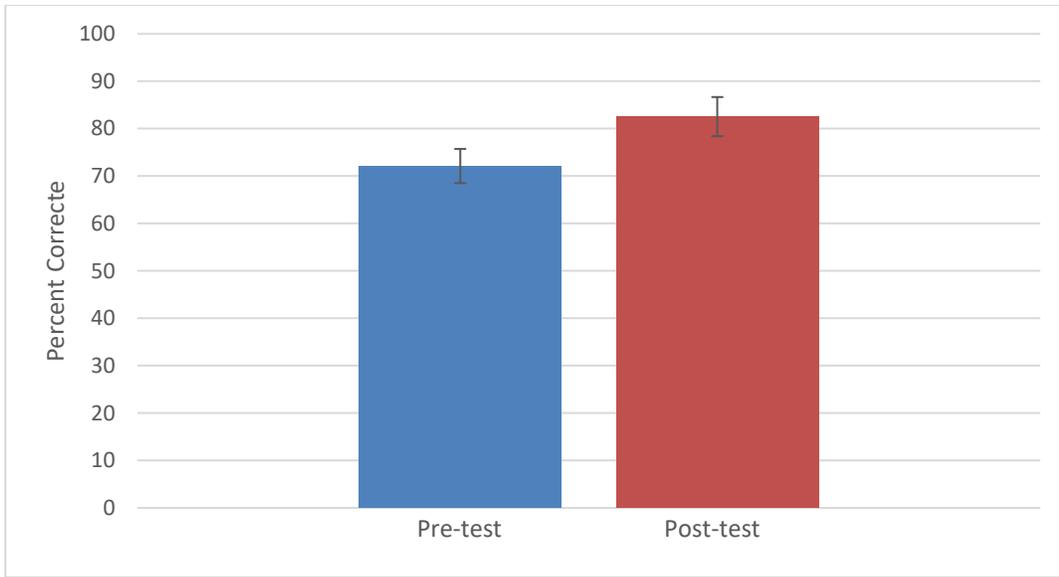
- Turning the tap off when brushing my teeth.
- Taking 5 minute showers.
- Only filling the bath tub half way for baths.
- Using left over water for plants instead of pouring it down the sink.
- Reminding my family to only do full loads of laundry.
- Reminding my family to only water the lawn when the sun is down.
- Other: to only use water for important use

Ana _____ Signature Roder Springs E _____ School

2123

We Love the Colorado River!

Figure 4: Mean Pre/Post Test Scores, Program Year 9

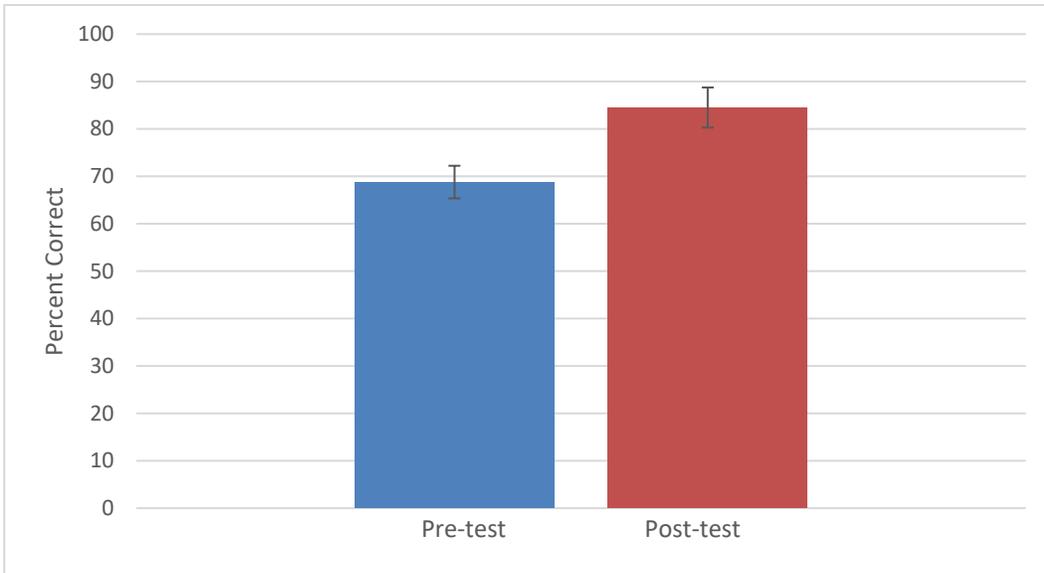


Figures 5a – 5c: Mean (Class Average) Pre-Test and Post-Test Scores

5A: Question #1: Where does your drinking water come from?



5B: Question #2: Do humans reuse the same water over time?



5C: Question #3: What are 3 examples of pollution that impact our waterways?

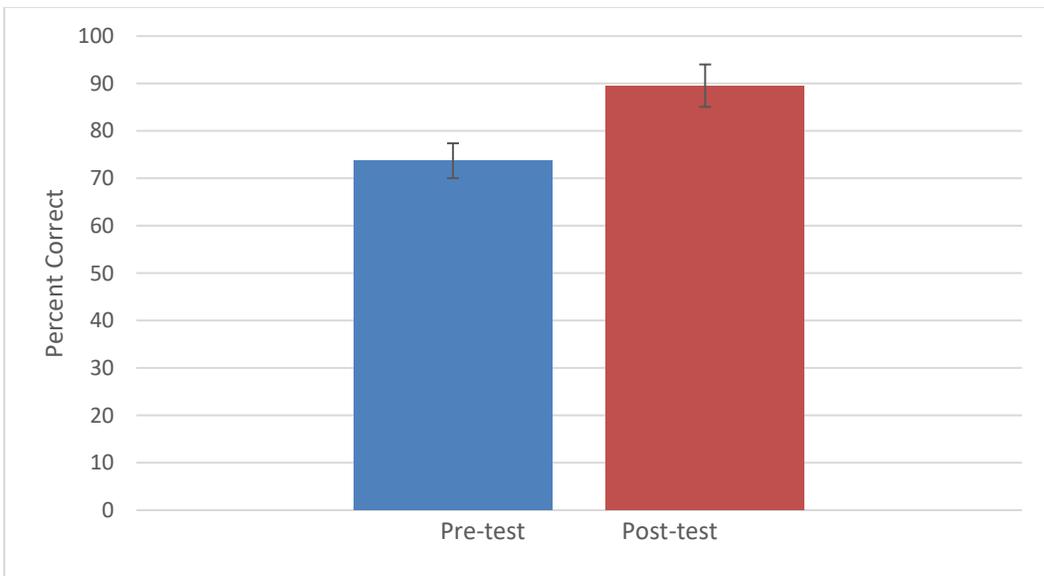


Figure 6A: Pre-Test Pollution (Question #3) Answer Categories, Years 4-9:

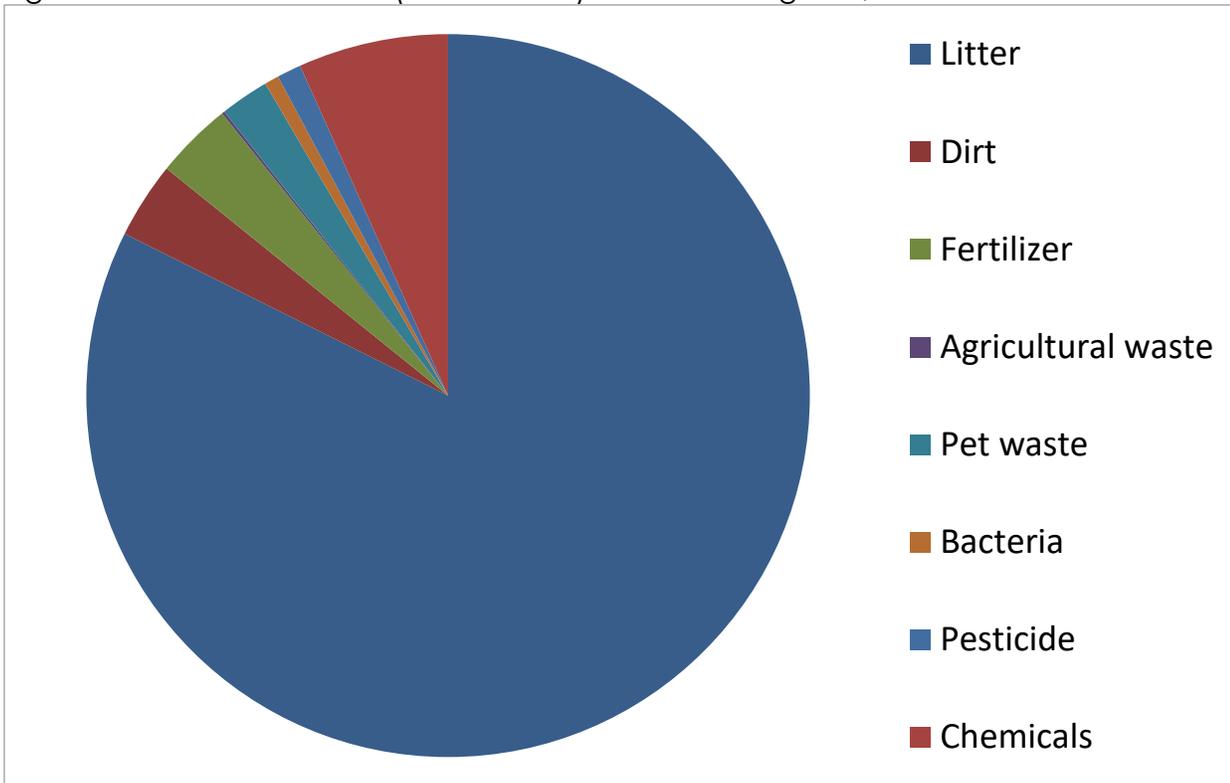


Figure 6B: Post-Test Pollution (Question #3) Answer Categories, Years 4-9

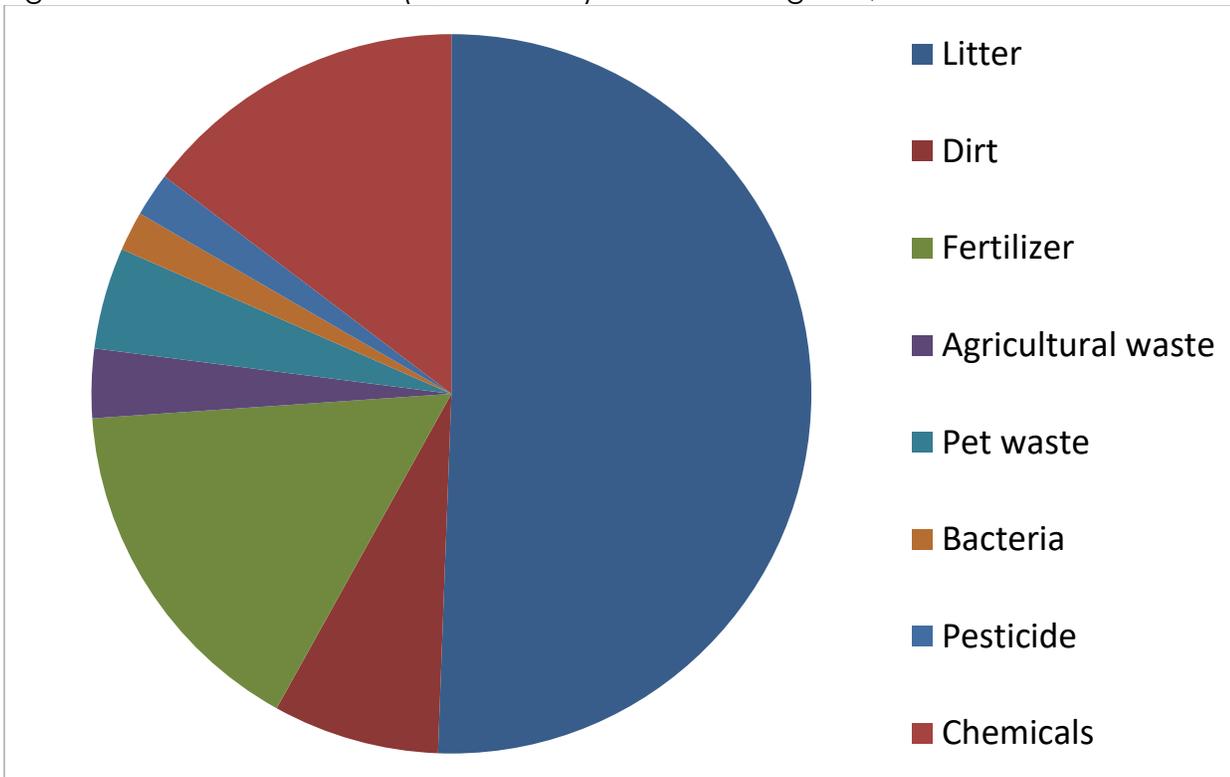


Figure 7: Student Field Journal

The Highland Lakes

The Colorado River

There are three main reasons for creating a dam

- _____
- _____
- _____

Water Cycle! A Little Drop of Water Goes a Long Way!

This was my journey as a water drop

	Station	What Happened	Destination
example	cloud	fell as rain	ocean
1			
2			
3			
4			
5			
6			
7			

Pollution and the Water Cycle

We added pollutants to the Animal Station of our water cycle game. Many of the pollutants ended up in our watershed!

Colorado River

Polluted by _____

Groundwater

Polluted by _____

Ocean

Polluted by _____

Drought and the Water Cycle

1. Circle the picture that is experiencing drought.
2. Across the three pictures, which water cycle process(es) is different and are the same? Different: _____ Same: _____

Everyone Lives in a Watershed

A watershed is an area of land that drains rainfall into one location. Here is an example.

We live in the _____ watershed.

That's where our drinking water comes from.

Point-source and Nonpoint-source Pollution

Water pollutants are categorized into two groups: **nonpoint-source** and **point-source** pollutants.

Our Gutters, Our River

Nonpoint-source pollution (pollution that comes from many sources) travels from our yards and streets into our gutters and flows into our river.

Here are some pollutants that end up in our gutters.

Using Water Efficiently

The average family uses about _____ gallons of water each day!
That's about _____ gallons a year or 1/2 an acre-foot!

These are ways people **waste** water:

Water WASTING Activity	Gallons Used	Ways I can REDUCE Water Use
brushing teeth with the tap running		
taking a bath with the bathtub full		
taking a 15-minute shower		
washing clothes		
washing dishes in the dishwasher		
watering the lawn		

Stressed Out!

Even many native and adaptive plants struggle during severe droughts. Some manage better than others. Draw a picture of a plant affected by the drought and record the differences between it and the photograph.

I observed: _____

One native plant that is surviving the drought better than most is _____.

Rainwater Harvesting

For centuries, people have relied upon rainwater harvesting to supply water for household, livestock and agricultural uses. At Redbud Center we use rainwater for watering plants and as water for flushing toilets. Redbud Center uses cisterns but smaller businesses and homes can use rain barrels.

This is how I could use a rainwater harvesting system where I live.

Colorado River Scramble!

Can you find:

Colorado River	Highland Lakes	Edwards Aquifer	Barton Springs	Watershed	Native plants
Rainwater	Dams	Cisterns	Fish	Drought	Flood

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A N T R W F C Q V H E A H K
X H P N T A N P E H V L O T G
E A I T A T T L T N P E R I N
O E V G R D O E N L L T K A I
I N U T H G U O R D N R E O R
C J S E A L K R I C O G C C P
O R A T N W A T E R H O J I S
N E X R I C W N U C E E L N N
C N E E A G S C D A M S D F O
E A T Z R A W E R L W D R E T
R E F I U G A C D R A W D E R
V C E H L I N S P R K N V A
E C O L O R A D O R I V E S S
L C T N A L P E V I T A N S N
D M R F G K E A E I C E D E
    
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